SUSTAINABLE DIGITAL ECONOMY, ENTREPRENEURSHIP, AND BLOCKCHAIN TECHNOLOGY ROLE IN INDUSTRIAL-ORGANIZATIONAL PSYCHOLOGY

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SUSTAINABLE DIGITAL ECONOMY, ENTREPRENEURSHIP, AND BLOCKCHAIN TECHNOLOGY ROLE IN INDUSTRIAL-ORGANIZATIONAL PSYCHOLOGY

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Editorial: Sustainable digital economy, entrepreneurship, and blockchain technology role in industrial-organizational psychology

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Editorial on the Research Topic
Sustainable Digital Economy, Entrepreneurship, and Blockchain Technology Role in Industrial-Organizational Psychology

With the advancement in information technology, today's digital economy offers numerous services influencing the global sectors. A sustainable digital economy, entrepreneurship, and blockchain have inevitably compelled the entire business infrastructure to alter the digital market dynamics, influencing industrial-organizational psychology. Today, digitalization has provided ample opportunities to promote a sustainable mindset. The emergence of information technology has shaped the business dynamics, thereby digitally empowering organizations to experience the features of sustainable innovation. These momentous developments in the digital era have put forward new ideas, fostering the characteristics of today's enterprises to encourage conventional businesses to embrace novel transformations.

With the advent of globalization, the digital economy has extensively expanded worldwide markets, emphasizing the importance of incorporating digital ecosystems. The recent technological surge has driven the market toward sustainable digital development. Indeed, in the wake of this digitalization, the debate on a sustainable digital economy has gained prominence, causing the concepts of entrepreneurship and blockchain technology to gain researchers' attention. Today's digitization has

encouraged the key players to adapt to the changing modern market conditions that focus on innovation and sustainability. This fundamental shift has prompted the world's businesses to shift from traditional commerce to online forums.

A call for papers on this topic was made by the Journal of frontier in psychology. Energized by the emerging significance of this Research Topic, numerous contributors heeded the call. In a Research Topic, researchers contributed to a discussion on *Sustainable Digital Economy, Entrepreneurship, and Blockchain Technology Role in Industrial-Organizational Psychology*. The current study examines the 23 relevant articles from that issue that fundamentally fulfill the research objective. These papers include articles from different disciplinary sectors (e.g., industrial, agricultural, and educational). The submissions were collected from diverse geographical places such as China, Pakistan, France, the United States, and Qatar, and offer a detailed view of this Research Topic. As such, this paper uncovers a significant understanding of the sustainable digital economy, entrepreneurship, and blockchain technology influencing industrial-organizational psychology.

Notably, this Research Topic illuminates the progress made on this subject during recent years. The prevalent scholarly perspective encourages global economies to embrace innovative technology, thus enhancing industrial psychological welfare. Indeed, the range of articles presented under this theme open new avenues for future researchers. This distinct theme embedded in this Editorial article provides a brief overview of the gathered contributions supporting the call. We hope that all the papers work as an inspiration, thus providing directions to future researchers.

In recent decades, the role of technology has flourished due to the effect of social media on our lives. Social media's impact on marketing is a key area of study for today's researchers. It has fundamentally transformed conventional business practices to shape customers' purchasing behavior. In recent years, e-business and social media networking has profoundly altered the market competition, strongly encouraging consumers to accept the offered product *via* social media. Marketing through social media has also gained attention in the world of entrepreneurship. This innovative technology (i.e., social media) has enabled consumers to modify their purchasing behavior toward achieving a sustainable digital economy. In explaining this notion, Dong et al. showed how today's digital marketing techniques have positively influenced consumers' online purchases to establish a sustainable digital approach.

In line with the past findings, there has also been recent progress in service marketing. Service is the most fundamental aspect that influences consumers' buying decisions. With the development in the digital world, service marketing has extended beyond the physical space to the virtual marketplace in various forms. The introduction of digital platforms for online activities has emerged as a useful tool for applying business practices. The novel blockchain technology has brought about changes in the business dynamics, thereby promoting online buying. This technological support has potentially encouraged businesses to enhance traditional marketing practices with innovative technological infrastructures. This new model radically strengthens online buying by establishing global payment methods. Undoubtedly, this value proposition has evolved businesses to take advantage of the novel digital platforms to increase and enhance business interactions (Zutshi et al., 2021). However, despite its increasing significance, online shopping has made it difficult for consumers to evaluate the quality of their purchases. Such unclear standards have elevated the need to make service marketing workable for consumers, thus helping them make wise decisions. Therefore, Wang Y. et al. suggest that organizations should revive their service marketing strategies to reflect consumers' online purchase experience.

Over the years, blockchain technology has emerged as an innovative technological tool, drastically transforming firms' conventional business models into potential innovative systems. In this regard, today, the internet has brought numerous advantages for organizations, thus ensuring the proper functioning of business models. In the wake of this digitalization, blockchain has optimized business value chains (Milashovska et al., 2021), substantially fostering changes in firms' business activities (Purusottama et al., 2022). This growing popularity of information technology has encouraged individuals to use digital tools for online purchases. Liu states that this technological advancement has made people switch from physical buying to online buying. In entrepreneurship, online shopping has attracted large markets, thus leading this mode of purchase to become today's norm. However, despite the increasing significance of social media marketing, online stores have faced considerable competition, causing individuals to encounter uncertain scenarios during online shopping. Guo et al. explain that leveraging the e-shopping experience requires management to improve the quality of their services to improve their customers' purchases due to loyalty.

Altogether, the economy has gained the benefits of these technologies and is currently transitioning from conventional forms to digital forums. The impact of blockchain technology may have intensified business activities, accelerating consumers' consumption patterns (Ertz and Boily, 2019). Overall, blockchain technology boosts participants' trust in business transparency, thereby fulfilling the needs of individual shoppers. The online platforms operating with the help of blockchain technology accelerate business engagement among platform users, profoundly centralizing individuals' trust in the business offering.

Undoubtedly, blockchain technology has rapidly conquered the world. Today, its increasing significance has led organizations to focus on creating value for their stakeholders. Also, its impact has encouraged firms to capitalize on the digital transformation, by promoting operational efficiency and innovation. This

change toward a digital standard has greatly disturbed the conventional activities of global organizations, especially ones involving customer relationships. Digital marketing has driven businesses' transformational characteristics to enhance individuals' experiences (Varma et al., 2021).

This development in e-commerce has caused countries across the globe to experience sustainable advancement in business functions. Recently, digitalization has modified the online medium to contribute to sustainable growth. It has encouraged global economies to capitalize on firms' marketing activities with novel developments. Indeed, today, digital marketing has become a global phenomenon driving businesses toward sustainable digital development. In supporting this notion, Pei states that firms' digital marketing is a key aspect in their achievement of sustainable development. In particular, creating a reliable and trustworthy distribution system has become almost compulsory for today's organizations. In this modern world, the global economic system depends upon integrating novel digital tools that create, store, and accelerate firms' business models. These developing blockchain applications encourage organizations to promote their products, substantially leading to a sustainable economy (Beck et al., 2017).

In the wake of digitalization, technology has played a vital role in the sustainable development of many countries. For example, Wang and Zhao suggest that this technological boost requires corporations to understand today's novel innovations to gain enduring competitiveness. Undoubtedly, there is a global consensus that digitalization leads to a sustainable digital economy. Among the different ideas presented on the digitalized economy, sustainable development is a dominant concept confronting the modern world. A sustainable digital economy enables organizations to scale up their objectives, thus leading to an increase in firms' information technology growth. In this regard, Xianbin and Qiong state that organizations should embrace novel reforms to build a sustainable digital economy.

Achieving enduring sustainability is the biggest challenge facing today's entrepreneurs. Accordingly, in recent years, entrepreneurship has gained researchers' attention. The entrepreneurial philosophy has encouraged stakeholders to alter their decisions regarding their corporate social responsibility (CSR) practices. From the viewpoint of entrepreneurship, Wei et al. state that CSR and innovation have broadly made the stakeholders appreciate and value the effect of financial performance on firms' CSR activities. Moreover, in this era of ITC innovation, CSR policies have compelled organizations to reinforce, normalize, and eliminate social, economic, and ecological disparities, thus contributing to stakeholders' welfare (Bapuji et al., 2020). As a result, governments and companies have embraced CSR activities to resolve market uncertainties (e.g., environmental and social concerns). However, despite the increasing role of CSR, global governments have raised concerns about firms' CSR activities. In this context, e-government has emerged as a phenomenon, enhancing the effectiveness of service delivery. It has made the government responsible for transparent societal activities. In explaining this notion, Avotra et al. reveal a negative influence of e-government on firms' corporate social responsibility, thereby emphasizing the need for stakeholders to adopt effective e-governmental policies.

In particular, the global trend has encouraged countries to contribute to sustainable growth, with specific projects, such as those of CPEC, being a common way of achieving sustainability. Across the journey of China-Pakistan Economic Corridor (CPEC), several innovative projects have started under this initiative. Numerous countries have responded to the increasing CPEC benefits, thus making global institutions realize their significant influence on the world's environment. Indeed, today, CPEC has made densely populated countries fulfill their responsibility toward environmental protection. Accordingly, Xiaolong et al. suggest that CPEC projects should ensure the world's ecological conditions to boost economic welfare. However, besides the CPEC growth, industrialization has greatly affected the world's climate and individuals' health. In this regard, Gherheş et al. suggest that waste material should be reduced, by ensuring firms' eco-friendly actions to ensure sustainable development. Further, the continuous improvement in individuals' living standards demands enhanced medical services and, in turn, improved health ensures individuals' career growth. Ge et al. state that individuals' career growth largely depends on individuals' motivation, health, and self-efficacy.

Notably, in the twenty-first century, rapid changes have pushed companies to ensure a healthy environment in which employees can flourish. In this regard, emotional intelligence has played a fundamental role in enhancing employees' quality of living. The emotions relating to the Big Five Personality Model improve employees' living standards. In illustrating this notion, Dan et al. explain that the partial effect of the Big Five models of personality on emotional intelligence influences employees' entrepreneurial behavior. Moreover, Linfang et al. also state that personality traits (i.e., extraversion, agreeableness, openness, conscientiousness, and neuroticism) enhance women's entrepreneurial intentions, thus accelerating their self-leadership.

In entrepreneurship, the progressing trend in digital technologies has profoundly changed the business dynamics, significantly influencing business infrastructures. Today's IT solutions have allowed the technological paradigm to enhance entrepreneurial activities, thereby empowering modern firms to achieve entrepreneurial success. The rigorous diffusion of technology has encouraged a new breed of entrepreneurs who launch novel ventures supporting business growth. As such, reveals that firms' technological knowledge and entrepreneurial orientation fundamentally drive their succeArdeleanss. Due to these factors, value modules have become a global trend in fostering business success. Modularity supplements firms'

knowledge foundations, thereby accelerating their performance. In understanding this notion, Wang J. et al. suggest that value modularity influences firms' innovation performance and business growth.

Over the years, several technological phenomena have influenced conventional commercial exchanges, reconfiguring the concept of collaborative economies to experience the benefits of blockchain technologies. This direct intensification has underpinned the robust digital infrastructures to increase the use of new technologies by redefining business processes. Concerning the connected economy, the smart grid of technological advancements (i.e., blockchain) has illuminated innovative payment methods to lead companies toward sustainable economic welfare (Ertz and Boily, 2020). Blockchain, introduced as a management technology, has taken over the world's economic welfare activities. Its decentralized system has profoundly updated organizations' prior processes, thus bringing sustainable benefits. Its potential in various sectors has enhanced the digital economic system, potentially ensuring a country's sustainable development. The development of information technology has sped up the digital economy to an unprecedented extent. Firms' technological freedom has allowed employees to express themselves in democratic management practices, substantially enhancing their organization's economic value. Based on this statement, Jiang et al. reveal that, in the digital economy, employees' direct and indirect involvement drastically alters firms' management practices, thus bringing positive financial results.

In this regard, the origin of financial inclusion has considerably gained prominence in the global sectors. The thematic concept of financial inclusion enhances businesses' access to consummating financial resources. Therefore, there is an immense need to embrace financial inclusion across worldwide industries, thus achieving sustainable growth. Financial inclusion helps to eradicate poverty, thus assisting businesses to contribute to achievement of the Millennium Development Goals (Valencia et al., 2021). In exploring this phenomenon, Liu et al. state that individual households should use financial inclusion to overcome the challenges hindering individuals' economic freedom. Another study conducted by Han and Gu states that digital financial inclusion enhances the innovative performance of high-tech companies, thereby achieving sustainable digital growth.

In recent years, the COVID-19 pandemic has caused unprecedented vulnerabilities influencing firms' sustainable growth in the educational sector. COVID-19's high rate of infectivity has drastically disturbed the educational system, due to the closure of many worldwide institutions. However, in combatting the increasing challenges of COVID-19, today's educators have widely advocated the inclusion of information technology as part of the learning system. Fundamentally, today's novel digital implementations have drastically impacted students' learning. The e-learning system has considerably filled the gap by facilitating learning over the web. Digital learning has seen significant uptake in recent years, encouraging institutions to shift their traditional learning system to digital forums. A study initiated by Zhang states that the pandemic has changed the whole scenario, leading the global education system to go online, and the effectiveness of pandemic learning has developed as a result.

In the education sector, mentors play a significant role in influencing a student's life, as individuals need direction to improve their vision. In this regard, entrepreneurial mentorship has emerged as a successful tool for providing training to the individual. Mentorship is a global phenomenon that enhances individuals' competencies by constantly developing their capacities. The mentor's assistance stimulates the individual's knowledge-sharing behavior, thus ensuring growth in their career. For example, Zhao indicates that mentorship plays a significant role in fostering an individual's knowledge-sharing behavior. In digital entrepreneurship, the mentorship upgrades the knowledge system to combat the emerging entrepreneurship challenges. Another study shows that the sustainable approach to entrepreneurial mentorship alters farmers' education and behavior in the agricultural sector. Hu et al. state that farmers' education, training, and motivation accelerate their behaviors to influence the firms' entrepreneurial success.

Moreover, during the pandemic crises, the global media played a major role in reporting the lethal nature of the outbreak, prompting fear in individuals but also spreading important awareness regarding the situation. Arguably, providing news with the aid of social media is the prime responsibility of today's media firms. However, during the pandemic, many groups used such platforms to spread false information. In supporting this statement, Wang K. et al. revealed that social media played a key role in spreading news during the COVID-19 pandemic, driving fear among individuals.

In conclusion, this study summarized 23 papers, with each paper contributing significantly to upgrading the past knowledge on the proposed theme. This study gives an overview of the literature by outlining the studies from different domains. All of the papers analyzed add value to the previous literature. We expect these papers to guide the researchers, professionals, organizations, and policymakers. This special issue has undoubtedly inspired numerous writers to share their perspectives in the Journal of the Frontier of Psychology. In particular, we hope that all the articles expand the understanding of the intended subject. Indeed, we expect this initiative to serve as a beneficial model for future researchers. Fundamentally, it will enable them to address the questions that have remained unclear regarding sustainable digital economy, entrepreneurship, and blockchain technology's role in different industries. Altogether, we thank all the researchers for taking this idea forward with their multi-disciplinary research.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Bapuji, H., Patel, C., Ertug, G., and Allen, D. G. (2020). Corona crisis and inequality: why management research needs a societal turn. *J. Manag.* 46, 1205–1222. doi: 10.1177/0149206320925881

Beck, R., Avital, M., Rossi, M., and Thatcher, J. B. (2017). Blockchain technology in business and information systems research. *Bus. Inform. Syst. Eng.* 59, 381–384. doi: 10.1007/s12599-017-0505-1

Ertz, M., and Boily, É. (2019). The rise of the digital economy: thoughts on blockchain technology and cryptocurrencies for the collaborative economy. *Int. J. Innov. Stud.* 3, 84–93. doi: 10.1016/j.ijis.2019.12.002

Ertz, M., and Boily, E. (2020). "Strategies for business sustainability in a collaborative economy," in *When Giants Meet: Collaborative Economy, Blockchain Technology, and Social Media*, ed R. D. Leon (Hershey, PA: IGI Global), 440.

Milashovska, O., Liba, N., Korolovych, O., Smyrnova, N., and Slatvinska, V. (2021). The potential of applying blockchain technologies in various sectors of the digital economy. *Revista de La Universidad Del Zulia* 13, 288–304. doi: 10.46925//rdluz.36.19

Purusottama, A., Simatupang, T. M., and Sunitiyoso, Y. (2022). The spectrum of blockchain adoption for developing business model innovation. *Bus. Process Manag. J.* 28, 834–855. doi: 10.1108/BPMJ-06-2021-0408

Valencia, D. C., Calabuig, C., Villa, E., and Betancur, F. (2021). *Financial Inclusion as a Complementary Strategy to Address the SDGs for Society*. Springer Nature. 79–89. doi: 10.1007/978-3-030-70948-8_6

Varma, P., Nijjer, S., Kaur, B., and Sharma, S. (2021). *Blockchain for Transformation in Digital Marketing*. IGI Global. 274–298. doi: 10.4018/978-1-7998-7545-1.ch012

Zutshi, A., Grilo, A., and Nodehi, T. (2021). The value proposition of blockchain technologies and its impact on Digital Platforms. *Comput. Indus. Eng.* 155:107187. doi: 10.1016/j.cie.2021.107187

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Exploring and Validating the Effects of Mega Projects on Infrastructure Development Influencing Sustainable Environment and Project Management

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The study is based on validating and exploring the effects of a mega project plan (CPEC) on infrastructure development and Sustainable Project Management. The CPEC has great importance to infrastructure development and economy-boosting. The current study's primary aim is to deal with environmental protection, economic boost up, international relations influencing to the Project's success. The paper also addressed project management as a moderator between environmental protection, economic boost up, international relations, and the CPEC project's success. The primary data has been gathered by using questionnaires, and PLS-SEM has been employed for the analysis. The results revealed that environmental protection, economy boost up, and international relations have a positive association with the success of CPEC. The outcomes also exposed that project management moderating among the nexus of economy boosts up the international relations and success of CPEC. The present study results guided how Pakistan and China make the CPEC project stronger with the efficient implementation of practices required for protecting the environment, with the economic growth and boost up, and good strong relations with foreign countries. This study was an attempt to validate the different factors to check their association with each other in a new environment, resulting in a leading edge for the success of mega projects that influence project management.

Keywords: project management, environmental protection, economy boosting, project success, CPEC, sustainable development

INTRODUCTION

The CPEC is the initiative of China's one belt one road initiative. The development of infrastructure and other improvements in economic, political, environmental, and regional aspects is tremendous. However, there are a lot of challenges and concerns in the development and establishment of this project. Security and environment protection are two critical areas to be considered in this

regard. Under this CPEC program, several modern and groundbreaking initiatives have begun. The building of the rail network, new economic zones, Gwadar port development, and road network initiatives are part of this significant economic development (Kanwal et al., 2020). Economic zones and other such infrastructure ventures need efficient transport. The decline in corruption would boost overall economic growth as far as sustainable growth is concerned (Abdullah et al., 2021). The loans for capital growth amounted to $11 billion. These loans certainly help Pakistan's economic growth. Another significant industrial growth development is that a building project on liquefied oil and gas pipeline has already started (Shahbaz et al., 2019; Mamirkulova et al., 2020; Sarfraz et al., 2020a,b; Ullah et al., 2020; Zaman et al., 2021).

Many new and innovative projects have been started under this CPEC initiative. Railways network construction, new economic zones, Gwadar port development, and road network construction initiatives are part of this substantial economic development (Li et al., 2020). Economic zones and other such projects development need efficient transportation. The road network optimization and new highway construction are also included in this project's developmental goals (Liu et al., 2016). The new and emerging trends of the CPEC also supported the economy of both countries. It is observed that foreign investors' trading investments have increased tremendously after the announcement and initiation of CPEC between Pakistan and China (Sial, 2014; Carvalho and Rabechini Jr, 2017; Wagner and Tripathi, 2018; Kanwal et al., 2019).

The economic and energy generation sectors are surely improved after initiation of this project, but the thing that should be considered is to avoid all the environmental losses (Khwaja et al., 2018; Initiative, 2020). Environment risk assessment should be considered as a prime responsibility of the Environment Protection legislation of both countries. Pakistan and China both are densely populated countries, and environmental pollution is a grave hazard in the way of CPEC project management (Hao et al., 2020a). Air quality and water resource scarcity are two major concerns. Water and air quality are adversely affected by the construction of roads. Biodiversity and natural reservoirs are also exhausted. These things should be considered effective, and management practices must be improved to support all these projects' development (Sarfraz et al., 2018a, 2020c; Nawaz et al., 2019, 2020; Huo et al., 2021). The international cooperation and support from other countries of the world are also the fruits of CPEC initiative. In the year 2018, Saudi Arabia has entered this project as a third partner and invested $10 billion. This investment will surely improve the pace of developmental activities. Saudi Arabia is investing in developmental projects and is also interested in the development of the mining industry of Pakistan (Jia et al., 2021). So, International relations are truly improved by this project. The development of infrastructure has significantly helped shape the economies and the associated development dimensions of both countries. Professional employees' exchange has generated several new programmers for social growth (Nawaz et al., 2021). The latest articles also addressed the management of energy and green innovation and scientific implications (Han et al., 2019). The exchange of social and economic wealth has clearly influenced the overall economic situation of entire Asia. Otherworld economies have invested in similar CPEC ventures too (Li et al., 2021), so it is safe to conclude that CPEC is hope and promotion to the Pakistani market and a conduit for economic growth and worldwide prosperity (Chakma, 2019; Kanwal et al., 2019).

The increased number of infrastructure development efforts and an influx of a huge number of tourists in the exotic natural reservoirs and natural parks of Pakistan has posed a grave environmental hazard to the tourist's spots and the biodiversity of those areas (Lin et al., 2015; Zeng et al., 2015; Winter, 2016). The combined efforts to support the rehabilitation and protection of these areas are necessary. The research evidence has provided deep insight into all the hazards which the environment has faced. Recently, a study conducted in Gilgit Baltistan showed that the climate change and air quality index of this mountain-based tourist spot has adversely affected construction procedures and the influx of tourists in these areas. The geographical location of Gilgit Baltistan is unique and is the central spot in CPEC (Khan et al., 2021). Air quality improvement and water resource management plans must be implemented in this area (Wu et al., 2020; Huo et al., 2021).

The environmental protection role is essential for any business or project's success (Sadiq et al., 2020a,b). Similarly, it is taking an essential role in CPEC Success. In a comfortable and suitable environment, any business will grow in a concise time. CEPC is the abbreviation of "China Pakistan Economic Corridor." CPEC, officially launched in 2015 and completed in 2030 (Hao et al., 2020b). Under environmental protection, it would be very easy for anyone to work and perform better. And the company or project will grow accordingly. CPEC is a hub, connecting the Middle East, Europe and Africa with China and will generate a lot of economic activity for Pakistan. Roads are very important for this region. If the environment is good, then the people will prefer to live in such areas, which is very important for CPEC success (Chen et al., 2017).

The economy of any country is mainly dependent upon trading and industrialization. CPEC and its related projects provided a lot of ease in both sectors. It can be easily illustrated by the recent studies conducted by different researchers that the unemployment rate is greatly reduced due to enhanced investments and the development of new projects. The foreign investments have elevated the stocks and trade industry of both countries. The economic security and advancement depend upon the combined efforts of individuals of these two neighboring countries. The easy access to trading centers of China improved trading in Pakistan. Local traders and industrial heads have declared the CPEC as the key to a new era of opportunities (Maqsoom et al., 2021).

Economy boost-up will be due to CPEC because it will provide the opportunities. Companies from all over the world will take an interest to start bunnies here. It will also provide job opportunities which would be the one of the reasons for economic boosting. A competitive environment will be created due to this Market. Therefore, the best quality products will be available due to this competition. It would be a central point

between the Gulf, Europe, and Asia (Ali et al., 2021). This network will stretch from China to the Arabian Sea in three parallel sections along eastern. CPEC can offer infinite bounties to many countries that can benefit the long run (Wu et al., 2021). These corridors will build an international market. Through this market, the trade will be easy and inaccessible to worldwide (Hao et al., 2020b).

The skill development in terms of the digitalized system is necessary, and Pakistan's government is working hard in this area. IT and artificial intelligence-related programs are made necessary to be included in all universities courses (Hao et al., 2020a; Nawaz et al., 2021).

Project management and related planning are essential in mediating the success factor of CPEC. Environmental protection, Economy boost-up, and International relations are all parts of the project management-related aspects (Chaudhri, 1986; Abednego and Ogunlana, 2006; Awais et al., 2019). Effective and proper project management practices will help to gauge the feasibility and success rate of the CPEC. The budget and financing departments work coherently with the project management teams to find the important and effective means by which the project's success rate can be increased. These things support the economy of China and Pakistan. So, well-managed and financially secured project management initiatives will provide a strong base for the development and success of CPEC (Liu et al., 2021).

Relations will be developed internationally with CPEC success. Countries will coordinate with each other for trades. Foreign relations will also be strong due to trade. Trade level will be increased. New and equal opportunities will be created at the International Level (Chen, 2018; Farooq et al., 2018; Reed and Trubetskoy, 2019). Issues would be resolved on an urgent basis due to available facilities. Due to market competition vendor will improve the quality with the best price. It will provide a good environment for trade. Confidence upon each other's will be increased internally (Cheng et al., 2016). Countries relation will be stronger. The communication level will be increased internally. International relations are supported a lot by the CPEC and related initiatives. An example of this project's success is that in a mere period of 3 years, a new strategic partnership has invested a huge amount in this project. Saudi Arabia has joined this project as a third partner. This country is also interested in the development of the mining and natural resources industry, So, not only the business and industries are becoming popular and developed, but also a lot of sectors have improved due to the CPEC initiatives (Zimmerman, 2015; Sarfraz et al., 2018b; Zaman et al., 2021). The recent advancement in terms of highly skilled individuals' involvement in CPEC helped a lot to improve the confidence of Pakistani's. They are now easily communicating with foreign delegates (Chowdhary, 2015).

Study Significance and Hypothesis Development

The combined efforts of Chinese and Pakistani workers showed a regional harmony to the world, the combined efforts in terms of the development of new and novel technologies have helped a lot in maintaining a good cooperative environment in between the people of both countries. The infrastructure development has helped a lot in reshaping the economy and related aspects of both countries' development (He et al., 2018). The exchange of skilled personals has created a lot of new social development initiatives. In recent studies, the conservation of resources and green engineering and technological aspects were discussed. It was observed that the exchange of social and economic resources had reshaped the overall economic condition of the whole Asian region. The other economies of the world have also invested in related projects of CPEC so it can be easily said that CPEC is not only hope and support for the Pakistani economy, but it is the gateway of industrial development and success for the whole world (Liu et al., 2016).

Due to its geographical location, developing countries like Pakistan can serve as a tunnel for international bonding and development (Huo et al., 2021). The world needs such projects for enhancing the support and cooperation between different countries. Environmental protection, security and social harmony are some important advantages of this project. The

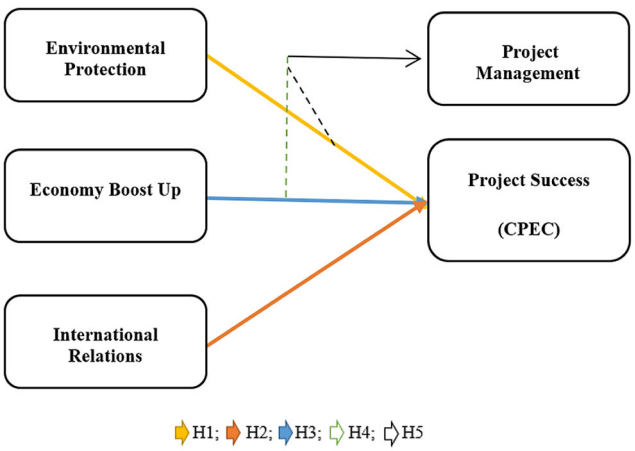

FIGURE 1 | Hypothesis development and study framework.

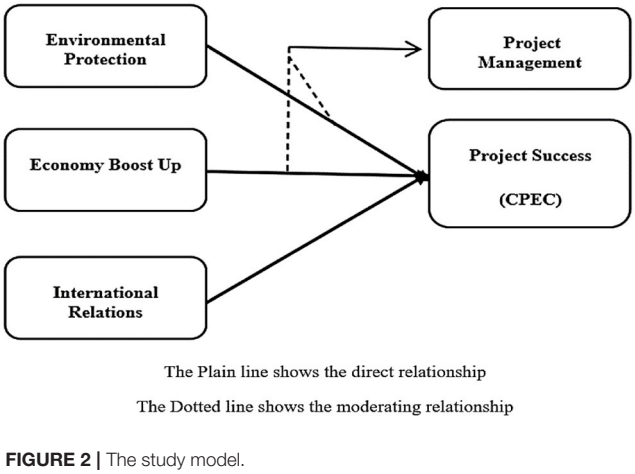

FIGURE 2 | The study model.

hour's need is to indulge in all such projects with honesty, devotion, and hard work. Chinese and Pakistani governments are devoting a lot of efforts and time in this project. The timely audit and other regulatory strategies are necessary for the betterment of this huge project. If all the people work honestly, then CPEC will surely prove itself a new hope for the advancement of the economy of Pakistan and China (Kumar, 2007; Irshad, 2015; Ali et al., 2016; Nabi et al., 2017; Wang, 2017; Zubedi et al., 2018; Kakar and Khan, 2021). The hypotheses derived from the above studies are below here and can be seen in **Figure 1**.

H1: There is a positive association between environmental protection and overall success of CPEC project.

H2: There is a positive association between economy boost up and overall success of CPEC project.

H3: There is a positive association between international relations and overall success of CPEC project.

H4: Project management moderates the association between environmental protection and the overall success of the CPEC project.

H5: Project management moderates the association between economy boost up and overall success of CPEC project.

H6: Project management moderates the association between international relations and the overall success of the CPEC project.

Methodology

CPEC is of great importance to both the countries (China and Pakistan) involved in this project. The quantitative methods have been used in this study to analyze data collected and examine the validity of the proposed hypotheses. Data has been collected from the site engineers, project managers, technical staff related to the CPEC projects. Moreover, the simple random sampling has been used to collect data, and the analysis of the data and the checking of validity of hypotheses, SMART-PLS, have been applied (smart-PLS, 2004). The required data has been acquired from the population of CPEC through the distribution of Questionnaires among them. A total of 550 questionnaires have been distributed through mail to collect data for our study while only 308 questionnaires have been returned within the 5 weeks on which our study is based on.

This study addresses three indicators/factors like environmental protection, economy boost up, and international relations that consist of different items. The environment protection (EP) has six items (Kumar, 2007; Irshad, 2015), economy boost up (EBU) has three items (Brunner, 2013; Khetran and Saeed, 2017; Hao et al., 2020b), and the indicator international relations (IR) has four items (Rizvi, 2014;

TABLE 1 | Convergent validity.

Constructs	Items	Loadings	Alpha	CR	AVE
Economy boost up	EBU1	0.848	0.775	0.821	0.606
	EBU2	0.760			
	EBU3	0.721			
Environmental protection	EP1	0.835	0.869	0.900	0.600
	EP2	0.731			
	EP3	0.727			
	EP4	0.785			
	EP5	0.763			
	EP6	0.802			
International relations	IR1	0.812	0.840	0.893	0.675
	IR2	0.849			
	IR3	0.821			
	IR4	0.804			
Project management	PM1	0.792	0.773	0.803	0.511
	PM2	0.513			
	PM4	0.747			
	PM5	0.772			
Success of CPEC	SCPEC2	0.782	0.827	0.898	0.747
	SCPEC4	0.910			
	SCPEC5	0.895			

TABLE 2 | Fornell Larcker method.

	EBU	EP	IR	PM	SCPEC
EBU	0.778				
EP	0.471	0.775			
IR	0.559	0.628	0.822		
PM	0.482	0.548	0.554	0.715	
SCPEC	0.523	0.692	0.601	0.533	0.864

TABLE 3 | Cross-loadings.

	EBU	EP	IR	PM	SCPEC
EBU1	**0.848**	0.442	0.554	0.471	0.481
EBU2	**0.760**	0.273	0.328	0.319	0.357
EBU3	**0.721**	0.368	0.394	0.314	0.369
EP1	0.393	**0.835**	0.508	0.548	0.652
EP2	0.408	**0.731**	0.578	0.414	0.595
EP3	0.397	**0.727**	0.371	0.443	0.567
EP4	0.329	**0.785**	0.491	0.354	0.446
EP5	0.338	**0.763**	0.482	0.348	0.400
EP6	0.290	**0.802**	0.476	0.375	0.466
IR1	0.330	0.505	**0.812**	0.452	0.515
IR2	0.365	0.554	**0.849**	0.441	0.534
IR3	0.558	0.489	**0.821**	0.477	0.455
IR4	0.617	0.511	**0.804**	0.456	0.463
PM1	0.389	0.402	0.417	**0.792**	0.404
PM2	0.263	0.282	0.308	**0.513**	0.270
PM4	0.363	0.480	0.482	**0.747**	0.465
PM5	0.349	0.365	0.343	**0.772**	0.345
SCPEC2	0.553	0.557	0.554	0.424	**0.782**
SCPEC4	0.409	0.627	0.496	0.485	**0.910**
SCPEC5	0.391	0.606	0.504	0.470	**0.895**

EP, Environmental Protection; PM, Project Management; IR, International Relation; EBU, Economy Boost Up; SSPEC, Project Success (CPEC).

Chowdhary, 2015; Ali et al., 2020). In addition, the study addresses the project management (PM) as an important moderator between environment protection, economy boost up, and international relations and the success of CPEC project which consists of five items (Acemoglu, 2012; Nawaz et al., 2015; Menhas et al., 2019). The success of CPEC project (CPEC) is a dependent variable which has five items. These indicators are represented by the following **Figure 2**.

RESULTS

These findings provide the convergent validity for the assessment of the measurement model. The figures highlighted that high nexus between the items of the constructs and valid convergent validity because the loadings and AVE values are more than 0.50 while Alpha and CR values are also >0.70. These values are mentioned in **Table 1**.

The outcomes also provide the discriminant validity that is also a part of the measurement model, and it is checked by using Fornell-Larcker method and cross-loadings. The figures highlighted no high nexus between the variables and valid discriminant validity because the figures that exposed the nexus among variables are higher than those that show the nexus with other constructs. These values are mentioned in **Tables 2** and **3**.

The discriminant validity is also checked by using Heterotrait-Monotrait (HTMT) ratio. The figures highlighted (see **Figure 3**) no high nexus between the variables and valid discriminant validity because the figures are less than 0.90. These values are mentioned in **Table 4**.

The results revealed that environmental protection, economy boost up, international relations have a positive association with the success of CPEC and accept H1, H2, and H3. The outcomes also exposed that project management moderating among the nexus of economy boosts up, international relations, and success of CPEC and accepts H5 and H6. However, the outcomes also exposed that project management does not moderate among the nexus of environmental protection and success of CPEC and reject H4. These are highlighted in **Table 5**.

DISCUSSION AND IMPLICATION

The results have indicated that environmental protection has positive impacts on the CPEC project. These results are in line with the previous studies (Akber, 2015; Nazir, 2015;

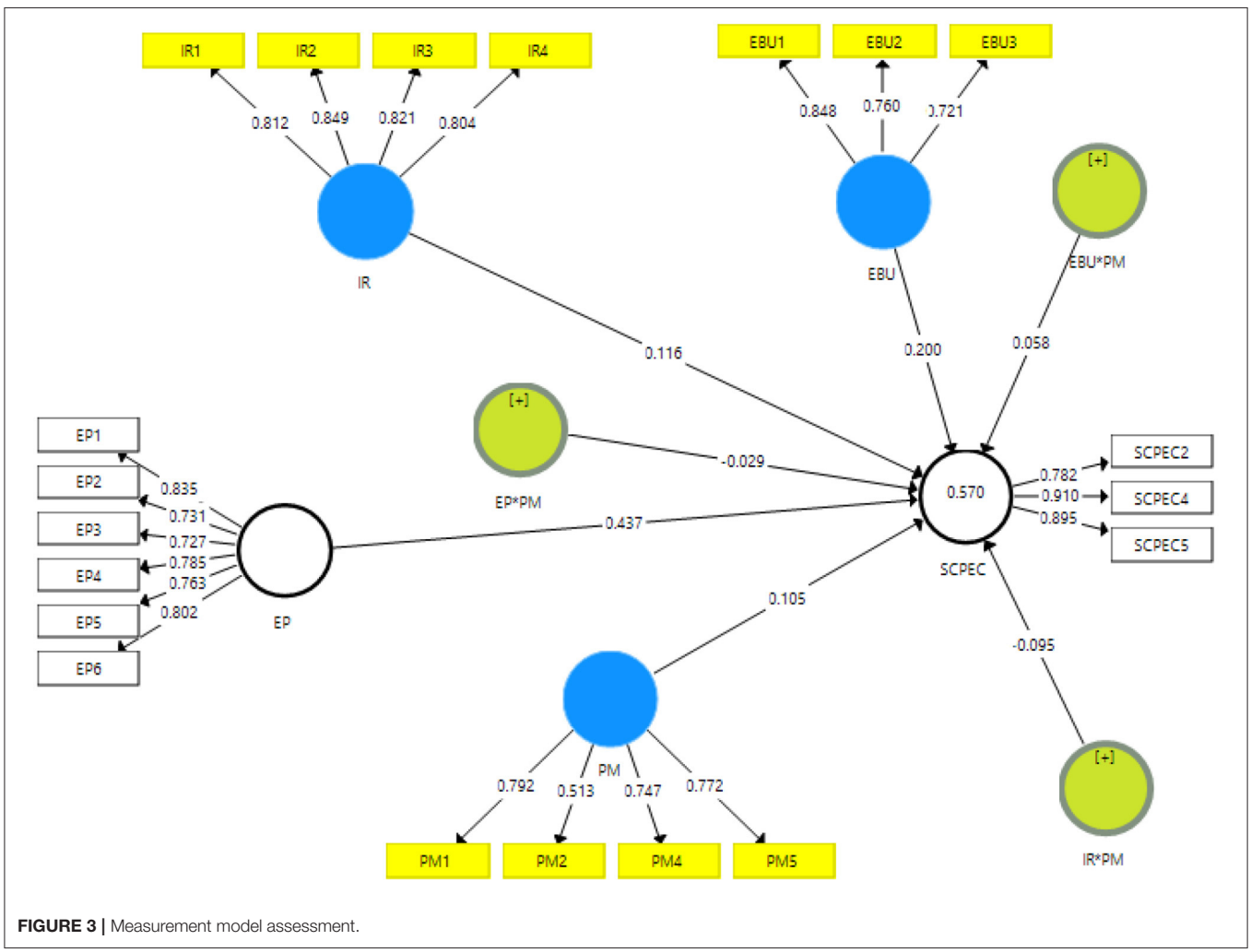

FIGURE 3 | Measurement model assessment.

TABLE 4 | Heterotrait Monotrait (HTMT) ratio.

	EBU	EP	IR	PM	SCPEC
EBU					
EP	0.593				
IR	0.737	0.728			
PM	0.697	0.684	0.727		
SCPEC	0.691	0.791	0.717	0.700	

TABLE 5 | Hypothesis results (Path Analysis).

Relationships	Beta	S.D.	t-statistics	*p*-values	L.L.	U.L.
EBU -> SCPEC	0.200	0.037	5.368	0.000	0.120	0.266
EBU*PM -> SCPEC	0.058	0.032	1.811	0.043	0.004	0.124
EP -> SCPEC	0.437	0.033	13.256	0.000	0.380	0.504
EP*PM -> SCPEC	−0.029	0.033	0.885	0.378	−0.090	0.033
IR -> SCPEC	0.116	0.035	3.284	0.001	0.039	0.190
IR*PM -> SCPEC	−0.095	0.034	2.756	0.007	−0.164	−0.037
PM -> SCPEC	0.105	0.032	3.301	0.001	0.047	0.166

Din, 2017), where it has been shown that the protection of the environment of both countries Pakistan and China has favorable impacts on the CPEC project. The results have shown that the economy boost up has a positive association with the CPEC project's success. These results match with the past studies of Nawaz et al. (2015), Ali et al. (2017), and Menhas et al. (2019), which has also shown that if the economic activities boost up the CPEC project is sound and successful.

The results have shown that international relations have a positive association with the success of the CPEC project. These results agree with past studies' results (Christoffersen, 2002; Khan et al., 2013; Rafi, 2016; Naz et al., 2018), according to which the sound relationship with foreign countries positively influences the CPEC project. The results have also represented that project management is a considerable moderator between international relations and the CPEC project's success. These results are in line with the past studies (Hao et al., 2020a,b), which shows that the project management's efficiency guarantees the CPEC project's success as it helps to protect the relations with other countries. The results have also revealed that the project management plays a moderating role between the economy boost up and international relations and CPEC management. These results match with the past studies of (Korytárová et al., 2015; Winter, 2016; Central, 2020).

The study carries both theoretical and empirical implications. The study contributes to the literature on international economic relations as it strengthens the economic relations between China and Pakistan in the form of the CPEC project's success. The study makes empirical implications as it guides both countries' governments to create successful their CPEC project. The study implies that Pakistan and China can make the CPEC project stronger with the efficient implementation of practices required to protect the environment, with the economic growth and boost up, and good strong relations with foreign countries.

CONCLUDING AND STUDY LIMITATIONS

Environment protection has positive influences on the success of CPEC. The study examines that if both the countries involved in the CPEC project are protective, the project will be more successful. The results conclude that the economic boost-up is favorable for the CPEC project's success as the emerging economic activities and economic growth in both countries accelerate the trade between them. Moreover, the results prove that favorable relations with foreign countries positively affect the success of CPEC. The study also implies that project management is an appropriate moderator between environment protection, economic boost up, and international relations and the success of CPEC as it strengthens the mutual relationship between environmental protection, economic boost up, and international relations and the success of CPEC.

Though the study throws ample light on the CPEC project's success, it has several limitations. This study discusses only the three factors that influence CPEC projects' success, such as environment protection-related aspects, the economic boost up, and international relations. At the same time, many other factors affect the success of CPEC. Future scholars should expand the study's scope by addressing more factors in relation to the success of CPEC. Moreover, the study elaborates on the moderating influences of project management between environment protection, the economic boost up, and international relations and the success of CPEC. Future scholars should use project management as a mediator.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

AUTHOR CONTRIBUTIONS

TX, NG, and AN conceived and designed the concept and wrote the paper. SI and MA performed the literature review. AN and GA contributed in the data collection. JH and AM helped to provide technical support to collect the data. AN and TX contributed in analysis tools. TX has supervised the work. AN and AM reviewed the work to improve the outcomes. All authors have read and agreed to the published version of the manuscript.

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REFERENCES

Abdullah, M. I., Huang, D., Sarfraz, M., and Sadiq, M. W. (2021). Service innovation in human resource management during COVID-19: a study to enhance employee loyalty using intrinsic rewards. *Front. Psychol.* 12:247. doi: 10.3389/fpsyg.2021.627659

Abednego, M. P., and Ogunlana, S. O. (2006). Good project governance for proper risk allocation in public–private partnerships in Indonesia. *Int. J. Proj. Manag.* 24, 622–634. doi: 10.1016/j.ijproman.2006.07.010

Acemoglu, D. (2012). Introduction to economic growth. *J. Econ. Theory* 147, 545–550. doi: 10.1016/j.jet.2012.01.023

Akber, A. L. I. (2015). China Pakistan economic corridor (CPEC): prospects and challenges for regional integration. *Int. J. Soc. Sci. Humanity Stud.* 7, 1–15. Available online at: https://dergipark.org.tr/en/pub/ijsshs/issue/26213/275986

Ali, L., Mi, J., Shah, M., Shah, S. J., and BiBi, K. (2017). The potential socio-economic impact of china Pakistan economic corridor. *Asian Dev. Policy Rev.* 5, 191–198. doi: 10.18488/journal.107.2017.54.191.198

Ali, L., Nawaz, A., Iqbal, S., Basheer, M. A., Hameed, J., Albasher, G., et al. (2021). Dynamics of transit oriented development, role of greenhouse gases and urban environment: a study for management and policy. *Sustainability* 13, 1–14. doi: 10.3390/su13052536

Ali, W., Gang, L., and Raza, M. (2016). China-Pakistan Economic corridor: current developments and future prospect for regional integration. *Int. J. Res.* 3. Available online at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2794276

Ali, Z., Gökçe, Ö., Binark, M., and Gidreta, A. D. (2020). China-Pakistan economic corridor and technicians of opinion in pakistani twittersphere: a thematic content analysis. *Asian Stud. Int. J. Soc. Sci.* 4, 9–28. Available online at: https://dergipark.org.tr/en/pub/asyar/issue/55675/744545

Awais, M., Samin, T., Gulzar, M. A., and Hwang, J. (2019). The sustainable development of the china pakistan economic corridor: synergy among economic, social, and environmental sustainability. *Sustainability* 11:7044. doi: 10.3390/su11247044

Brunner, H.-P. (2013). *What Is Economic Corridor Development and What Can It Achieve in Asia's Subregions Asian Development Bank Economics Working Paper Series, 117*. Mandaluyong: Asian Development Bank.

Carvalho, M. M., and Rabechini Jr, R. (2017). Can project sustainability management impact project success an empirical study applying a contingent approach. *Int. J. Proj. Manag.* 35, 1120–1132. doi: 10.1016/j.ijproman.2017.02.018

Central, G. (2020). *Implication of the Developement of the Power Projects in Pakistan Under CPEC*. Available online at: https://gwadarcentral.com/implications-of-the-development-of-power-projects-in-pakistan-under-cpec/ (accessed November 12, 2019).

Chakma, B. (2019). The BRI and India's neighbourhood. *Strat. Anal.* 43, 183–186. doi: 10.1080/09700161.2019.1607030

Chaudhri, M. A. (1986). Strategic and military dimensions in Pakistan-China relations. *Pak. Horiz.* 39, 15–28.

Chen, X. (2018). Globalisation redux: can China's inside-out strategy catalyse economic development and integration across its Asian borderlands and beyond *Cambridge J. Reg. Econ. Soc.* 11, 35–58. doi: 10.1093/cjres/rsy003

Chen, Y., He, L., Guan, Y., Lu, H., and Li, J. (2017). Life cycle assessment of greenhouse gas emissions and water-energy optimization for shale gas supply chain planning based on multi-level approach: case study in Barnett, Marcellus, Fayetteville, and Haynesville shales. *Energy Convers. Manag.* 134, 382–398. doi: 10.1016/j.enconman.2016.12.019

Cheng, X., He, L., Lu, H., Chen, Y., and Ren, L. (2016). Optimal water resources management and system benefit for the Marcellus shale-gas reservoir in Pennsylvania and West Virginia. *J. Hydrol.* 540, 412–422. doi: 10.1016/j.jhydrol.2016.06.041

Chowdhary, M. (2015). China's billion-dollar gateway to the subcontinent: Pakistan may be opening a door it cannot close. *Forbes. Usa, Forbes. Com*.

Christoffersen, G. (2002). The role of east asia in sino-american relations. *Asian Surv.* 42, 369–396. doi: 10.1525/as.2002.42.3.369

Din, A. N. U. (2017). *Impact of emotional intelligence on project success with mediation of team cohesion and moderation of self-efficacy* (Master Degree thesis). Capital University of Science and Technology, Islamabad, Pakistan.

Farooq, M. S., Yuan, T., Zhu, J., and Feroze, N. (2018). Kenya and the 21st Century maritime silk road: implications for china-africa relations. *China Q. Int. Strateg. Stud.* 4, 401–418. doi: 10.1142/S2377740018500136

Han, C., Zhang, B., Chen, H., Wei, Z., and Liu, Y. (2019). Spatially distributed crop model based on remote sensing. *Agric. Water Manag.* 218, 165–173. doi: 10.1016/j.agwat.2019.03.035

Hao, W., Mehmood, S., Shah, A., Nawaz, A., Atif, M., and Noman, S. M. (2020a). The impact of CPEC on infrastructure development, a-double mediating role of project success factors and project management. *Argent. J. Psychol. Clin.* 29, 737–750. doi: 10.24205/03276716.2020.878

Hao, W., Shah, S. M. A., Nawaz, A., Asad, A., Iqbal, S., Zahoor, H., et al. (2020b). The impact of energy cooperation and the role of the one belt and road initiative in revolutionizing the geopolitics of energy among regional economic powers: an analysis of infrastructure development and project management. *Complexity* 2020:8820021. doi: 10.1155/2020/8820021

He, L., Shen, J., and Zhang, Y. (2018). Ecological vulnerability assessment for ecological conservation and environmental management. *J. Environ. Manag.* 206, 1115–1125. doi: 10.1016/j.jenvman.2017.11.059

Huo, C., Hameed, J., Nawaz, A., Adnan Raheel Shah, S., albahser, G., Alqahtani, W., et al. (2021). Scientific risk performance analysis and development of disaster management framework: a case study of developing Asian countries. *J. King Saud Univ. Sci.* 33:101348. doi: 10.1016/j.jksus.2021.101348

Initiative, B. R. (2020). *BRI Projects*. Available online at: https://www.beltroad-initiative.com/projects/ (accessed October 28, 2020).

Irshad, M. S. (2015). One belt and one road: dose China-Pakistan economic corridor benefit for Pakistan's economy *J. Econ. Sustain. Dev.* 6. Available online at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2710352

Jia, L.-C., Jin, Y.-F., Ren, J.-W., Zhao, L.-H., Yan, D.-X., and Li, Z.-M. (2021). Highly thermally conductive liquid metal-based composites with superior thermostability for thermal management. *J. Mater. Chem. C.* 9, 2904–2911. doi: 10.1039/D0TC05493C

Kakar, A., and Khan, A. N. (2021). The impacts of economic and environmental factors on sustainable mega project development: role of community satisfaction and social media. *Environ. Sci. Pollut. Res.* 28, 2753–2764. doi: 10.1007/s11356-020-10661-y

Kanwal, S., Pitafi, A. H., Pitafi, A., Nadeem, M. A., Younis, A., and Chong, R. (2019). China–Pakistan Economic Corridor (CPEC) development projects and entrepreneurial potential of locals. *J. Public Aff.* 19:e1954. doi: 10.1002/pa.1954

Kanwal, S., Rasheed, M. I., Pitafi, A. H., Pitafi, A., and Ren, M. (2020). Road and transport infrastructure development and community support for tourism: the role of perceived benefits, and community satisfaction. *Tour. Manag.* 77:104014. doi: 10.1016/j.tourman.2019.104014

Khan, A., Waris, M., Panigrahi, S., Sajid, M. R., and Rana, F. (2021). Improving the performance of public sector infrastructure projects: role of project governance and stakeholder management. *J. Manag. Eng.* 37:4020112. doi: 10.1061/(ASCE)ME.1943-5479.0000886

Khan, A. A., Ahmed, M., and Malik, O. M. (2013). Pak-China economic alliance to bring prosperity in region. *Int. Rev. Manag. Bus. Res.* 2:776. Available online at: https://fac.ksu.edu.sa/sites/default/files/pak-china_economic_alliance_to_bring_prosperity_in_region.pdf

Khetran, M. S. B., and Saeed, M. A. (2017). The CPEC and China-Pakistan relations: a case study on Balochistan. *China Q. Int. Strateg. Stud.* 3, 447–461. doi: 10.1142/S2377740017500191

Khwaja, M. A., Saeed, S., and Urooj, M. (2018). *Preliminary environmental impact assessment (EIA) study of China-Pakistan economic corridor (CPEC) northern route road construction activities in Khyber Pakhtunkhwa* (KPK), Sustainable Development Policy Institute.

Korytárová, J., Hanák, T., Kozumplíková, L., and Špiroch, M. (2015). "Contribution of socio-economic benefits to economic efficiency of large-scale infrastructure projects," *Proceedings of the 20th International Research Conference on Business, Economics and Social Sciences, IRC-2015* (Istanbul), 5–6.

Kumar, S. (2007). The China–Pakistan strategic relationship: trade, investment, energy, and infrastructure. *Strateg. Anal.* 31, 757–790. doi: 10.1080/09700160701662278

Li, B.-H., Liu, Y., Zhang, A.-M., Wang, W.-H., and Wan, S. (2020). A survey on blocking technology of entity resolution. *J. Comput. Sci. Technol.* 35, 769–793. doi: 10.1007/s11390-020-0350-4

Li, H., Hameed, J., Khuhro, R. A., Albasher, G., Alqahtani, W., Sadiq, M. W., et al. (2021). The impact of the economic corridor on economic stability: a double mediating role of environmental sustainability and sustainable development under the exceptional circumstances of COVID-19. *Front. Psychol.* 11:634375. doi: 10.3389/fpsyg.2020.634375

Lin, W., Chen, B., Xie, L., and Pan, H. (2015). Estimating energy consumption of transport modes in China using DEA. *Sustainability* 7, 4225–4239. doi: 10.3390/su7044225

Liu, S., Chan, F. T. S., and Ran, W. (2016). Decision making for the selection of cloud vendor: an improved approach under group decision-making with integrated weights and objective/subjective attributes. *Expert Syst. Appl.* 55, 37–47. doi: 10.1016/j.eswa.2016.01.059

Liu, S., Yu, W., Chan, F. T. S., and Niu, B. (2021). A variable weight-based hybrid approach for multi-attribute group decision making under interval-valued intuitionistic fuzzy sets. *Int. J. Intell. Syst.* 36, 1015–1052. doi: 10.1002/int.22329

Mamirkulova, G., Mi, J., Abbas, J., Mahmood, S., Mubeen, R., and Ziapour, A. (2020). New Silk Road infrastructure opportunities in developing tourism environment for residents better quality of life. *Glob. Ecol. Conserv.* 24:e01194. doi: 10.1016/j.gecco.2020.e01194

Maqsoom, A., Babar, Z., Shaheen, I., Abid, M., Kakar, M. R., Mandokhail, S. J., et al. (2021). Influence of construction risks on cost escalation of highway-related projects: exploring the moderating role of social sustainability requirements. *Iran. J. Sci. Technol. Trans. Civ. Eng.* doi: 10.1007/s40996-021-00601-2. [Epub ahead of print].

Menhas, R., Mahmood, S., Tanchangya, P., Safdar, M. N., and Hussain, S. (2019). Sustainable development under belt and road initiative: a case study of China-Pakistan economic corridor's socio-economic impact on Pakistan. *Sustainability* 11:6143. doi: 10.3390/su11216143

Nabi, G., Khan, S., Ahmad, S., Khan, A., and Siddique, R. (2017). China–Pakistan Economic Corridor (CPEC): an alarming threat to the biodiversity of Northern Pakistan. *Biodivers. Conserv.* 26, 3003–3004. doi: 10.1007/s10531-017-1402-0

Nawaz, A., Su, X., Din, Q. M. U., Khalid, M. I., Bilal, M., and Shah, S. A. R. (2020). Identification of the handamp;s (health and safety factors) involved in infrastructure projects in developing countries-a sequential mixed method approach of OLMT-project. *Int. J. Environ. Res. Public Health* 17:635. doi: 10.3390/ijerph17020635

Nawaz, A., Su, X., and Nasir, I. M. (2021). BIM Adoption and its impact on planning and scheduling influencing mega plan projects-(CPEC-) quantitative approach. *Complexity* 2021:8818296. doi: 10.1155/2021/8818296

Nawaz, A., Waqar, A., Shah, S. A. R., Sajid, M., and Khalid, M. I. (2019). An innovative framework for risk management in construction projects in developing countries: evidence from Pakistan. *Risks* 7:24. doi: 10.3390/risks7010024

Nawaz, F., Azam, M. F., and Noor, N. (2015). The dilemma of gadoon amazai industrial estate, khyber pakhtunkhwa. *J. Econ. Sustain. Dev.* 6, 313–327. Available online at: https://core.ac.uk/reader/234647040

Naz, L., Ali, A., and Fatima, A. (2018). International competitiveness and ex-ante treatment effects of CPEC on household welfare in Pakistan. *Int. J. Dev. Issues.* 17, 168–186. doi: 10.1108/IJDI-05-2017-0100

Nazir, M. (2015). Analysis of determinants for CPEC's success and failure: emerging challenges and lessons for Pakistan. *Development* 6, 200–207.

Rafi, A. E. (2016). *Completion of CPEC: Impact on Pakistan's Strategic Position and Economy*. Islamabad: Islamabad Policy Research Institute.

Reed, T., and Trubetskoy, A. (2019). *Assessing the Value of Market Access from Belt and Road Projects*. Policy Research Working Paper. Washington, DC: World Bank.

Rizvi, H. A. (2014). The China-Pakistan economic corridor. *Strateg. Stud.* 34, 1–17. Available online at: https://www.issi.org.pk/wp-content/uploads/2015/12/Hasan-Askari-Rizvi_3435_SS_41_20142015.pdf

Sadiq, M. W., Hameed, J., Abdullah, M. I., and Noman, S. M. (2020a). Service innovations in social media and blogging websites: enhancing customer's psychological engagement towards online environment friendly products. *Rev. Argent. Clín. Psicol.* 29, 677–696. doi: 10.24205/03276716.2020.873

Sadiq, W., Abdullah, I., Aslam, K., and Zulfiqar, S. (2020b). Engagement marketing: the innovative perspective to enhance the viewer's loyalty in social media and blogging e-commerce websites. *Mark. Manag. Innov.* 1, 149–166. doi: 10.21272/mmi.2020.1-12

Sarfraz, M., He, B., and Shah, S. G. M. (2020a). Elucidating the effectiveness of cognitive CEO on corporate environmental performance: the mediating role of corporate innovation. *Environ. Sci. Pollut. Res.* 27, 45938–45948. doi: 10.1007/s11356-020-10496-7

Sarfraz, M., Ozturk, I., Shah, S. G. M., and Maqbool, A. (2020b). Contemplating the impact of the moderators agency cost and number of supervisors on corporate sustainability under the aegis of a cognitive CEO. *Front. Psychol.* 11:965. doi: 10.3389/fpsyg.2020.00965

Sarfraz, M., Qun, W., Abdullah, M. I., and Alvi, A. T. (2018b). Employees' perception of Corporate Social Responsibility impact on employee outcomes: mediating role of organizational justice for Small and Medium Enterprises (SMEs). *Sustainability (Switzerland)* 10:2429. doi: 10.3390/su10072429

Sarfraz, M., Qun, W., Hui, L., and Abdullah, M. (2018a). Environmental risk management strategies and the moderating role of corporate social responsibility in project financing decisions. *Sustainability* 10:2771. doi: 10.3390/su10082771

Sarfraz, M., Shehzad, K., and Farid, A. (2020c). Gauging the air quality of New York: a non-linear Nexus between COVID-19 and nitrogen dioxide emission. *Air Qual. Atmos. Health* 13, 1135–1145. doi: 10.1007/s11869-020-00870-2

Shahbaz, M. S., Soomro, M. A., Bhatti, N. U. K., Soomro, Z., and Jamali, M. Z. (2019). The impact of supply chain capabilities on logistic efficiency for the construction projects. *Civ. Eng. J.* 5, 1249–1256. doi: 10.28991/cej-2019-03091329

Sial, S. (2014). The China-Pakistan economic corridor: an assessment of potential threats and constraints. *Confl. Peace Stud.* 6:24. Available online at: https://www.researchgate.net/profile/Farhan-Zahid-2/publication/329759511_Understanding_the_Islamic_State_ideology_affiliates_and_the_Da%27esh_Model/links/5c19572892851c22a335c087/Understanding-the-Islamic-State-ideology-affiliates-and-the-Daesh-Model.pdf#page=12

smart-PLS (2004). *Smart-PLS*. https://www.smartpls.com/ (accessed December 02, 2020).

Ullah, M., Khan, M. W. A., Kuang, L. C., Hussain, A., Rana, F., Khan, A., et al. (2020). A structural model for the antecedents of sustainable project management in Pakistan. *Sustainability* 12:8013. doi: 10.3390/su12198013

Wagner, C., and Tripathi, S. (2018). *India's Response to the Chinese Belt and Road Initiative: New Partners and New Formats*. Berlin: Stiftung Wissenschaft und Politik.

Wang, L. (2017). *Opportunities and Challenges of the China-Pakistan Economic Corridor (CPEC) and Implications for US Policy and Pakistan*. Washington, DC: East-West Center.

Winter, T. (2016). One belt, one road, one heritage: cultural diplomacy and the Silk Road. *The Diplomat* 29, 1–5.

Wu, C., Wu, P., Wang, J., Jiang, R., Chen, M., and Wang, X. (2021). Ontological knowledge base for concrete bridge rehabilitation project management. *Autom. Constr.* 121:103428. doi: 10.1016/j.autcon.2020.103428

Wu, H., Shah, S. M. A., Nawaz, A., Mahmood, A., Albashar, G., Shah, S. A. R., et al. (2020). Disaster management policy development and engineering economics: an analysis of game-changing impact of COVID 19 on oil-power industry, environment, and economy. *Rev. Argent. Clín. Psicol.* 29:550. https://www.revistaclinicapsicologica.com/archivesarticle.phpid=162

Zaman, U., Nawaz, S., Anjam, M., Anwar, R. S., and Siddique, M. S. (2021). Human resource diversity management (HRDM) practices as a coping mechanism for xenophobia at transnational workplace: a case of

a multi-billion-dollar economic corridor. *Cogent Bus. Manag.* 8:1883828. doi: 10.1080/23311975.2021.1883828

Zeng, S. X., Ma, H. Y., Lin, H., Zeng, R. C., and Tam, V. W. Y. (2015). Social responsibility of major infrastructure projects in China. *Int. J. Proj. Manag.* 33, 537–548. doi: 10.1016/j.ijproman.2014.07.007

Zimmerman, T. (2015). *The New Silk Roads: China, The US, and The Future of Central Asia*. New York, NY: Center on International Cooperation.

Zubedi, A., Jianqiu, Z., Arain, Q. A., Memon, I., Khan, S., Khan, M. S., et al. (2018). Sustaining low-carbon emission development: an energy efficient transportation plan for CPEC. *J. Inf. Process. Syst.* 14, 322–345. doi: 10.3745/JIPS.04.0067

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Battling for Consumer's Positive Purchase Intention: A Comparative Study Between Two Psychological Techniques to Achieve Success and Sustainability for Digital Entrepreneurships

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This research focuses on students' online purchase intentions in Pakistan toward different products available for sale on numerous e-business websites. This study's main objective is to determine which methodology is better to enhance customer online purchase intention. It also aims to discover how to improve perceived benefits and lower perceived risks associated with any available online product and entrepreneurship. AMOS 24 has been used to deal with the mediation in study design with bootstrap methodology. The study was conducted on 250 students from different educational institutes in Pakistan using a simple random sampling technique. A finding of this study suggests that both methods positively impact online purchase intention of consumers and sustainable digital economy. But social media advertisement is more effective through enhancing the perceived benefits of products. In contrast, product content factors are more effective at lowering the perceived risks associated with available online products.

Keywords: purchase intentions, online purchase intention, perceived risk, social media, e-business, entrepreneurship, organizational sustainability

INTRODUCTION AND BACKGROUND

In recent decades, social media has been a valuable addition to our everyday lives (Schmid and Axhausen, 2019). As the technology has significantly flourished in the past few years, the effect of social networking sites have had a more significant and substantial impact on one's life than before (Ahmed et al., 2019). In the field of marketing, e-business and social media has drastically changed the competition of markets by being more efficient and significant (Heath, 2019). According to Chi, "social media marketing is a relationship between brands and consumers, which offers a personal channel and currency for user-centered networking and social interaction" (2011). Marketing through social media keeps consumers in the focus of the corporate world and entrepreneurships.

It provides them with creative and innovative segments, allowing marketers to grab the consumers' attention and maximize efficient purchasing behavior (Vasić et al., 2019). The most significant and exciting feature is its speed and efficiency, as a potential customer is just one click away (Hossain, 2019) and it is only a few further clicks until a product is purchased. Therefore, it is not possible to grab the market without knowing its technological importance, and businesses must focus on attractive packages, policies, promotions, and offers to enhance purchasing behavior for a sustainable economy (Wai et al., 2019). Since the approach for interacting with customers has changed because of social media, businesses should learn how effectively they can use social media to improve their sales (Mangold and Faulds, 2009). The practical and smart use of social media benefits companies (Alam et al., 2020) struggling to get a competitive edge (Liu et al., 2008; Sarfraz et al., 2020a,b; Li et al., 2021).

It is essential to acknowledge that social media works as a platform where companies and customers interact directly for mutual benefits (Tandon, 2020). Hence, it is equally important to observe and interpret their customers' behavior to achieve the maximum benefits (Cao et al., 2018). According to an estimation, over 500 million people are using social media (Facebook) (Ostrow et al., 2019){#246}. It is impossible to read and address such a large number of individuals without social media help and entrepreneurships (Cao et al., 2018). Consumer behavior is most important in marketing, as (Huo et al., 2020) it helps and guides the marketers to plan their strategies and tactics more efficiently (Hair and Sarstedt, 2021). The consumer-socialization theory predicts that communication among consumers affects their affective (Harrigan et al., 2021), cognitive, and behavioral attitudes (Ward, 1974). Hence, if one happy customer exists, they will bring more customers because of their positive experience with a specific brand and will surely recommend it to friends or family. This cycle keeps on moving (Harrigan et al., 2021). When a particular brand focuses on their customers happiness, it creates a positive brand reputation among customers' friends (Lipsman et al., 2012). Therefore, when a product is marketed through social media, it has multiple chances of spreading considerably because of the consumer-socialization theory (Meire et al., 2019; Sarfraz et al., 2020c). So, it is vital to check how effectively companies use social media to attract and influence their targeted consumers apart from just marketing their products.

It is also imperative to remember that every person following social media is not the actual customer of that specific company or brand. So, it is equally crucial for a company to convert those random followers into loyal and happy customers. According to Lipsman et al. a fan's value can be analyzed in three ways: increasing the depth of loyalty and engagement among fans, generating incremental purchase behaviur, and leveraging fans' ability to influence friends. The major goal is to create a strong and impactful social media brand impression (Sheth, 2021). And this brand impression can convert the popularity of a company into actual financial value for the company. However, the basic need is to identify the key factors affecting the existing consumers, which will automatically help attract potential consumers to convert them into actual consumers through active marketing skills (Moorman et al., 2019).

OBJECTIVES AND SIGNIFICANCE OF THE STUDY

The purpose of this study is (1) to comprehensively study the existing literature, which explains how companies and entrepreneurships through a digital economy use social media marketing tools and techniques (Vinerean et al., 2013). They use it to shape their e-business/marketing strategies in entrepreneurships to influence consumer behaviur regarding particular products (Moorman et al., 2019). (2) The chapter will introduce social media today and how it helps companies market their products to specific audiences worldwide. (3) The chapter will discuss different marketing techniques that are put into use through social media marketing and will explain how these techniques prove fruitful for companies and entrepreneurships and sustainable digital economy in terms of financial gains. Going a step further, the chapter will also discuss in detail the consumer behaviors and attitudes from the perspective of existing literature and will try to explain the factors which play a role in determining or changing the attitude of a consumer toward a product or a company he or she comes across on social media (Sarfraz, 2018; Dar et al., 2019, 2020).

Therefore, information from all relevant research streams will be incorporated in this chapter such that it paves the way for further research (Heinonen, 2011). The chapter will also serve as a foundation for primary research and help evaluate and understand the primary research results. Hence, the literature will be coupled with the results from real life to provide useful conclusions and recommendations about the subject under consideration and will try to answer the research questions in this context (Lopez and Castaño, 2019).

THEORETICAL BACKGROUND

There are two mediating variables and two independent variables, given in **Figure 1**. These variables can influence the online digital purchase intention positively or negatively, which is a dependent variable. Moreover, it can enhance online shopping by giving or offering smooth and safe transactions in industrial organizations.

Consumer socialization theory forecasts that communication between consumers disturbs their affective, cognitive, and behavioral attitudes (Ward, 1974). Through socialization, consumers acquire consumption-related skills and attitudes toward the marketplace. The widely applied socialization framework delineates consumer knowledge processes and how people execute their parts as patrons in society (e.g., Moschis and Churchill, 1978; Churchill and Moschis, 1979; De Gregorio and Sung, 2010) and in the marketplace.

For a successful marketing relation with different variables, it is crucial to understand the importance of those variables or factors that directly or indirectly influence purchasing behavior. We explored the strong relationship between innovative design and social media advertisement and the perceived risks and benefits of online purchase intentions. We concluded that all of these critical factors are important for every marketer with strong cooperation required for a successful relationship. First,

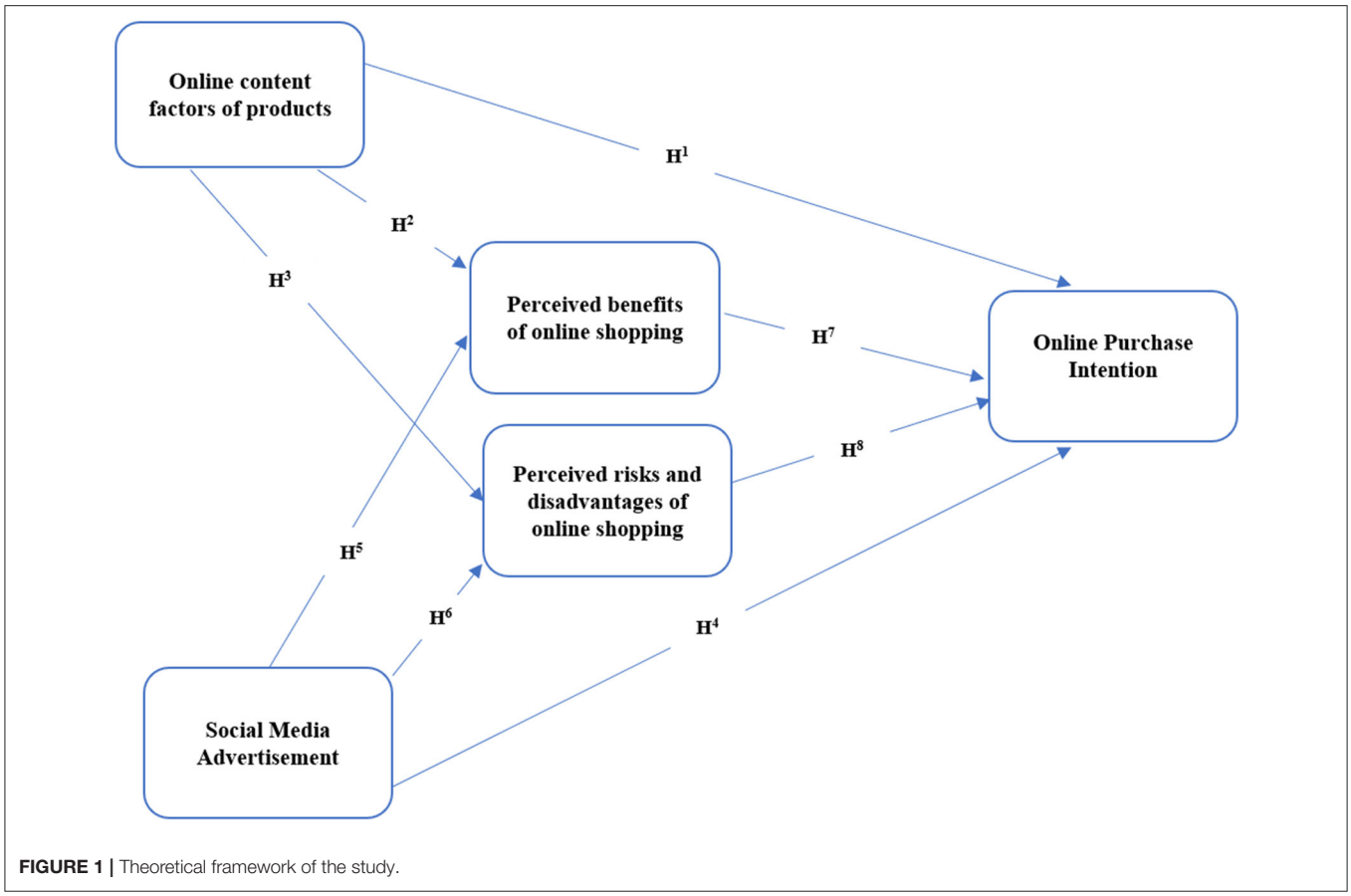

FIGURE 1 | Theoretical framework of the study.

we observe and study the nature of relationship marketing and recommend how this theory should be abstracted. Then, we conclude that successful relationship marketing needs strong social media advertisement and unique product design, and discuss the perceived benefits and factors that reduce the amount of risk. Next, we present them as a prominent and significant mediating variable. After that, we test those major mediating variables using data to build a strong marketing relationship online. Finally, we make a comparison with our rival to show whether our model allows the most substantial connection of these mediating variables. It is found that online competition is increasing on a daily basis among the markets (Thorelli, 1986, p. 47).

LITERATURE REVIEW

Product Online Content Factors

Product design includes style, aesthetics, function, and overall product outlook as the basic components or elements that could be created for a specific product (Schivinski et al., 2021). A company, entrepreneurship, or brand mostly focuses on these features and elements to distinguish it from others (Naeem, 2021). Core product elements are the heart of any product, such as the engine system of an automobile or a computer processor, and they should not be compromised at all (Sultan et al., 2021) as it would be noticed if these elements differed from one another. These functions also allow the customer to distinguish between you and your competitor. Hence, unique product design's responsibility can directly stimulate the customer's buying behavior (Amen et al., 2020). Therefore, the design is a collective process through which differences could be created easily (Huo et al., 2020).

An advanced package of different design essentials has made it exciting and easy to distinguish products in looks and functions to an exclusively reserved position in the market. Regrettably, most products fail to attain distinction in this way and to present their product more uniquely than others. Understanding its importance will ultimately lead to product success (Li et al., 2020a). According to different research, the up-to-date view of the product began in the 1940's and 1950's. Other product designers were known as public figures and attained fame because of it (Loewy, 1950; Dreyfuss and Glimcher, 1955; Li et al., 2020b). Current designers must be efficient enough in all the essential or valuable fields, such as engineering, physical sciences, and social sciences (Molotch, 2005). A trio of impacts, from design, manufacturing, and marketing energies known as new product development and process of development. We started this study mainly to address the strategies, methods, goals, and tricks that product design teams can use to add value to customer attraction and satisfaction.

H1: Online content factors create a positive online purchase intention in the consumer's mind.

H2: Online content factors create a positive online purchase intention in consumers' minds when mediated by the perceived benefits of online shopping.

H3: Online content factors create a positive online purchase intention in consumers' minds when mediated by perceived risks and disadvantages of online shopping.

Social Media Advertisement

This study aims to understand how brands and companies use social media advertisements to attract and influence consumer behaviurs toward their products (Voorveld et al., 2018). It is imperative to find and discuss how these attractions work to get maximum benefit (Alalwan, 2018). Understanding the foundations of social media marketing will help us evaluate how companies can use these tools to strengthen their brand image and thus (Alhabash et al., 2017) convert their followers into loyal buyers(Van-Tien Dao et al., 2014). It is also essential for a marketer to understand every social media feature before using it as a marketing or advertisement tool (Lee and Hong, 2016). According to Campbell et al. "social media is a lot more about how people are using the technology (Chu et al., 2013) and less about the technology itself. Because people are now creating and utilizing information instead of just storing it" (2011), social media can be defined as a tool or a complete package of different applications based on the technological base of web 2.0 which permits creating, innovating, or exchanging information through the internet (Chu et al., 2013). Furthermore, Web 2.0 could be explained more comprehensively as it is a totally new way where the information could be edited or created by the user anytime (Winter et al., 2021).

Purchase intention can be influenced because the contents of advertising and the message (Schivinski et al., 2021) through advertisement in social media are more eye catching and striking. Advertisements could be presented in numerous ways, like pictures, celebrity endorsement, or reviews of happy customers that could be uploaded (Naeem, 2021). The more powerful the message shared through visual advertisements, the more significant and positive a response could be collected from online consumers (Fotis et al., 2011). Wang et al. explains that the ads that appear very often leave a more significant impact on purchase intension. These ads do not have a specific message or maybe annoy the customer because of repetition (Sharma et al., 2021). Consumers may not resist a strong message or strong content that shares the product's innovating features and functions. The great increase in purchase intention will automatically lead to more sales (Hong and Kim, 2021).

H4: Social Media Advertisement creates a positive online purchase intention in the consumer's mind.

H5: Social Media Advertisement creates a positive online purchase intention in consumers' minds when mediated by the perceived benefits of online shopping.

H6: Social Media Advertisement creates a positive online purchase intention in consumers' minds when mediated by perceived risks and disadvantages of online shopping.

Perceived Benefits of Online Shopping

Online shopping predicts many risks, and there is always room for benefits and attractions that ultimately manipulate consumers' minds toward online shopping (Katta and Patro, 2017a). The perceived or the important benefits are related to consumer's satisfaction and happiness with online shopping and the perception of a consumer or customer is that online shopping is supposed to be easy, convenient, trustworthy, time saving, less risky (Tzeng et al., 2021), and offer more variety compared to conventional shopping. The internet has changed our life completely; as everything is just one click away, in seconds we could comfortably be looking at the best products or services. As per the findings of Seiders et al. (2000), convenience offers different prospects in the online buying method: Find, acquire, get, and complete the transaction. Furthermore (González et al., 2021), convenience is an essential and vital motivation for online shopping (González et al., 2021).

Additionally, convenience is significant and positively related to buying behaviur, which encourages a buyer's willingness (Wang et al., 2007). Moreover, Wang et al. (2021) websites provide a massive variety for a specific brand to multiple different consumers at a time using single platforms because there is no problem involved with storing or displaying the stock. An additional type is a motivational factor that stimulates consumers to purchase online (Katta and Patro, 2017b). It is very convenient for consumers to stay at home and acquire any product they want (Al-Debei et al., 2015).

It saves time. Any busy individual can purchase their products in just a few clicks (Hebbar et al., 2020). Online shopping provides different coupons, sale offers, deals, promotions, and much more. So, it is more attractive in terms of benefits over risks.

H7: Perceived benefits of online shopping creates a positive online purchase intention in the consumer's mind.

Perceived Risk and Disadvantages of Online Shopping

Perceived risk is well-defined by Dowling and Staelin (1994) as something that creates doubt in the consumer's mind to buy any specific goods or services. It has been demonstrated that perceived risk in consumer behavior is much more of an issue now than it has been in the past (Amirtha et al., 2021).

Product risk is the doubt a consumer has that the product will meet their expectations while making a purchase decision (Masri et al., 2021). Risk is experienced more in online shopping because the sense of physical experience and inspection is missing that cannot be passed on online (Tzeng et al., 2021). Traditional shopping provides better customer satisfaction as they can physically experience the product (Jain, 2021). That is why risk in traditional shopping is negligible as compared to advanced and speedy online shopping methods. It is the consumer's primary demand and concern (Lin et al., 2019). In shopping via technology, consumers have random or selective and very to-the-point information regarding a specific product. That is why they feel uncomfortable due to limited instructions (Lin et al., 2019).

Privacy risk is the most significant issue related to online shopping (Islam, 2021). Consumers are supposed and compelled to share very private details to make any transaction possible (Peng et al., 2019). Moreover, as online shopping grows in popularity, so too does the risk associated with it, causing people to not want to buy online. Especially in Pakistan, a there was a decrease of online buyers from 3 to 2.07%. Many people prefer cash on deliveries service because of that risk and do not want to share their bank details with the marketer or that website. According to Vasić et al. (2019), 8% of online users stopped buying online due to privacy risks and more than 50% do not even want to try online shopping because they feel it is very risky and they are afraid of any problematic situation (Nazione et al., 2021). Privacy risks automatically lead toward people not buying online. Moreover, it does not meaningfully attract the consumer to make a purchase decision. Consumers' concern and insecurity about their personal information or a specific product result in negative effects on intentions (Qalati et al., 2021).

The intention of a consumer to shop online could be improved by ensuring that their private data is the brand's priority. A few findings show that "privacy risk significantly reduces online shopping behavior" (Yildirim et al., 2021). Therefore, the connection between risk and shopping online is powerful, and it is essential to discuss this to obtain maximum benegit. In the most recent findings, purchase intention could be used to strengthen the relationship between risk and purchase behavior (Zhong et al., 2021). Furthermore, different studies predict that there is no need to focus on privacy risk because people are neglecting its consequences in online shopping behavior (Lazaroiu et al., 2020).

H8: Perceived risks and disadvantages of online shopping create negative online purchase intention in consumers' minds.

Online Purchase Intention

Online purchase intention is the choice of an individual to purchase anything through the internet (Jain, 2021). While making a purchasing decision, the purpose could be affected by many factors that play vital roles like trust, time-saving, and convenience. If a lack of consumer purchase intention exists, it might cause significant problems because that specific person might influence others' behavior toward online shopping who are loyal or happy customers (Ma et al., 2021). Additionally, intentions are a collection of thoughts on whether an individual is willing to purchase or their specific buying behaviors (Jain, 2021).

Meanwhile, attractions through benefits and risks are the boosters of actual consumers' behavior. Most of the research describes a healthy and positive relationship among online shopping and purchase intentions (Chen et al., 2021; Ham and Chung, 2021) Many of the researchers found that it will help if our focus was on consumer purchase intention because it works well in online shopping to maintain a sustainable digital economy (Bhatti et al., 2018). There is an emerging trend to prioritize the latest trends in behaviur for the future because the future is all about online transactions (Chen and Zimitat, 2006; Bhatti et al., 2018).

TABLE 1 | Respondents' demographic profile.

Category	Subdivision	Frequency	Percentage
Demographic profile of the respondents			
Marital status	Married	150	60
	Un-married	100	40
Age	Below 25 years	50	2
	25–30	85	34
	31–35	65	26
	36–40	40	16
	40 and above	10	4
Education	Intermediate	110	44
	Bachelors	128	51
	Masters	12	5
	M.Phil	0	0
	Phd	0	0
Internet usage frequency	Once in a day	202	80.5
	After 3 days	17	6.8
	After 1 week	6	2.4
	After 2 weeks	2	8
	After 1 month	24	9.6

Research Methodology

A hypothesis study has been used for this research to explain the nature of the relationship between a number of variables. Students from different educational institutes were drawn from the admission offices of their respective educational institutes. The reason for selecting students from universities is that they are heavy users of social media. They also have the highest probability of buying products online with the ability to spend money in hand.

This study used a correlational type of investigation because it needs to check the variables' relationship through hypotheses. Research has been conducted in a natural environment. That is why it will be considered a non-contrived study setting. This study has minimal researcher interference toward respondents regarding the filling out of questionnaires. In this study, the data is collected from students; that is why this study's unit of analysis is individual. The researcher has implemented a cross-sectional study method for this study. It involves the study of a whole population, or a representative subset, at one specific point in time.

Empirical Settings and Data Collection

The data was obtained with respondent's consent. These studies have been conducted on students from different universities and educational institutes of the Punjab province; 500 questionnaires were distributed among them, and almost 270 questionnaires were returned, maintaining a response rate of 55%. A reliable and valid questionnaire has been used for this study. As 20 questionnaires were returned with incomplete information, the analysis was done with 250 complete responses. Respondents' demographic profile is given in **Table 1**.

The respondents were students from a variety of colleges and universities and were selected randomly using a simple random sampling technique. Respondents had to have experience using social media or online purchasing websites so that they could answer the questionnaire with more information and awareness.

MEASURE AND METHODS

Instrument

For measuring online content factors of products, perceived benefits of online shopping, and perceived risks and disadvantages of online shopping, we will use the scale developed by Adnan (2014). We will use the scale developed by Logan et al. (2012) and online purchase intention. We will use a scale developed by Duffett (2015). The instruments were rated and measured on a 5-point Likert scale with higher numerical values showing greater satisfaction.

Confirmatory Factor Analysis

It is necessary to conduct the confirmatory factor analysis for accurate and precise results for all variables. For this study, it was decided to conduct a pooled CFA analysis, which is given in **Table 2**. It runs all the latent variables at the same time to achieve the required model fitness. The pooled CFA method is a lot easier and better than the individual CFA since it runs all the latent variables simultaneously, which is time-saving (detail given in **Table 3**) (Afthanorhan et al., 2014; Chong et al., 2014).

The model fit indices show an acceptable fit between the data and the proposed measurement model. The values of the Comparative Fit Index (CFI = 0.938), Root Mean Error of Approximation (RMSEA = 0.049), and Chi-square to Degree of Freedom Ratio (x 2/df = 1.590) all meet the cutoff criteria, so the values of the fitness indices meet the excellent standards for model fitness (Lomax and Schumacker, 2004; Hoe, 2008; Anderson et al., 2010).

After running the pooled CFA, it is also necessary to check and verify each item's reliability for further research. CFA of this study's data was used to measure reliability, convergent validity, and discriminant validity. The reliability of the measurement scales was measured with composite reliability, which is preferred to report a scale's reliability (Netemeyer et al., 2003).

Discriminant validity is used to confirm that the measurement scales are distinct from other measures used in the study. Discriminant validity was measured using the HTMT analysis in which the cut-off criteria for strict discriminant validity is 0.850 and for liberal discriminant validity is 0.900 (details given in **Table 4**) (Henseler et al., 2015). Therefore, it is established that all the measurement scales used in the study differ from each other, so the data used in our study fulfils the requirements of convergent and discriminant validity and is suitable for further analysis.

Structural Equation Modeling

Structural equation modeling (SEM) was used in the structural model to test the hypotheses, using AMOS 24 (detail given in **Table 5**). As the proposed model contains mediation, the SEM technique was used to analyze all the paths simultaneously (Iacobucci et al., 2007; Hoe, 2008; Alavifar et al., 2012). The model fit indices for the structural model meet the acceptance criteria.

Hypothesis Testing

The results of the structural model are shown in **Table 6**. The SEM statistics show that **H1 (Content Factors→Purchase Intention)** and **H4 (Social Media Advertisement→Purchase Intention)** are rejected on the grounds of significance level, as the SEM results show that the *P*-values of these hypotheses are not significant. These results suggest that these variables do not have a direct significant positive impact on employee loyalty. While **H7 (Perceived benefits→Purchase Intention)** and **H8 (Perceived Risks→Purchase Intention)** are accepted on the grounds of significance level, as the SEM results show that the *P*-values of these hypotheses are significant. These results suggest that these variables have a direct significant positive impact on employee loyalty. Moreover, the results also indicate that high perceived benefits could lead to positive purchase intention, directly proportional to independent and dependent variables. In contrast, the higher perceived risk could lead toward negative purchase intention and vice versa.

These results shown in **Table 7** display the complete picture of this research study. The study showed that **H2** (**Content Factors→Perceived Benefits→Online Purchase Intention, $\beta = 0.20$, $P = 0.005$**) is positively significant and suggests that when websites impressively use the product content factor then it is effective in enhancing the product's perceived benefits in the eyes of its target customer, hence leads toward positive online purchase intention behavior.

The study showed that **H3 (Social Media Advertisement → Perceived Risks→Online Purchase Intention, $\beta = 0.55$, $P = 0.045$)** is also positively significant and suggests that organizations that use social media advertising to promote their products online create a positive impact in their targeted customer's online purchase intentions.

This hypothesis showed that **H5** (**Content Factors→Perceived Risks Online→Purchase Intention, $\beta = 0.35$, $P = 0.026$**) is positively significant and suggests that content factors of the available online create a positive online purchase intention when perceived risks mediate it. Hence, it could be deducted that content factors help lower the perceived risks in buyers' minds and enhance their online purchase intention toward that specific product.

This specific hypothesis showed that **H6 (Social Media Advertisement→Perceived Risks→Purchase Intention, $\beta = 0.25$, $P = 0.009$)** is also positively significant and suggests that organizations' investment on social media advertisement is useful and creates a positive online purchase intention in its target customers.

DISCUSSION

This study's primary purpose was to encounter all the variables that may increase or decrease intention toward a valuable consumer's purchase behavior. There are multiple significant and positive relationships or dimensions that may influence an individual's shopping online.

TABLE 2 | Pooled CFA model fitness tests.

Name of category	Name of index	Index full name	Value in analysis	Acceptable value	References
Pooled CFA model fitness tests					
Absolute fit	RMSEA	Root mean square of error approximation	0.049	<0.80	Browne and Cudeck, 1993
Incremental fit	CFI	Comparative fit index	0.938	>0.90	Bentler, 1990
Parsimonious fit	Chisq/df	Chi Square/Degrees of freedom	1.590	<3	Hu and Bentler, 1999

TABLE 3 | Pooled confirmatory factor analysis (Independent, mediating, and dependent variable).

Scale	Items	Factor loadings	Scale reliability
Pooled confirmatory factor analysis (independent, mediating, and dependent variable)			
Online content factors of products	I buy from online stores only if they are visually appealing and have a well-organized appearance.	0.739	0.719
	I buy from online stores only if the navigation flow is user friendly.	0.740	
	I buy from online stores only if the site content is easy for me to understand and the information provided is relevant.	0.656	
	I buy from online stores only if they have an easy and error free ordering and transaction procedure.	0.742	
Social media advertisement	Social media advertising is a good source of product information and supplies relevant product information.	0.770	0.777
	Social media advertising provides timely information.	0.993	
	Social media advertising is a good source of up-to-date product information.	0.558	
	Social media advertising is a convenient source of product information.	0.856	
	Social media advertising supplies complete product information.	0.708	
Perceived benefits of online shopping	I shop online as I can shop whenever I want to (24/7 availability).	0.707	0.703
	I shop online as I get detailed product information online.	0.739	
	I shop online because I get a broader selection of products and better deals available.	0.640	
	Online shopping gives the facility of easy price comparison (Hence, price advantage).	0.701	
	I shop online as I get user/expert reviews on the product.	0.776	
	I use online shopping for buying products which are otherwise not easily available in the nearby market or are unique/new	0.656	
	I shop online as there are more payment options available.		
Perceived risks and disadvantages of online shopping	I hesitate to shop online as there is a high risk of receiving malfunctioning merchandise.	0.742	0.760
	It is hard to judge the quality of the merchandise over the internet.	0.802	
	I feel that there will be difficulty in settling disputes when I shop online (e.g., while exchanging products).	0.816	
	I might not receive the product ordered online.	0.605	
	I do not like being charged for shipping when I shop online.	0.775	
	Getting good after sale service is time taking and difficult for online purchases.	0.825	
Online Purchase Intention	I will buy products that are advertised on social media.	0.825	0.709
	I desire to buy products that are promoted on advertisements on social media.	0.763	
	I am likely to buy products that are promoted on social media.	0.543	
	I plan to purchase products that are promoted on social media.	0.705	

TABLE 4 | HTMT analysis to measure discriminant validity.

	Content factor	Social media advertisement	Perceived benefits	Perceived risks	Online purchase intention
HTMT analysis					
Content factor					
Social media advertisement	0.275				
Perceived benefits	0.272	0.167			
Perceived risks	0.107	0.095	0.050		
Online purchase intention	0.320	0.070	0.055	0.578	

TABLE 5 | Structural equation modeling analysis.

Name of category	Name of index	Index full name	Value in analysis	Acceptable value	References
SEM, model fitness tests					
Absolute fit	RMSEA	Root mean square of error approximation	0.067	<0.80	Browne and Cudeck, 1993
Incremental fit	CFI	Comparative fit index	0.915	>0.90	Bentler, 1990
Parsimonious fit	Chisq/df	Chi square/degrees of freedom	1.214	<3	Hu and Bentler, 1999

TABLE 6 | Direct findings of the SEM.

Hypothesis	Causal path	Lower bound	Upper bound	*P*-value	Standardized estimated
Results of structural model: direct effects					
H1	Content factors→Purchase intention	−0.162	0.093	0.790	−0.032
H4	Social media advertisement→Purchase intention	−0.183	0.026	0.306	−0.080
H7	Perceived benefits→Online Purchase intention	0.096	0.378	0.005	0.335
H8	Perceived risks→Online Purchase intention	0.219	0.464	0.003	0.430

TABLE 7 | Indirect findings of the SEM.

Hypothesis	Causal path	Lower bound	Upper bound	*P*-value	Standardized estimated
Results of structural model: indirect effects					
H2	Content factors→Perceived Benefits→Purchase intention	0.060	0.174	0.005	0.20
H5	Social media advertisement→Perceived benefits→Purchase intention	0.027	0.140	0.045	0.55
H3	Content factors→Perceived Risks→Purchase Intention	0.052	0.153	0.026	0.35
H6	Social media advertisement→Perceived risks→Purchase intention	0.019	0.098	0.009	0.25

Innovative and creative design, ads through social media, and benefits and risks related to online purchase intentions directly affect consumers' buying behavior. So, the marketers have a significant gap to capture the market entirely and create a competitive edge.

In this research, we found that married people between 25 and 30 are more inclined to shop online. So, existing marketers can mold their advertisements according to this age group's interest, and they will automatically influence their social circle and community.

More benefits like giving a cash on delivery option or providing them with a trial option makes consumers feel the experience is more convenient and are happier about that product. It will create a significant difference among marketers.

On the other hand, the risk could be controlled more efficiently by providing the customer with ease and choices. The shared findings show that the relationship between benefits and

risks is not only important in marketing relationship, but also that there are many more factors which are equally important and demand investigation in entrepreneurship (Becker, 1960; Achrol, 1991; Dwyer et al., 2001). They are also key mediating variables in these relationships. We found that the relationship among these variables is significantly and positively related with the desired outcomes.

Moreover, more variables could be added to get different opinions on where to work and how to work, especially for online shopping. A specific gender could be chosen to get other markets, but the variables discussed in this research give a clear direction for the existing and new markets.

CONCLUSION

This study showed that both techniques are helpful in enhancing the online purchase intention of target customers while mediated by a product's perceived risks and benefits. But for specific actions, social media advertisement is more useful in enhancing the perceived benefits of those products available for sale online (Michaelidou et al., 2011; Kim and Ko, 2012). At the same time, the content factors or product listing is more helpful in lowering the perceived risks associated with any available product online. These conclusions are also backed up by other studies conducted (Hong et al., 2004; Schmutz et al., 2010; Boateng and Okoe, 2015). Moreover, the impact of control variables still needed to be discussed in this research work. The specific variables which are selected for this research could perform indifferently in different situations. The results of this study could help organizations promote their product and services so that they could minimize their promotional costing of that product, lower the perceived risks associated with their product, and elevate the perceived benefits effectively.

Finally, this study's results could also vary from time to time due to demographics and geographic changes. That is why it is strongly recommended to apply this research framework in other situations or even the same problem again to verify and generalize the said results.

Despite these collaborative and managerial implications, this study has numerous limitations that provide salient future research directions. First, the websites included were not categorized according to region, so the respondent data was not associated with norms and cultural background. So, there is much more work required regarding this aspect. In addition, there are different marketing techniques to enhance purchase intention.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the Corresponding author/s.

AUTHOR CONTRIBUTIONS

DD: writing main draft and analysis. HA: revised the draft, data collection, and improved the article. YL: lead this study, final draft, and analysis. EE: layout, framework, and analysis elucidation. AM and JK: data, proof read, and language editing. All authors contributed to the article and approved the submitted version.

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REFERENCES

Achrol, R. S. (1991). Evolution of the marketing organization: new forms for turbulent environments. *J. Market.* 55, 77–93. doi: 10.1177/002224299105500406

Adnan, H. (2014). An analysis of the factors affecting online purchasing behavior of Pakistani consumers. *Int. J. Mark. Stud.* 6:133. doi: 10.5539/ijms.v6n5p133

Afthanorhan, W., Ahmad, S., and Mamat, I. (2014). Pooled confirmatory factor analysis (PCFA) using structural equation modeling on volunteerism program: a step by step approach. *Int. J. Asian Soc. Sci.* 4, 642–653.

Ahmed, B. S., Amroush, F., and Maati, M. B. (2019). "The intelligence of E-CRM applications and approaches on online shopping industry," in *Advanced Methodologies and Technologies in Digital Marketing and Entrepreneurship*, eds D. B. A. Mehdi Khosrow-Pour (IGI Global), 70–82. doi: 10.4018/978-1-5225-7766-9.ch006

Alalwan, A. A. (2018). Investigating the impact of social media advertising features on customer purchase intention. *Int. J. Inf. Manage* 42, 65–77. doi: 10.1016/j.ijinfomgt.2018.06.001

Alam, G. M., Parvin, M., Ayub, A. F. B. M., Kader, R., and Rahman, M. M. (2020). Does an MBA degree advance business management skill or in fact create horizontal and vertical mismatches? *Bus. Process Manag. J.* doi: 10.1108/BPMJ-10-2020-0465. [Epub ahead of print].

Alavifar, A., Karimimalayer, M., and Anuar, M. K. (2012). Structural equation modeling vs multiple regression. *Eng. Sci. Technol.* 2, 326–329.

Al-Debei, M. M., Akroush, M. N., and Ashouri, M. I. (2015). Consumer attitudes toward online shopping: the effects of trust, perceived benefits, and perceived web quality. *Internet Res.* 25, 707–733. doi: 10.1108/IntR-05-2014-0146

Alhabash, S., Mundel, J., and Hussain, S. A. (2017). Social media advertising. *Digit. Adv.* 285:15. doi: 10.4324/9781315623252-16

Amen, R., Hameed, J., Albashar, G., Kamran, H. W., Shah, M. U. H., Zaman, K. U., et al. (2020). Modeling the higher heating value of municipal solid waste for assessment of waste-to-energy potential: a sustainable case study. *J. Clean. Prod.* 287:125575. doi: 10.1016/j.jclepro.2020.125575

Amirtha, R., Sivakumar, V., and Hwang, Y. (2021). Influence of perceived risk dimensions on e-shopping behavioural intention among women—a family life cycle stage perspective. *J. Theor. Appl. Electr. Commer. Res.* 16, 320–355. doi: 10.3390/jtaer16030022

Anderson, R., Babin, B., Black, W., and Hair, J. (2010). *Multivariate Data Analysis: A Global Perspective.* Upper Saddle River: Pearson prentice Hall.

Becker, H. S. (1960). Notes on the concept of commitment. *Am. J. Sociol.* 66, 32–40. doi: 10.1086/222820

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychol. Bull.* 107:238. doi: 10.1037/0033-2909.107.2.238

Bhatti, A., Saad, S., and Gbadebo, S. M. (2018). Convenience risk, product risk, and perceived risk influence on online shopping: moderating effect of attitude. *Sci. Arena Publ. Int. J. Bus. Manage.* 3, 1–11.

Boateng, H., and Okoe, A. F. (2015). Consumers' attitude toward social media advertising and their behavioural response. *J. Res. Interactive Mark.* 9, 299–312. doi: 10.1108/JRIM-01-2015-0012

Browne, M. W., and Cudeck, R. (1993). Alternative ways of assessing model fit. *Sage Focus Ed.* 154:136.

Cao, Y., Ajjan, H., and Hong, P. (2018). Post-purchase shipping and customer service experiences in online shopping and their impact on customer satisfaction. *Asia Pac. J. Mark. Logistics* 30, 400–416. doi: 10.1108/APJML-04-2017-0071

Chen, C.-J., Tsai, P.-H., and Tang, J.-W. (2021). How informational-based readiness and social influence affect usage intentions of self-service stores through different routes: an elaboration likelihood model perspective. *Asia Pac. Bus. Rev.* 1–30. doi: 10.1080/13602381.2021.1872912

Chen, C. H., and Zimitat, C. (2006). Understanding Taiwanese students' decision-making factors regarding Australian international higher education. *Int. J. Educ. Manage.* 20, 91–100. doi: 10.1108/09513540610646082

Chong, E. E., Nazim, A., and Ahmad, S. B. (2014). A comparison between individual confirmatory factor analysis and pooled confirmatory factor analysis: an analysis of library service quality, a case study at a public university in Terengganu. *Int. J. Eng. Sci. Innovative Technol.* 3, 110–116.

Chu, S.-C., Kamal, S., and Kim, Y. (2013). Understanding consumers' responses toward social media advertising and purchase intention toward luxury products. *J. Glob. Fashion Mark.* 4, 158–174. doi: 10.1080/20932685.2013.790709

Churchill Jr, G. A., and Moschis, G. P. (1979). Television and interpersonal influences on adolescent consumer learning. *J. Cons. Res.* 6, 23–35. doi: 10.1086/208745

Dar, A. A., Chen, J., Shad, A., Pan, X., Yao, J., Bin-Jumah, M., et al. (2020). A combined experimental and computational study on the oxidative degradation of bromophenols by Fe (VI) and the formation of self-coupling products. *Environ. Pollut.* 258:113678. doi: 10.1016/j.envpol.2019.113678

Dar, A. A., Wang, X., Wang, S., Ge, J., Shad, A., Ai, F., et al. (2019). Ozonation of pentabromophenol in aqueous basic medium: kinetics, pathways, mechanism, dimerisation and toxicity assessment. *Chemosphere* 220, 546–555. doi: 10.1016/j.chemosphere.2018.12.154

De Gregorio, F., and Sung, Y. (2010). Understanding attitudes toward and behaviors in response to product placement. *J. Advert.* 39, 83–96. doi: 10.2753/JOA0091-3367390106

Dowling, G. R., and Staelin, R. (1994). A model of perceived risk and intended risk-handling activity. *J. Consum. Res.* 21, 119–134.

Dreyfuss, J. R., and Glimcher, M. J. (1955). Epiphyseal injury following frostbite. *New Engl. J. Med.* 253, 1065–1068. doi: 10.1056/NEJM195512152532404

Duffett, R. G. (2015). Facebook advertising's influence on intention-to-purchase and purchase amongst millennials. *Internet Res.* 25, 498–526. doi: 10.1108/IntR-01-2014-0020

Dwyer, F. R., Schurr, P. H., and Oh, S. (2001). "Developing buyer-seller relationships," in *Marketing: Critical Perspectives on Business and Management*, 194–225. doi: 10.2307/1251126

Fotis, J., Buhalis, D., and Rossides, N. (2011). Social media impact on holiday travel planning: the case of the Russian and the FSU markets. *Int. J. Online Mark.* 1, 1–19. doi: 10.4018/ijom.2011100101

González, E. M., Meyer, J.-H., and Toldos, M. P. (2021). What women want? How contextual product displays influence women's online shopping behavior. *J. Bus. Res.* 123, 625–641. doi: 10.1016/j.jbusres.2020.10.002

Hair, J. F. Jr., and Sarstedt, M. (2021). Data, measurement, and causal inferences in machine learning: opportunities and challenges for marketing. *J. Mark. Theory Pract.* 29, 65–77. doi: 10.1080/10696679.2020.1860683

Ham, J., and Chung, N. (2021). "The role of perceived technology and consumers' personality traits for trust transfer in airbnb," in *Information and Communication Technologies in Tourism 2021*, eds W. Wörndl, C. Koo, and J. L. Stienmetz (Cham: Springer), 128–133. doi: 10.1007/978-3-030-65785-7_11

Harrigan, P., Daly, T. M., Coussement, K., Lee, J. A., Soutar, G. N., and Evers, U. (2021). Identifying influencers on social media. *Int. J. Inf. Manage.* 56:102246. doi: 10.1016/j.ijinfomgt.2020.102246

Heath, S. (2019). *System and Method for Social Networking Interactions Using Online Consumer Browsing Behavior, Buying Patterns, Advertisements and Affiliate Advertising, for Promotions, Online Coupons, Mobile Services, Products, Goods and Services, Entertainment and Auctions, With Geospatial Mapping Technology*. US20130073473A1. Washington, DC: U.S. Patent and Trademark Office.

Hebbar, S., Kamath, G. B., Mathew, A. O., and Kamath, V. (2020). Attitude toward online shopping and its influence on purchase intentions: an urban Indian perspective. *Int. J. Bus. Innov. Res.* 22, 326–341. doi: 10.1504/IJBIR.2020.107961

Heinonen, K. (2011). Consumer activity in social media: managerial approaches to consumers' social media behavior. *J. Consum. Behav.* 10, 356–364. doi: 10.1002/cb.376

Henseler, J., Ringle, C. M., and Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J. Acad. Mark. Sci.* 43, 115–135. doi: 10.1007/s11747-014-0403-8

Hoe, S. L. (2008). Issues and procedures in adopting structural equation modeling technique. *J. Appl. Quant. Methods* 3, 76–83.

Hong, H., and Kim, Y. (2021). What makes people engage in civic activism on social media? *Online Inf. Rev.* doi: 10.1108/OIR-03-2020-0105

Hong, W., Thong, J. Y., and Tam, K. Y. (2004). Designing product listing pages on e-commerce websites: an examination of presentation mode and information format. *Int. J. Hum. Comput. Stud.* 61, 481–503. doi: 10.1016/j.ijhcs.2004.01.006

Hossain, S. F. A. (2019). Social networking and its role in media entrepreneurship: evaluating the use of mobile phones in the context of online shopping–a review. *J. Media Manage. Entrep.* 1, 73–86. doi: 10.4018/JMME.2019010105

Hu, L. T., and Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct. Eq. Model.* 6, 1–55. doi: 10.1080/10705519909540118

Huo, C., Dar, A. A., Nawaz, A., Hameed, J., Pan, B., and Wang, C. (2020). Groundwater contamination with the threat of COVID-19: insights into CSR theory of Carroll's pyramid. *J. King Saud Univ. Sci.* 33:101295. doi: 10.1016/j.jksus.2020.101295

Iacobucci, D., Saldanha, N., and Deng, X. (2007). A meditation on mediation: evidence that structural equations models perform better than regressions. *J. Consum. Psychol.* 17, 139–153. doi: 10.1016/S1057-7408(07)70020-7

Islam, M. S. (2021). Online shopping behaviour among international students from belt and road countries in China. *Eur. J. Bus. Manage. Res.* 6, 63–75. doi: 10.24018/ejbmr.2021.6.1.681

Jain, S. (2021). Examining the moderating role of perceived risk and web atmospherics in online luxury purchase intention. *J. Fashion Mark. Manage.* doi: 10.1108/JFMM-05-2020-0089

Katta, R. M. R., and Patro, C. S. (2017a). Influence of perceived benefits on consumers' online purchase behaviour: an empirical study. *Int. J. Sociotechnol. Knowled. Dev.* 9, 38–64. doi: 10.4018/IJSKD.2017070103

Katta, R. M. R., and Patro, C. S. (2017b). Influence of perceived risks on consumers' online purchase behaviour: a study. *Int. J. Sociotechnol. Knowled. Dev.* 9, 17–37. doi: 10.4018/IJSKD.2017070102

Kim, A. J., and Ko, E. (2012). Do social media marketing activities enhance customer equity? An empirical study of luxury fashion brand. *J. Bus. Res.* 65, 1480–1486. doi: 10.1016/j.jbusres.2011.10.014

Lazaroiu, G., Negurita, O., Grecu, I., Grecu, G., and Mitran, P. C. (2020). Consumers' decision-making process on social commerce platforms: online trust, perceived risk, and purchase intentions. *Front. Psychol.* 11:890. doi: 10.3389/fpsyg.2020.00890

Lee, J., and Hong, I. B. (2016). Predicting positive user responses to social media advertising: the roles of emotional appeal, informativeness, and creativity. *Int. J. Inf. Manage.* 36, 360–373. doi: 10.1016/j.ijinfomgt.2016.01.001

Li, H., Hameed, J., Khuhro, R. A., Albasher, G., Alqahtani, W., Sadiq, M. W., et al. (2021). The impact of the economic corridor on economic stability: a double mediating role of environmental sustainability and sustainable development under the exceptional circumstances of COVID-19. *Front. Psychol.* 11:634375. doi: 10.3389/fpsyg.2020.634375

Li, H., Inzamam, U. H., Hira, N., Gadah, A., Wedad, A., Ahsan, N., et al. (2020a). How environmental awareness relates to green purchase intentions can affect brand evangelism? altruism and environmental consciousness as mediators. *Int. J. Early Childhood Special Educ.* 811–825. [Epub ahead of print].

Li, H., Javaria, H., Rafiq, K., Gadah, A., Wedad, A., Muhammad, W., et al. (2020b). The impact of economic corridor on the economic stability: a double mediating role of environmental sustainability and sustainable development under the exceptional circumstances of COVID-19. *Front. Psychol.* 11:4025.

Lin, X., Featherman, M., Brooks, S. L., and Hajli, N. (2019). Exploring gender differences in online consumer purchase decision making: an online product presentation perspective. *Inf. Syst. Front.* 21, 1187–1201. doi: 10.1007/s10796-018-9831-1

Lipsman, A., Mudd, G., Rich, M., and Bruich, S. (2012). The power of "like": How brands reach (and influence) fans through social-media marketing. *J. Advert. Res.* 52, 40–52. doi: 10.2501/JAR-52-1-040-052

Liu, X., He, M., Gao, F., and Xie, P. (2008). An empirical study of online shopping customer satisfaction in China: a holistic perspective. *Int. J. Retail Distrib. Manage.* 36, 919–940. doi: 10.1108/09590550810911683

Loewy, F. E. (1950). Morphine in asthma. *Br. Med. J.* 1:1143.

Logan, K., Bright, L. F., and Gangadharbatla, H. (2012). Facebook versus television: advertising value perceptions among females. *J. Res. Interact. Mark.* 6, 164–179. doi: 10.1108/17505931211274651

Lomax, R. G., and Schumacker, R. E. (2004). *A Beginner's Guide to Structural Equation Modeling*. New york, NY: Psychology press. doi: 10.4324/9781410610904

Lopez, A., and Castaño, R. (2019). Consumer behavior on social media: a thematic exploration and an agenda for future inquiry. *Bus. Govern. Soc.* 281–301. doi: 10.1007/978-3-319-94613-9_17

Ma, L., Zhang, X., Ding, X., and Wang, G. (2021). How social ties influence customers' involvement and online purchase intentions. *J. Theor. Appl. Electron. Commer. Res.* 16, 395–408. doi: 10.3390/jtaer16030025

Mangold, W. G., and Faulds, D. J. (2009). Social media: the new hybrid element of the promotion mix. *Bus. Horizons* 52, 357–365. doi: 10.1016/j.bushor.2009.03.002

Masri, N. W., Ruangkanjanases, A., and Chen, S.-C. (2021). The effects of product monetary value, product evaluation cost, and customer enjoyment on customer intention to purchase and reuse vendors: institutional trust-based mechanisms. *Sustainability* 13:172. doi: 10.3390/su13010172

Meire, M., Hewett, K., Ballings, M., Kumar, V., and Van den Poel, D. (2019). The role of marketer-generated content in customer engagement marketing. *J. Mark.* 83, 21–42. doi: 10.1177/0022242919873903

Michaelidou, N., Siamagka, N. T., and Christodoulides, G. (2011). Usage, barriers and measurement of social media marketing: An exploratory investigation of small and medium B2B brands. *Ind. Market. Manag.* 40, 1153–1159. doi: 10.1016/j.indmarman.2011.09.009

Molotch, H. (2005). Extravaganzas of show and tell: industrial designers Society of America Annual Convention Pasadena, CA, October 27-30, 2004. *Contexts* 4, 74–75. doi: 10.1525/ctx.2005.4.2.74

Moorman, C., van Heerde, H. J., Moreau, C. P., and Palmatier, R. W. (2019). *Challenging the Boundaries of Marketin*. Los Angeles, CA: SAGE Publications Sage CA. doi: 10.1177/0022242919867086

Moschis, G. P., and Churchill Jr, G. A. (1978). Consumer socialization: a theoretical and empirical analysis. *J. Market. Res.* 15, 599–609.

Naeem, M. (2021). Do social media platforms develop consumer panic buying during the fear of Covid-19 pandemic. *J. Retailing Consum. Serv.* 58:102226. doi: 10.1016/j.jretconser.2020.102226

Nazione, S., Perrault, E., and Pace, K. (2021). Impact of information exposure on perceived risk, efficacy, and preventative behaviors at the beginning of the COVID-19 pandemic in the United States. *Health Commun.* 36, 23–31. doi: 10.1080/10410236.2020.1847446

Netemeyer, R. G., Bearden, W. O., and Sharma, S. (2003). *Scaling Procedures: Issues and Applications*. Thousand Oaks, CA: Sage Publications. doi: 10.4135/9781412985772

Ostrow, L., Croft, B., Weaver, A., and Naeger, S. (2019). An exploratory analysis of the role of social supports in psychiatric medication discontinuation: results related to family involvement. *Psychosis* 11, 212–222. doi: 10.1080/17522439.2019.1615110

Peng, L., Zhang, W., Wang, X., and Liang, S. (2019). Moderating effects of time pressure on the relationship between perceived value and purchase intention in social E-commerce sales promotion: considering the impact of product involvement. *Inf. Manage.* 56, 317–328. doi: 10.1016/j.im.2018.11.007

Qalati, S. A., Vela, E. G., Li, W., Dakhan, S. A., Hong Thuy, T. T., and Merani, S. H. (2021). Effects of perceived service quality, website quality, and reputation on purchase intention: the mediating and moderating roles of trust and perceived risk in online shopping. *Cogent Bus. Manage.* 8:1869363. doi: 10.1080/23311975.2020.1869363

Sarfraz, M. (2018). A moment-based quasilinear theory for electron firehose instability driven by solar wind core/halo electrons. *J. Geophys. Res.* 123, 6107–6118. doi: 10.1029/2018JA025449

Sarfraz, M., He, B., and Shah, S. G. M. (2020c). Elucidating the effectiveness of cognitive CEO on corporate environmental performance: The mediating role of corporate innovation. *Environ. Sci. Pollut. Res.* 27, 45938–45948. doi: 10.1007/s11356-020-10496-7

Sarfraz, M., Ozturk, I., Shah, S. G. M., and Maqbool, A. (2020b). Contemplating the impact of the moderators agency cost and number of supervisors on corporate sustainability under the aegis of a cognitive CEO. *Front. Psychol.* 11:965. doi: 10.3389/fpsyg.2020.00965

Sarfraz, M., Shah, S. G., Fareed, Z., and Shahzad, F. (2020a). Demonstrating the interconnection of hierarchical order disturbances in CEO succession with corporate social responsibility and environmental sustainability. *Corp. Soc. Respons. Environ. Manag.* 27, 2956–2971. doi: 10.1002/csr.2014

Schivinski, B., Muntinga, D. G., Pontes, H. M., and Lukasik, P. (2021). Influencing COBRAs: the effects of brand equity on the consumer's propensity to engage with brand-related content on social media. *J. Strateg. Mark.* 29, 1–23. doi: 10.1080/0965254X.2019.1572641

Schmid, B., and Axhausen, K. W. (2019). In-store or online shopping of search and experience goods: a hybrid choice approach. *J. Choice Model.* 31, 156–180. doi: 10.1016/j.jocm.2018.03.001

Schmutz, P., Roth, S. P., Seckler, M., and Opwis, K. (2010). Designing product listing pages—effects on sales and users' cognitive workload. *Int. J. Hum. Comput. Stud.* 68, 423–431. doi: 10.1016/j.ijhcs.2010.02.001

Seiders, K., Berry, L. L., and Gresham, L. G. (2000). Attention, retailers! How convenient is your convenience strategy? *MIT Sloan Manag. Rev.* 41:79.

Sharma, S., Singh, S., Kujur, F., and Das, G. (2021). Social media activities and its influence on customer-brand relationship: an empirical study of apparel retailers' activity in India. *J. Theor. Appl. Electron. Commer. Res.* 16, 602–617. doi: 10.3390/jtaer16040036

Sheth, J. (2021). New areas of research in marketing strategy, consumer behavior, and marketing analytics: the future is bright. *J. Mark. Theory Pract.* 29, 3–12. doi: 10.1080/10696679.2020.1860679

Sultan, M. T., Sharmin, F., Badulescu, A., Stiubea, E., and Xue, K. (2021). Travelers' responsible environmental behavior toward sustainable coastal tourism: an empirical investigation on social media user-generated content. *Sustainability* 13:56. doi: 10.3390/su13010056

Tandon, U. (2020). Predictors of online shopping in India: an empirical investigation. *J. Mark. Analyt.* 9, 1–15. doi: 10.1057/s41270-020-00084-6

Thorelli, H. B. (1986). Networks: between markets and hierarchies. *Strat. Manag. J.* 7, 37–51. doi: 10.1002/smj.4250070105

Tzeng, S.-Y., Ertz, M., Jo, M.-S., and Sarigöllü, E. (2021). Factors affecting customer satisfaction on online shopping holiday. *Mark. Intell. Plan.* doi: 10.1108/MIP-08-2020-0346

Van-Tien Dao, W., Nhat Hanh Le, A., Ming-Sung Cheng, J., and Chao Chen, D. (2014). Social media advertising value: the case of transitional economies in Southeast Asia. *Int. J. Adv.* 33, 271–294. doi: 10.2501/IJA-33-2-271-294

Vasić, N., Kilibarda, M., and Kaurin, T. (2019). The influence of online shopping determinants on customer satisfaction in the Serbian market. *J. Theor. Appl. Electron. Commer. Res.* 14, 70–89. doi: 10.4067/S0718-18762019000200107

Vinerean, S., Cetina, I., Dumitrescu, L., and Tichindelean, M. (2013). The effects of social media marketing on online consumer behavior. *Int. J. Bus. Manage.* 8:66. doi: 10.5539/ijbm.v8n14p66

Voorveld, H. A., Van Noort, G., Muntinga, D. G., and Bronner, F. (2018). Engagement with social media and social media advertising: the differentiating role of platform type. *J. Advert.* 47, 38–54. doi: 10.1080/00913367.2017.1405754

Wai, K., Dastane, O., Johari, Z., and Ismail, N. B. (2019). Perceived risk factors affecting consumers' online shopping behaviour. *J. Asian Finan. Econ. Bus.* 6, 246–260. doi: 10.13106/jafeb.2019.vol6.no4.249

Wang, C., Walker, E., and Redmond, J. (2007). Explaining the lack of strategic planning in SMEs: the importance of owner motivation. *Int. J. Org. Behav.* 12, 1–16.

Wang, F., Yuan, Y., and Lu, L. (2021). Dynamical prediction model of consumers' purchase intentions regarding anti-smog products during smog risk: taking the information flow perspective. *Physica A* 563:125427. doi: 10.1016/j.physa.2020.125427

Ward, S. (1974). Consumer Socialization. *J. Cons. Res.* 1, 1–14. doi: 10.1086/208584

Winter, S., Maslowska, E., and Vos, A. L. (2021). The effects of trait-based personalisation in social media advertising. *Comput. Hum. Behav.* 114:106525. doi: 10.1016/j.chb.2020.106525

Yildirim, M., Özaslan, A., and Arslan, G. (2021). Perceived risk and parental coronavirus anxiety in healthcare workers: a moderated mediation role of coronavirus fear and mental well-being. *Psychol. Health Med.* 1–12. doi: 10.1080/13548506.2021.1871771

Zhong, B., Huang, Y., and Liu, Q. (2021). Mental health toll from the coronavirus: social media usage reveals Wuhan residents' depression and secondary trauma in the COVID-19 outbreak. *Comput. Hum. Behav.* 114:106524. doi: 10.1016/j.chb.2020.106524

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Entrepreneurship, Corporate Social Responsibilities, and Innovation Impact on Banks' Financial Performance

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The basic aim of this research was to check the impact of innovation, corporate social responsibilities (CSR), and entrepreneurship on the monetary performance of banks in five different countries: Qatar, Pakistan, China, the United States (US), and France. This research was conducted to measure the relationship of these factors and innovative workforce activities. The secondary data were collected from websites of twenty five banks in different countries, including Islamic and conventional banks. Different econometric analyses, such as descriptive statistical analysis, correlation coefficient test for measuring the interaction, and ordinary least square regression analysis for determining the impact of dependent and independent variables, were carried out. In the present study, entrepreneurship, CSR, and innovation were taken as independent variables. Board size, frequency of assemblies, and self-employed with large shareholders were included as sub-parts of entrepreneurship. On the other hand, the financial performance of banks was taken as the dependent variable. Return on assets (ROA) and return on equity (ROE) were considered parts of economic performance. The overall conclusions drawn in this study showed that there was a significant relationship between all the studied variables. The research provided useful insights into the long-debated question regarding the relevance of entrepreneurship and CSR.

Keywords: entrepreneurship, return on assets, corporate social responsibilities, innovation, return on equity, board size, financial performance

INTRODUCTION

Entrepreneurship is important due to the departure of control and ownership in openly held organizations. It encompasses a collection of skills in processes, proper mechanisms, and relations used by different parties in the corporations. It is also a combination of board and committee, all policies, legalities, rules and regulations system, overall hierarchy, and internal control (Kojima et al., 2017).

Entrepreneurship and its components identify all rights among participants including managers, auditors, creditors, the board of directors, and other shareholders (Chen and Yu, 2017). Corporate entrepreneurs are very important for organizations because they increase the possibility of recovering from conflicts between upper management and shareholders. Entrepreneurship is a scheme through which organizations are measured and monitored. The Board of Directors are mainly accountable for the success of corporations. The role of stockholders in entrepreneurships is to assign the auditors and directors to satisfy themselves and to provide a suitable overall governance structure (Al-ahdal et al., 2020).

Sometimes entrepreneurship is broken down into four elements, also called the four Ps institutions: people, purpose, process, and performance (Wondem and Batra, 2019). These philosophies provide guidelines about entrepreneurship on why entrepreneurship exists, the governance mechanism, and how it works and operates. Large shareholders influence the management of a company. They also have the power to shape the company's investment decisions and deploy minority shareholders' resources. The block holder often acts as an agent who controls the principal's resources (i.e., minority shareholders) (Choi and Park, 2019). In this way, entrepreneurship shapes the relationship between large and small self-employed shareholders by providing minorities the means to safeguard their interests, if they are different from those of the majority shareholders. The misalignment between the managers and shareholders' risk tolerance might be damaging for shareholders since it can result in an allocation of resources that is not efficient from a shareholder's point of view.

To sum up, the principal-agent problem arises in modern corporations because of the coexistence of four elements:

- Agent's self-interest.
- Division of ownership and control.
- Information asymmetry between agent and principal.
- Residual decision rights allocated to the agent.

Skill is involved in improving the operation and creating more efficiency, mitigating risk, enhancing the access to capital, and providing a defense to stakeholders (Mansur and Tangl, 2018). An improved operation also produces more accountability and transparency for builders and investors. Malik Riaz, Bill Gates, and Larry Page are examples of good entrepreneurs. They usually outperform other firms (Ahmad et al., 2019). The main focus of entrepreneurship is to support the investor and help to finance further growth. The entrepreneurship assessment used in this work directly or indirectly evaluates all these methods. Apart from these three governance-related mechanisms, the research study includes the entrepreneurship instruments and the financial control performed by external auditors. The enforcement of these instruments is paramount for companies (Sarpong-Danquah et al., 2018).

Corporate social responsibilities (CSR) also play an important role in the firm's efficacy. CSR shows the organization's self-accountability related to the social as well as environmental concerns. The organizations that put their attention toward the social and environmental responsibilities also put extensive attention toward their efficiency and strive for high financial performance (Ali et al., 2017). CSR are effective regulations on social and environmental matters that must be followed by organizations to survive in society and avoid environmental degradation to enhance the social norms (Chen et al., 2018). CSR restrict the ability of organizations to damage societal norms and the environment by providing the framework of responsibilities that must be performed by the organization. Thus, CSR is a necessary element for the organization to survive in the society and to provide a positive impact on the firm's efficiency. Therefore, the present study considered CSR to examine the firm's financial performance.

Innovation is about creating new value in a new way. Basically, innovation is a development, creation, and implementation process related to new products and services with improved efficiency, competitive advantages, and increased effectiveness in organization-related work (Akram et al., 2011; Nawaz et al., 2019).

This research study's main emphasis was to measure the association of entrepreneurship, CSR, and innovation with the economic performance of banking sectors. Entrepreneurs play an essential role in every corporation. For this research we used the number of members on the board of management, the frequency of meetings, and number of large stakeholders as independent variables. These are all the subunits of entrepreneurship. Process innovation and product innovation along with CSR were also considered independent variables for determining the impact of financial performance.

The emphasis of this research was to examine the extent of relation amid firm-specific entrepreneurship practices and firms' actual routines. We tried to provide an answer to the long-debated question, "Does entrepreneurship have a substantial impact on a firm's results?"

Financial performance is an essential subjective measure that measures a firm's performance and considers how well a firm used financial assets from the different primary modes of all businesses and generates revenues. There are several performance indicators related to financial performance i.e., revenue, profit margin, client retention rate, and average class attendance to increase the probability of measuring productivity (Srivastava and Bhatia, 2020). Similarly, five types of financial statements show financial performance, such as financial position, statement of cash flow, equity statement, income statement, and financial information. In this research data were collected from these annual financial statements.

Research Questions

- How do entrepreneurship, CSR, and innovation affect financial performance in banking sectors?
- How can financial performance of banks be measured?

LITERATURE REVIEW

Al-Rahahleh (2017) conducted a study on entrepreneurship in corporation and bank's financial performance. This research was

conducted in the Arabian Peninsula. This study used different variables related to entrepreneurship, such as board size and bank age. The sample used in this research comprised both Islamic banks and conventional banks that operate in seven Arabian Peninsula countries including the Kingdom of Saudi Arabia, Oman, Yemen, and Qatar. This research's findings showed that there was an important association between board size, bank age, and bank's financial performance. Overall results described a meaningful association between entrepreneur and financial performance. The studies of Matousek and Tzeremes (2016) have implied that the technical efficiency of the banks can be measured using two measures: Data Envelopment Approach (DEA) and Free Disposal Hall (FDH). Djebali and Zaghdoudi (2020) evaluated entrepreneur performance testing the entrepreneurship performance in relation to Tunisian banks based on the specific GMM system analysis. This study's main aim was to examine the internal entrepreneur impact on banking sectors and their performance. For this purpose, they used annual data from 10 Tunisian banks registered in the stock exchange of Tunisia. Data were used from between 1998 and 2015. The results indicated that the correlation between the state's presence, the attendance of ID (Independent directors), and the board of directors had an optimistic and significant association. On the other hand, some CEO compensation and institutional and foreign stakeholders represent a negative consequence on the presentation of banking sectors. Banking performance is heavily affected by return on assets (ROA) and number of shareholders (Fukuyama and Matousek, 2017). Owiredu and Kwakye (2020) investigated the impression of entrepreneurship on commercial banks' economic performance in Ghana. Data for this research were composed from the yearly reports and the financial statements of selected banks from 2007 to 2016. For this purpose, they used different models, including the random sampling model, the ordinary Regression analysis, and the OLS model, for analysis. Results revealed an important and optimistic association between entrepreneurship and a bank's financial performance.

Social corporate responsibilities (CSR) also has a positive effect on the financial performance of an organization because it improves the efficiency of the organization not only in terms of social and environmental concerns but also with achieving the high performance goals of the organization. In many previous studies it was revealed that banking is highly affected by shareholders (Farrukh et al., 2017; Dakhlallh et al., 2019). They also enhance the efficiency to achieve the goal of maximization of shareholders' wealth (Beck et al., 2018). In addition, CSR are effective regulations related to the social norms which improve the efficiency of an organization toward social concerns along with the financial performance of an organization (Fernández-Gago et al., 2018). Moreover, the banks that implement CSR within an organization are more efficient and high-performance-oriented than banks which are not effectively implementing CSR in their organization (Jain et al., 2015). Thus, CSR are necessary elements for an organization and they have a positive impact on a firm's efficiency. Therefore, in the present study we took this into consideration and examined the role of CSR for firm financial performance.

MATERIALS AND METHODS

Research Method

This study's basic theme was to inspect the influence of entrepreneurship, CSR, and innovation on the economic presentation in banking sectors. To achieve this objective, we used data from five countries: Pakistan, Qatar, China, France, and the United States. Twenty-five banking sectors, both Islamic and conventional, were selected for empirical study in every country.

Board of Directors

The board of managements, the leading authority concerned with manager monitoring, is appointed by the shareholders and acts on their behalf to monitor the managers' decision-making activities to ensure their good faith and their shareholder value creation attitude (Qadorah and Fadzil, 2018). Directors participate in the business's economic life and have the responsibility of accountability to monitor the managers' actions and rectification (Jizi, 2017). They may or may not hold executive roles within the organization. Managers must report periodically to the Board of Directors and the latter have to evaluate the proposals and approve them (Miyajima et al., 2018).

Corporate Social Responsibilities

Corporate social responsibilities (CSR) are the responsibilities related to the social norms and environmental concerns that must be implemented by the organization to protect the society and environment. The organizations that implemented and followed CSR are considered more efficient not only toward societal norms and environmental concerns but also toward attaining high financial performance (Asmeri et al., 2017). Thus, the organizations that have implemented and followed CSR has been assigned the value "1" while the organizations that have not implemented and followed CSR have been assigned the value "0."

Outsiders rely much more on objective evaluation criteria given their lack of understanding of businesses and firm practices, thus enabling ex-post financial controls (evaluating the outcome of manager's conduct). On the other hand, insiders adopt more subjective criteria, based on business and firm knowledge that descends from their past experiences. Hence, insiders can establish ex-ante strategic controls on managers' decisions (evaluating their behavior).

Large Shareholder Rights

The division of powers and the unfeasibility of complete contracts have awarded managers great authority over the company's life. However, in light of their owner's role, corporate laws provide shareholders with the power to have a say in the company's management. This power is fragmented into minor separate rights which shareholders can enforce against executives and managers. The existence of a set of rights awarded to every shareholder indiscriminately, proportionally to the size of their stake, aims at ensuring not only the protection of owners against their agents, e.g., managers, but also against larger controlling shareholders who can exert tremendous pressure on management to pursue their private interests, which might be different from

those of minorities. The exercise of these rights can protect themselves from managerial misbehavior and the supremacy of large block holders. Every national legal framework prescribes a shareholder meeting which is called to rectify some resolutions of primary importance for the company. These matters are crucial for the company's life i.e., mergers and acquisitions, financial statement approval, the election of the board members, and so forth. To this extent, shareholder rights are characteristics of a given legal framework rather than of a single company. However, the company can take some legal measures that indirectly impede the exercise of these rights. These could include takeover defenses that might entrench management or the introduction of misalignment between ownership and voting power in the bylaws (Hansen and Block, 2020).

External Auditor

Audits embed all the activities that are undertaken to examine and verify the company's records and statements. In past years, external audits have attracted attention due to the occurrence of scandals regarding the independence and good faith of external auditors like the Enron scandal, which eventually led to the company's bankruptcy. External auditors exercise a gate keeping role since they provide an independent judgment and assure the market that the company's financial condition is portrayed truthfully. External audits reduce the agency problem by relying on independent and objective supervision performed by competent authorities without any linkage to the organization. Research analysis includes the external audit as an additional entrepreneurship instrument to follow the categorization proposed by Institutional Shareholder Services (Owen and Temesvary, 2018).

In this research paper, the effectiveness of all the above-described tools were evaluated to grade entrepreneurship. However, these were classified differently. In most developed markets, entrepreneur systems have reached a high level of development. Companies can attract reasonable capital amounts by investors ensuring that their money will be deployed in their best interests. The mitigation of the agency problems and the subsequent allocation of responsibilities allow shareholders to "trust" the company. Indeed, the poor economic results of any company are not entirely dependent on the existence of managers' good faith. They can well act to satisfy their shareholders but can still take wrong decisions that diminish owners' wealth. The organization operates in a competitive field and the uncertainty which is systemically associated with its actions creates risks to shareholders. Entrepreneurship assures the shareholders that the rewards they receive for their residual claim are the outcome of a set of informed decisions taken in their best interests (Wahyudin and Solikhah, 2017). Their finance provider role has to be rewarded in light of their investments which are essential to allow the corporation to grow (Khan et al., 2013).

Sampling

This research paper describes the inspiration of entrepreneurship, CSR, and innovation on a bank's economic performance. The sample size of this research was selected from five countries: Pakistan, China, Qatar, France, and the United States. The statistics were collected from the bank's annual and financial information by selected banks of these countries including Islamic banks and conventional banks.

Hypothesis Development

H0 = There is no association between entrepreneurship, CSR, and innovation on the financial performance of banking sectors.

H1 = There is an important association among board size and financial performance.

H2 = There is an associated impact of incidence of meetings and the bank's financial performance.

H3 = There is a specific association among entrepreneurship and financial performance.

H4 = The number of large shareholders shows an optimistic and important consequence on a bank's financial performance.

H5 = CSR has a significant relation with financial performance.

H6 = The innovation has a significant relationship with financial performance and entrepreneurship.

Entrepreneurial instruments, such as performance-based executive compensation, are aimed at making opportunistic behavior financially unattractive for managers. The monitoring performed by the Board of Directors ensures an adequate evaluation of managerial conduct and impedes the occurrence of shareholder value-destroying actions.

In the presence of proper control, the incentive that managers have in expropriating bank's resources drops since the probability of their discovered malfeasances increases. In this situation, the management team would be replaced, which is highly undesirable for managers. Furthermore, the Board of Directors' impartial and objective control is necessary to ensure minority shareholders that a controlling shareholder's presence would not diminish their returns.

Figure 1 shows the theoretical frameworks and **Table 1** shows the variables. Connection between Entrepreneurship, CSR, and Performance: The second set of models investigated the relationship between the performance indicators and scores awarded to each bank for each of the three entrepreneurship pillars. Again, the performance indicators were dependent variables and the overall score was the regressor.

The two equations were:

$$MODEL2.1 : ROE_{it} = \beta_0 + \beta_1 BS_{it} + \beta_2 \mathrm{FOM}_{it} + \beta_3 \mathrm{CSR}_{it} + \beta_3 \mathrm{NOLS}_{it} + \varepsilon$$

$$MODEL2.1 : ROA_{it} = \beta_0 + \beta_1 BS_{it} + \beta_2 \mathrm{FOM}_{it} + \beta_3 \mathrm{CSR}_{it} + \beta_4 \mathrm{NOLS}_{it} + \varepsilon$$

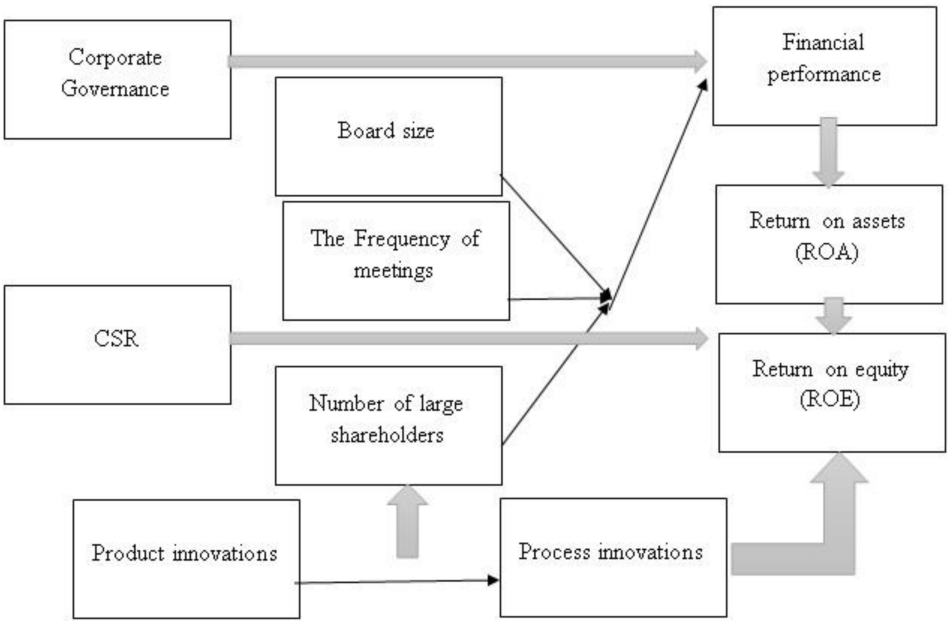

FIGURE 1 | Theoretical framework.

RESULTS

Table 2 describes the descriptive statistical analysis of all variables: board size; the frequency of meetings; number of large shareholders; CSR; the ROA; and return on equity (ROE) by the value of the mean, standard deviation, medium value, maximum values, and minimum values. Entrepreneurship, CSR, and innovation were considered as independent variables and financial performance was the dependent variable. Return on assets and returns on equity were sub variables related to financial performance. Their mean values were 25.422 and 0.518, respectively. The median values were 0.43 and 18.32. Their standard deviation values were 0.279 and 16.482 which showed that "ROA" and "ROE" deviated 27 and 16% from their means. Similarly, the return on asset's maximum value was 0.990 and the ROE's maximum value was 93.32. This statistical analysis used 275 observations for measuring the influence between entrepreneurship and innovation on the bank's financial performance. The probability value was put at 0.000 which showed a 100% significance level. The skewness values were 0.49, 0.07, 1.47, 0.29, and 1.56, respectively, for all the variables. Results described the overall relationship between them.

Table 3 represents the correlation coefficient analysis between entrepreneurship, CSR, and financial performance. The correlation coefficient examination explained the inter-correlation among variables, such as board size and ROA which showed a negative relationship between them at –0.1821. The frequency of meetings showed a positive relationship with ROA, 0.0663, and a negative relationship with ROE, –0.069. Return on equity showed a positive relationship with board size at a rate of 0.120. CSR had a positive association with ROA, i.e., 0.04195, and ROE, i.e., 0.3176. The number of shareholders and ROA presented a positive relationship of 0.0503. One represents the 100% significance level among all variables, such as board size, number of shareholders, and occurrence of meetings, showed the entrepreneur performance regarding financial aspects. The frequency of meetings and ROA also described a positive relationship at a 0.066 level of significance. Board size and ROA showed an 18% significance level.

Table 4 explains the cross-section results related to ordinary least square regression analysis when the dependent variable was the ROA. The value of standard deviation, the T-statistic value, and the probability value described the relations between a dependent variable and independent variables. The board size was the independent variable and as a part of entrepreneurship, its coefficient value was –0.0179. Its standard deviation value

TABLE 1 | Variables.

Sr. no	Variables	Notation
	Independent variable	
1	Entrepreneurship	CG
2	Corporate social responsibilities	CSR
3	No of the large shareholders	NLS
4	Frequency of meetings	FOM
5	Board size	BS
6	Innovation	I
7	Product innovation	PI
8	Process Innovation	PI
9	Dependent variable	DV
0	Financial performance	FP
11	Return on assets	ROA
12	Return on equity	ROE

TABLE 2 | Descriptive statistical analysis.

	Board size	Frequency of meetings	Number of large shareholders	Return on assets	Return on equity	CSR
Mean	13.68364	5.578182	24.43445	0.518331	25.42273	0.532112
Median	13.00000	6.000000	18.01000	0.430000	18.32000	0.522513
Maximum	20.00000	9.000000	76.32000	0.990000	93.32000	1
Minimum	7.000000	3.000000	9.310000	0.110000	9.310000	0
Std. dev.	2.750897	1.141566	14.89482	0.279440	16.48223	0.314752
Skewness	0.492071	0.079864	1.471600	0.295661	1.562766	0.084511
Kurtosis	2.416709	2.534174	4.350983	1.687623	4.890914	2.314854
Jarque-Bera	14.99626	2.778721	120.1702	23.74159	152.9058	2.935612
Probability	0.000554	0.249235	0.000000	0.000007	0.000000	0.000000
Observations	275	275	275	275	275	275

TABLE 3 | Correlation coefficient.

	Board size	Frequency of meetings	Number of large shareholders	Return on assets	Return on equity	CSR
Board size	1	0.0572	−0.173	−0.182	0.120	0.321
Frequency of meetings	0.0572	1	−0.077	0.066	−0.069	0.015
Number of large shareholders	−0.173	−0.077	1	0.050	−0.137	0.329
Return on assets	−0.182	0.066	0.0503	1	−0.079	0.041
Return on equity	0.120	−0.069	−0.137	−0.079	1	0.317
CSR	0.321	0.0154	0.329	0.041	0.317	1

was 0.0061, the t-statistic value was –2.9099, and the probability value was 0.003. Results showed that the board size presented a negative relationship but a significant connection with financial performance. The second independent variable was the frequency of meetings. Its coefficient value was 0.018. The standard deviation value was 0.0146. Its t-statistic value was 1.23 and the probability value was 0.216. The third predictor was the CSR; its coefficient value was 0.0325. The standard deviation value was 0.0121. Its t-statistic value was 2.679 and the probability value was 0.0210. It showed positive and significant association among CSR and ROA. Regression analysis indicated that the frequency of meetings showed positive linkage with the financial performance, but it was not significant. The number of shareholders was also taken as an independent variable and part of entrepreneurship. Its *t*-statistic value and coefficient value were 0.0003 and 0.3017, respectively. Its probability value was 0.76. The results showed that there was a positive but not significant connection with the financial performance of banking sectors. The value of R-square was 0.042 and its probability value was 0.0199 which showed 1.99% significant association. The F-statistic value was 2.97 and the adjusted R-square value was 0.027.

Table 5 also represented the ordinary least square regression analysis related to financial performance. In this table, ROE was considered dependent for measuring the financial performance of banking sectors and measuring the relations between entrepreneurship and innovation regarding financial performance. The total panel of observation was 275. The board size was an independent variable. Its coefficient value was 29.1862 and the standard deviation value was 7.67. Its value of t-statistic was 3.802 and its probability value was 0.002.

TABLE 4 | Regression analysis: descriptions dependent variable is the return on assets.

Variable	Coefficient	Std. error	t-statistic	Probability
C	0.6763	0.1267	5.3357	0.000
Board size	–0.0179	0.0061	−2.9099	0.003
Frequency of meetings	0.0182	0.0146	1.2393	0.216
CSR	0.0325	0.0121	2.6793	0.021
Number of large shareholders	0.0003	0.0011	0.3017	0.763
The value of R-squared	0.0421			
Value of adjusted R-squared	0.0279			
Standard error of regression	0.2755			
The sum of squared residuals	20.493			
The log-likelihood	–33.167			
Value of F-statistic	2.9715			
Probability (F-statistic)	0.0199			

TABLE 5 | Dependent variable: return on equity.

Variable	Coefficient	Std. error	t-statistic	Probability
C	29.18626	7.675065	3.802738	0.0002
Board size	0.561698	0.369508	1.520127	0.1296
Frequency of meetings	–1.167295	0.868014	–1.344788	0.1798
CSR	0.143921	0.072321	1.990031	0.0214
Number of large shareholders	–0.138232	0.067241	–2.055781	0.0408
The value of R-squared	0.038088			
Value of adjusted R-squared	0.023837			
Standard error of regression	16.28460			
The sum of squared residuals	71600.82			
The log-likelihood	–1154.996			
Value of F-statistic	2.672725			
Probability (F-statistic)	0.032478			

TABLE 6 | Hypothesis.

Alternative the hypothesis: common AR Coefficients (within-dimension)				
	Statistic value	Probability	Weighted Statistic value	Probability
The panel v-statistic	–0.927719	0.8232	–1.165478	0.8781
The panel rho-statistic	2.247529	0.9877	2.902417	0.9981
The panel PP-statistic	–6.833293	0.0000	–3.158293	0.0008
The panel ADF-statistic	–0.404606	0.3429	1.398021	0.9189
The alternative hypothesis: individual AR Coefficients (between-dimension)				
	Statistic value	Probability		
Group rho-statistic	5.067267	1.0000		
Group PP-statistic	–6.057705	0.0000		
Group ADF-statistic	0.284462	0.6120		
Overall cross-section specific results				
The Phillips-Peron results (non-parametric)				
Cross ID	**AR(1)**	**Variance**	**HAC**	**Bandwidth Observation**
1	–0.408	1.499276	0.339436	9.00 10
2	–0.111	4.828203	4.828203	0.00 10
3	–0.039	4.884368	4.884368	0.00 10
4	–0.222	7.435828	7.435828	0.00 10
5	–0.347	1.377512	0.719122	5.00 10
6	–0.237	1.003110	0.239579	9.00 10
7	–0.386	0.776175	0.547335	2.00 10
8	–0.484	1.443591	0.243868	8.00 10
9	0.192	0.373116	0.433681	1.00 10
10	–0.465	1.327791	1.354859	1.00 10
11	–0.155	2.023940	2.001785	1.00 10
12	–0.376	5.985166	6.180868	1.00 10
13	–0.485	5.902544	2.466254	7.00 10
14	–0.267	3.493007	3.765426	1.00 10
15	–0.170	2.184042	1.081399	7.00 10
16	0.436	3.075256	2.745813	2.00 10
17	–0.428	6.779533	6.779533	0.00 10
18	0.586	0.785261	1.127738	2.00 10
19	0.383	2.941114	2.941114	0.00 10
20	–0.392	7.541704	1.824278	9.00 10
21	–0.122	1.334927	1.334927	0.00 10
22	0.145	0.527217	0.634162	2.00 10
23	–0.203	1.833193	1.892224	1.00 10
24	–0.454	6.110362	2.159845	9.00 10
Augmented Dickey-Fuller results (parametric)				
Cross ID	**AR (1)**	**Value of variance**	**Total lag**	**The max lag Observation**
1	–1.267	0.536633	1	– 9
2	–0.090	5.165431	1	– 9
3	–0.292	5.177026	1	– 9
4	–0.171	8.195278	1	– 9
5	–0.778	1.229689	1	– 9
6	–0.809	0.681627	1	– 9
7	–1.165	0.691117	1	– 9
8	–1.160	1.096966	1	– 9
9	0.146	0.333277	1	– 9
10	–0.576	1.312699	1	– 9
11	–0.251	2.232980	1	– 9
12	–0.262	6.578937	1	– 9
13	–1.261	1.973118	1	– 9
14	0.104	3.548082	1	– 9
15	–0.812	1.771987	1	– 9
16	0.103	2.385752	1	– 9
17	–0.583	5.936183	1	– 9
18	0.753	0.730156	1	– 9
19	0.191	3.179142	1	– 9
20	–1.016	6.133864	1	– 9
21	–0.181	1.468779	1	– 9
22	0.601	0.398824	1	– 9
23	–0.021	1.990258	1	– 9
24	–1.252	1.958642	1	– 9

(Continued)

TABLE 6 | continued

Alternative the hypothesis: common AR Coefficients (within-dimension)				
	Statistic value	Probability	Weighted Statistic value	Probability

TABLE 7 | Unit root test.

Methods test	Statistic	Probability**	Cross sections	Observation
Null: the Unit root (assumes common unit root process)				
Levin, Lin, and Chu t*	–0.31671	0.3757	25	225
Null: unit root (assumes individual unit root process)				
Im, Pesaran, and Shin W-stat	–1.03189	0.1511	25	225
ADF–Fisher Chi-square	68.9313	0.0391	25	225
PP–Fisher Chi-square	82.2652	0.0027	25	250

***The probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All the other tests assume asymptotically are normality. *Stationary at level.*

TABLE 8 | Correlation matrix.

Variables	BS	FOM	NOLS	CSR	ROA
BS	1.000				
FOM	0.019	1.000			
NOLS	–0.114	0.193	1.000		
CSR	0.138	0.126	0.176	1.000	
ROA	0.061	–0.039	–0.190	–0.478	1.000

TABLE 9 | Variance inflation factor.

	VIF	1/VIF
BS	1.641	0.609
FOM	1.454	0.688
NOLS	1.413	0.708
CSR	1.106	0.904
ROA	1.077	0.929

Results showed that the board size represented an optimistic and most important link with the ROE at an 100% significance level. The frequency of meetings was also taken as part of entrepreneurship in a way that its coefficient and t-statistic values were –1.1672 and –1.244, respectively. It indicated that the negative relationship of its probability value was 0.17 showing no significance at a rate of 17%. CSR coefficient value was 0.1439.

TABLE 10 | Skewness and kurtosis test.

	Pr(Skewness)	Pr(Kurtosis)	adj_chi2(2)	Prob > chi2
BS	0.000	0.000	.	0.000
FOM	0.000	0.000	55.840	0.000
NOLS	0.526	0.000	15.510	0.000
CSR	0.000	0.000	37.490	0.000
ROA	0.000	0.001	27.630	0.000

The standard deviation value was 0.0723. Its t-statistic value was 1.990 and the probability value was 0.0214. It showed positive and significant association among CSR and ROE. The number of large shareholders was also an independent variable and part of entrepreneurship. Its coefficient value was –0.1382 and the t-statistic value was –2.055, which showed a negative relationship with ROE. Still, it was significant because of its probability value: 0.04. The importance of R-square was 0.038. Overall probability value was 0.032. Its F-statistic value was 2.672. Overall results rejected the H0 (null hypothesis) and accepted all alternative hypotheses: H1, H2, and H3.

Table 6 explained the Pedroni co-integration test among all variables including entrepreneurship, CSR, innovation, and financial performance. Results represented the alternative hypothesis with statistic value, the value of probability, and observational values related to the legs and variances. These results accepted the alternative view and rejected the null hypothesis associated with entrepreneurship and financial performance.

Table 7 described the unit root test analysis among variables with statistics' help. The total observations were 225 and the overall cross-section value was 25. This analysis used multiple tests related to the hypotheses. The Levin, Lin, and Chu *t*-test showed statistic value as –0.3167. Its probability value was 0.37. Other tests were Pesaran and Shin W-stat tests. It showed that statistic value was –1.03189. Its probability was 15%. The observed values of this analysis were 225. The ADF-Fisher Chi-square was another test related to the asymptotic Chi-square distribution. Its statistic value was 68.93 and its probability value was 0.0391. It showed a 3% significance level.

Table 8 shows the correlation matrix has shown the links among the variables. The values highlighted no high linkage among the items while all the predictors have a positive association with the bank performance except numbers of large shareholders and CSR.

In **Table 9**, the VIF displays the multicollinearity in the model. The values show that no multicollinearity exists in the model because the VIF values are lower than five.

Table 10 examined the normality of the variables and values of the Skewness and Kurtosis, with the probability values less than 0.05, which indicates that there is a normality issue in the model.

Table 11 explained the coefficient confidence interval of all variables including board size, the frequency of meetings, entrepreneur, CSR, and financial performance positions. This interval was divided into three parts at 90, 95, and 99% and showed the low level and high level of all variables. The board size coefficient value was 29.186. Its 99% interval low value was 9.275 and high-level value was 49.096. Similarly, the frequency of meetings' value of the coefficient was 0.5616. Its low value showed a negative interval in every part as –2.599, –2.876, and –3.419, respectively. The coefficient value of ROA was –3.0108 which also showed hostile relations.

DISCUSSION

The study results have revealed that banking size positively relates to banking performance, but the number of large shareholders is negatively related with banking performance. These results are in line with the past studies of Halkos et al. (2016), which showed the banks' ability to attain maximum output with the minimum quantity of input. These studies depicted the significant importance of banking performance in the banking sector. It has been elaborated by these studies that the improvement in the rate of return of assets accelerates banking institutions' operational and economic performance. The studies also approved the results of Tsionas and Mamatzakis (2017), which showed the importance of more ROA in attaining superior operational and economic performance. These studies recommended the management of banking and financial institutions to devise their strategies, technology, procedures, and combination of factors in such a way as to attain optimal output by employing minimum quantity of available input. Moreover, the results have indicated that the frequency of meetings is linked with banking and financial sectors' operational and economic performance. These results were approved by the studies of Pruteanu-Podpiera et al. (2016), according to which the frequency of meetings have a negative association with the

TABLE 11 | Confidence interval test.

		90% CI		95% CI		99% CI	
Variables	**Coefficient**	**Low value**	**High value**	**Low value**	**High value**	**Low value**	**High value**
C	29.186	16.5	41.85	14.07	44.29	9.275	49.09
BS	0.561	–0.04	1.171	–0.165	1.289	–0.396	1.520
FOM	–1.167	–2.59	0.265	–2.876	0.541	–3.419	1.084
NOLS	–0.138	–0.24	–0.027	–0.270	–0.005	–0.312	0.036
CSR	0.032	0.012	0.213	0.002	0.321	0.001	0.421
ROA	–3.010	–8.94	2.918	–10.08	4.062	–12.33	6.30

performance rate of banking and financial institutions as it motivated them to improve their service which meant they met the customers' needs and demands. It is suggested by these studies that both the frequency of meetings and financial institutions among different enterprises in other economic industries affects banking performance. The studies also approved results of Jayakumar et al. (2018), which also revealed that the large number of shareholders and frequency meetings negatively affect the banking sector's operational performance and makes them grow with an increasing rate. These studies elaborate that the large number of shareholders results in improved services as the banks try to have complete information about the changing market trends and customers' requirements and adapt their activities to match these shifts and requirements. Moreover, the study results have indicated that the bank size had considerable influence on operational and economic performance. These results are approved by a previous study by Nikolaou et al. (2015), which threw light on the fact that the size of a bank may have severe impacts on banking performance while others are less severe. These studies are also in accordance with the past studies of Lehkonen and Heimonen (2015), which also proved the size of a bank increased the banks' performance.

CONCLUSION

This research paper analyzed the consequences of entrepreneurship performance and CSR with innovation on a bank's financial performance. This research collected a set of ratings to mirror the efficiency of banks' specific entrepreneurship practices and a set of performance indicators to obtain this objective. The research investigated the relationship between this group of variables. The results showed that differences in entrepreneurship practices are reflected in banks' actual performance. According to the empirical analysis results, American best-performing firms in terms of entrepreneurship were an example of this latter scenario. The quick score takes the highest-scoring and lowest-scoring firms as a benchmark and evaluates the others subsequently. The negative relationship between the analyzed variables could be due to the reason that best-performer was taken as a benchmark of entrepreneurship effectiveness falling within the second interval, the one in which an increase in entrepreneurship effectiveness decreases performance rather than boosting it. Agency theory predicts that entrepreneur measures foster firm performance by optimizing agency costs and reducing capital waste.

Limitations

The relationship between the variables has not been consistent throughout all the analyzed samples. The theoretical paradigm used to establish a linkage between the analyzed elements was the agency theory. Only five countries were selected for the data. The analysis provided useful insights to the long-debated question regarding the relevance of entrepreneurship.

Implication

Findings of the present study suggested that it was not always the case. Extreme strictness in entrepreneurial practices can decrease a bank's performance. Results concluded that there was a significant positive relation between entrepreneurship, CSR, and innovation on a bank's financial performance. Government plays a vital role in every field, such as corporations, firms, industries, and the banking sectors Entrepreneurships include the board of directors' activities, the working activities of external and internal auditors, and the practices of shareholders including common and individual shareholders. This evidence suggested that enhancing entrepreneurship is not always the optimal choice as controls entail costs that may impact negatively on the firm's results. Instead, entrepreneurship structure should be designed to counterbalance the positive and negative effects associated with it. This is the strategy that leads to the best possible outcome.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

JW made the conceptual framework. RX made the literature review. MH made the methodology. AS analyzed the data. FA made the discussion. JK made the conclusion. All authors contributed to the article and approved the submitted version.

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REFERENCES

Ahmad, M., Baek, N. W., Kim, D. W., and Shah, B. A. (2019). The impact of institutional ownership on firms' performance evidence from Pakistan. *J. Asian Stud.* 22, 27–48.

Akram, K., Siddiqui, S. H., Nawaz, M. A., Ghauri, T. A., and Cheema, A. K. H. (2011). Role of knowledge management to bring innovation: an integrated approach. *Int. Bull. Bus. Adm.* 92, 121–134.

Al-ahdal, W. M., Alsamhi, M. H., Tabash, M. I., and Farhan, N. H. (2020). The impact of corporate governance on financial performance of Indian and GCC listed firms: an empirical investigation. *Res. Int. Bus. Fin.* 51:101083. doi: 10.1016/j.ribaf.2019.101083s

Ali, W., Frynas, J. G., and Mahmood, Z. (2017). Determinants of corporate social responsibility (CSR) disclosure in developed and developing countries: a literature review. *Corp. Soc. Responsib. Environ. Manag.* 24, 273–294. doi: 10.1002/csr.1410

Al-Rahahleh, A. S. (2017). Corporate governance quality, board gender diversity and corporate dividend policy: evidence from Jordan. *Australas. Account. Bus. Fin. J.* 11, 86–104. doi: 10.14453/aabfj.v11i2.6

Asmeri, R., Alvionita, T., and Gunardi, A. (2017). CSR disclosures in the mining industry: empirical evidence from listed mining firms in Indonesia. *Indones. J. Sustain. Account. Manag.* 1, 16–22. doi: 10.28992/ijsam.v1i1.23

Beck, C., Frost, G., and Jones, S. (2018). CSR disclosure and financial performance revisited: a cross-country analysis. *Aust. J. Manag.* 43, 517–537.

Chen, L.-W., and Yu, H.-Y. (2017). Corporate governance, political involvement, and internationalization: an empirical investigation in Japan and Taiwan. *Res. Int. Bus. Fin.* 39, 640–655. doi: 10.1016/j.ribaf.2016.07.023

Chen, Y.-C., Hung, M., and Wang, Y. (2018). The effect of mandatory CSR disclosure on firm profitability and social externalities: evidence from China. *J. Account. Econ.* 65, 169–190. doi: 10.1016/j.jacceco.2017.11.009

Choi, Y. M., and Park, K. (2019). Foreign ownership, agency costs, and long-term firm growth: evidence from Korea. *Sustainability* 11:1599. doi: 10.3390/su11061599

Dakhlallh, M. M., Mohd Rashid, N., Abdullah, W. A. W., and Dakhlallh, A. (2019). The mediating effect of the managerial ownership towards the influence of the board of directors on the firm performance among jordanian public shareholders companies. *J. Environ. Treat. Tech.* 7, 760–767.

Djebali, N., and Zaghdoudi, K. (2020). Testing the governance-performance relationship for the Tunisian banks: a GMM in system analysis. *Financial Innov.* 6:23. doi: 10.1186/s40854-020-00182-5

Farrukh, K., Irshad, S., Khakwani, M. S., Ishaque, S., and Ansari, N. Y. (2017). Impact of dividend policy on shareholders wealth and firm performance in Pakistan. *Cogent Bus. Manag.* 4:1408208.

Fernández-Gago, R., Cabeza-García, L., and Nieto, M. (2018). Independent directors' background and CSR disclosure. *Corp. Soc. Responsib. Environ. Manag.* 25, 991–1001. doi: 10.1002/csr.1515

Fukuyama, H., and Matousek, R. (2017). Modelling bank performance: a network DEA approach. *Eur. J. Oper. Res.* 259, 721–732.

Halkos, G. E., Matousek, R., and Tzeremes, N. G. (2016). Pre-evaluating technical efficiency gains from possible mergers and acquisitions: evidence from Japanese regional banks. *Rev. Quant. Fin. Account.* 46, 47–77.

Hansen, C., and Block, J. (2020). Exploring the relation between family involvement and firms' financial performance: a replication and extension meta-analysis. *J. Bus. Ventur. Insights* 13:e00158. doi: 10.1016/j.jbvi.2020.e00158

Jain, A., Keneley, M., and Thomson, D. (2015). Voluntary CSR disclosure works! Evidence from Asia-Pacific banks. *Soc. Responsib. J.* 11, 2–18. doi: 10.1108/SRJ-10-2012-0136

Jayakumar, M., Pradhan, R. P., Dash, S., Maradana, R. P., and Gaurav, K. (2018). Banking competition, banking stability, and economic growth: are feedback effects at work? *J. Econ. Bus.* 96, 15–41.

Jizi, M. (2017). The influence of board composition on sustainable development disclosure. *Bus. Strateg. Environ.* 26, 640–655. doi: 10.1002/bse.1943

Khan, A., Muttakin, M. B., and Siddiqui, J. (2013). Corporate governance and corporate social responsibility disclosures: evidence from an emerging economy. *J. Bus. Ethics* 114, 207–223. doi: 10.1007/s10551-012-1336-0

Kojima, K., Adhikary, B. K., and Mitra, R. K. (2017). Does equity holding by main banks affect the earnings quality of client firms? Empirical evidence from Japan. *J. Multinl. Financ. Manag.* 42, 56–73. doi: 10.1016/j.mulfin.2017.10.003

Lehkonen, H., and Heimonen, K. (2015). Democracy, political risks and stock market performance. *J. Int. Money Finance* 59, 77–99.

Mansur, H., and Tangl, A. (2018). The effect of corporate governance on the financial performance of listed companies in Amman stock exchange (Jordan). *J. Adv. Manag. Sci.* 6, 97–102. doi: 10.18178/joams.6.2.97-102

Matousek, R., and Tzeremes, N. G. (2016). CEO compensation and bank efficiency: an application of conditional nonparametric frontiers. *Eur. J. Oper. Res.* 251, 264–273. doi: 10.1016/j.ejor.2015.10.035

Miyajima, H., Ogawa, R., and Saito, T. (2018). Changes in corporate governance and top executive turnover: the evidence from Japan. *J. Jpn. Int. Econ.* 47, 17–31. doi: 10.1016/j.jjie.2017.12.006

Nawaz, M. A., Basheer, M. F., and Afridi, T. (2019). The knowledge economy and open innovation: evidence from Pakistan. *Pak. Soc. Sci. Rev.* 3, 332–346.

Nikolaou, I., Evangelinos, K., and Leal Filho, W. (2015). A system dynamic approach for exploring the effects of climate change risks on firms' economic performance. *J. Clean. Prod.* 103, 499–506.

Owen, A. L., and Temesvary, J. (2018). The performance effects of gender diversity on bank boards. *J. Bank. Financ.* 90, 50–63. doi: 10.1016/j.jbankfin.2018.02.015

Owiredu, A., and Kwakye, M. (2020). The effect of corporate governance on financial performance of commercial banks in Ghana. *Int. J. Bus. Soc. Sci.* 11, 18–27. doi: 10.30845/ijbss.v11n5p3

Pruteanu-Podpiera, A., Weill, L., and Schobert, F. (2016). "Banking competition and efficiency: a micro-data analysis on the Czech banking industry," in *Global Banking Crises and Emerging Markets*, eds J. C. Brada and P. Wachtel (London: Palgrave Macmillan), 52–74.

Qadorah, A. A. M., and Fadzil, F. H. B. (2018). The relationship between board size and CEO duality and firm performance: evidence from Jordan. *Int. J. Account. Fin. Risk Manag.* 3, 16–20. doi: 10.11648/j.ijafrm.20180303.11

Sarpong-Danquah, B., Gyimah, P., Afriyie, R. O., and Asiamah, A. (2018). Corporate governance and firm performance: an empirical analysis of manufacturing listed firms in Ghana. *Account. Fin. Res.* 7, 111–118. doi: 10.5430/afr.v7n3p111

Srivastava, A., and Bhatia, S. (2020). Influence of family ownership and governance on performance: evidence from India. *Glob. Bus. Rev.* 14, 1–19. doi: 10.1177/0972150919880711

Tsionas, E. G., and Mamatzakis, E. C. (2017). Adjustment costs in the technical efficiency: an application to global banking. *Eur. J. Oper. Res.* 256, 640–649.

Wahyudin, A., and Solikhah, B. (2017). Corporate governance implementation rating in Indonesia and its effects on financial performance. *Corp. Gov. Int. J. Bus. Soc.* 17, 250–265. doi: 10.1108/CG-02-2016-0034

Wondem, B., and Batra, G. (2019). The impact of corporate governance practices on corporate financial performance in Ethiopia. *Int. J. Account Res.* 7, 196–201. doi: 10.35248/2472-114X.19.7.196

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Fuzzy Logic Analysis for Key Factors for Customer Loyalty in E-Shopping Environment

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Due to subjective evaluation and qualitative characteristics, the assessment processes of loyalty often cannot use the crisp value to express the final value. That makes the evaluation of online store performance usually filled with uncertainty and ambiguity. The loyalty assessment of electronic shopping is complex, and online stores' strategy and production control problems are frequently accompanied by uncertain conditions. This study constructs a conceptual model to leverage the fuzzy logic approach for understanding the consumers' decision-making in the e-service context of shopping. This study also exposes the relationships between system quality, information quality, and service quality to understand their impacts on customer loyalty. Implications and future research directions for service providers and researchers are discussed.

Keywords: fuzzy logic, loyalty, e-shopping, digital economy, consumer

INTRODUCTION

The growing popularity of the Internet and information technology continues to flourish. In such a background, the use of mobile (web) sites are growing every year. According to the latest information on Internet World Stats, as of June 2008, the global online population has reached 1.46 billion, of which Asia accounted for 40%, 26% in Europe, and 17% in North America. Penetration of the global Internet population has surpassed into two, which in North America up to 74%, 60% in Oceania, and 48% in Europe. Global Internet population from 2000 to 2008 grew at a rate of more than 300%, and the countries of the world strive to improve the information penetration of the case. Therefore, the global Internet population will show a more rapid population growth in the future[1]. In addition, in investigation results from International Telecommunication Union, twice the world's online population has grown over the past 5 years, and will include more than 20

[1] Available online at: http://www.find.org.tw/find/home.aspx?page=news&id=5340.

million people this year[2]. Then according to the Institute for Information Industry statistics, at the end of June 2010 in Taiwan, total broadband subscribers were 4.98 million, an increase over the previous quarter's fifty thousand users[3]. The global Internet used by the rapid rise in population could reflect how network usage and daily life have been inextricably linked.

With the rapid development of Internet, along with the number of people e-shopping has continued to grow in recent years. According to a Market Intelligence Center study, global e-shopping market grew from in 2006 at U.S. 640 billion dollars to U.S. 782 billion dollars in 2008. And the forecasts for 2009 and 2010, respectively, are up to U.S. 830 billion dollars and U.S. 951

[2]Available online at: http://www.ithome.com.tw/itadm/article.php?c=64008.
[3]Available online at: http://www.find.org.tw/find/home.aspx?page=many&id=159.

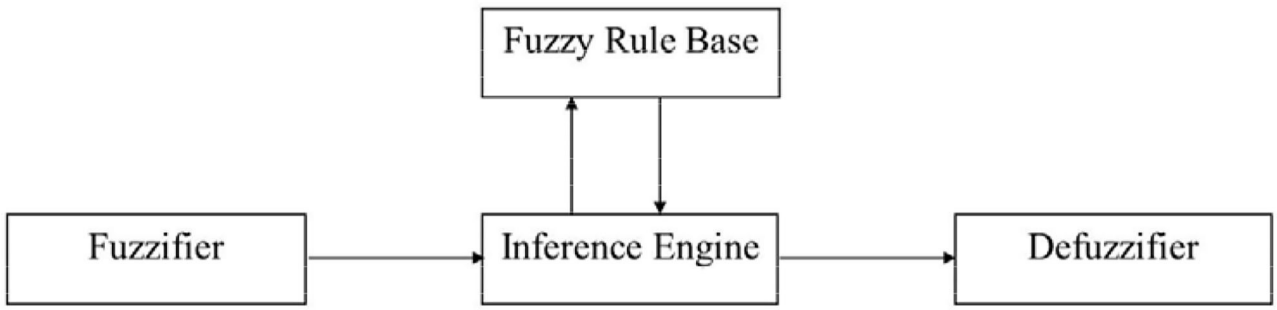


FIGURE 1 | Block diagram of fuzzy logic controller.

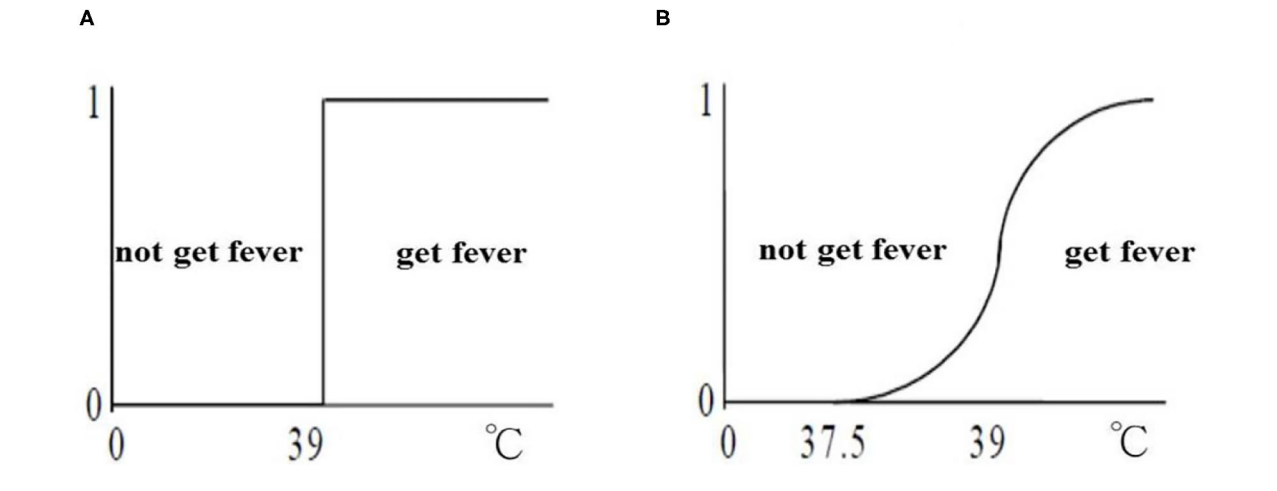


FIGURE 2 | (A) Classical set and **(B)** fuzzy set.

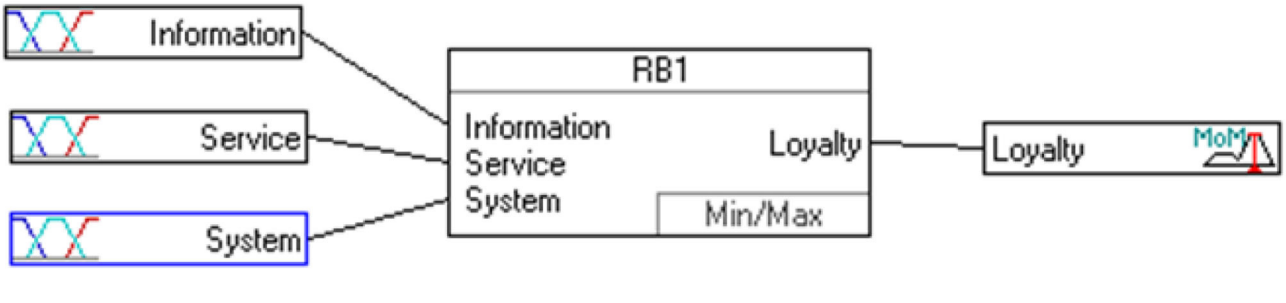


FIGURE 3 | The proposed framework.

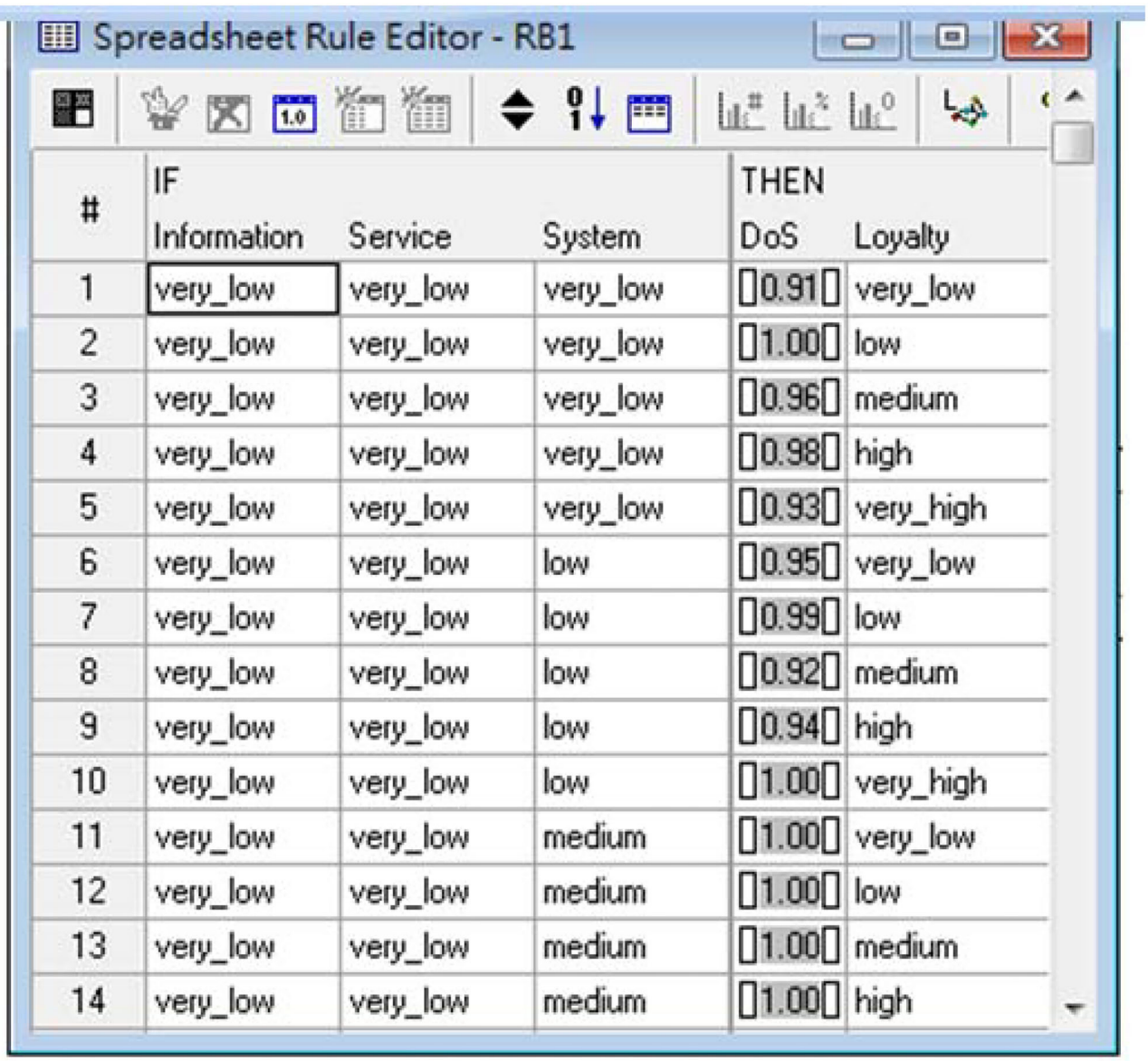
billion dollars. Although the development of Taiwan's e-shopping is late, after a strong government and private investment in information and communication building, the Internet use of the environment has matured, and Taiwan's e-shopping market will reach U.S. 105 billion dollars in 2009[4].

Compared to physical stores, online stores possess lower spatial and temporal costs, low barriers to construct, and are coupled with media reports. Therefore, attracting many people into the online store to entrepreneurship, making the online store has become the most popular emerging industry. But also because of the relatively low barriers to entry, online store competition is fierce; therefore, to enhance the performance of online stores becomes even more important, and the online store's performance depends on many factors. For example, the characteristics of goods, the smoothness of the website, the way

[4]Available online at: http://www.cepd.gov.tw/m1.aspx?sNo=0012144.

TABLE 1 | Summary of decision variables and corresponding linguistic members.

Variables	Linguistic members
System	Very-Low, low, medium, high, very-high
Information	Very-Low, low, medium, high, very-high
Service	Very-Low, low, medium, high, very-high
Loyalty	Very-Low, low, medium, high, very-high



#	IF			THEN	
	Information	Service	System	DoS	Loyalty
1	very_low	very_low	very_low	0.91	very_low
2	very_low	very_low	very_low	1.00	low
3	very_low	very_low	very_low	0.96	medium
4	very_low	very_low	very_low	0.98	high
5	very_low	very_low	very_low	0.93	very_high
6	very_low	very_low	low	0.95	very_low
7	very_low	very_low	low	0.99	low
8	very_low	very_low	low	0.92	medium
9	very_low	very_low	low	0.94	high
10	very_low	very_low	low	1.00	very_high
11	very_low	very_low	medium	1.00	very_low
12	very_low	very_low	medium	1.00	low
13	very_low	very_low	medium	1.00	medium
14	very_low	very_low	medium	1.00	high

FIGURE 4 | Partial decision rules for measuring the possibility of maintenance.

of transactions, distribution, and other factors (Troy and Shaw, 1997) will affect the online store crowds and the money flows, and also the online store's performance in the operating performance. Since the influencing factors are complex, it is difficult to control the online store's business strategy. In fact, for such decision problems with uncertainty and ambiguity, we should be able to use fuzzy set theory to deal effectively and make the appropriate decisions (Bellman and Zadeh, 1970; Chen and Hwang, 1992; Akhter et al., 2003).

In this study, we use the linguistic variables to express the subjective assessment value of the evaluators in order to reduce the ambiguity. We then use the combination of fuzzy logic theory and neural algorithm to assess a proper decision to construct a decision model for the performance of the online store. In this way, we can quickly and effectively grasp the operation of the online store for the consumers and enterprises through the online store performance of decision-making. Based on the above, the main purposes of this study are the following two points:

(1) Discussion the performance influencing factors of online store.
(2) Construct a fuzzy logic for shopping online store management decision-making.

LITERATURE REVIEW

E-Commerce and E-Shopping

Due to the Rapid progress of Internet technology, e-commerce's management become an important research topic. E-commerce is a kind of way of business communication and transaction by computer and Internet (Haynes, 1995). Broadly speaking the exchange of the commercial activity can be called e-commerce (Wigand, 1997). Turban et al. (1999) also defined e-commerce through the Internet to sell or exchange products, services, and information. This shows that the e-commerce utilizes the Internet for commodities trading.

Online stores can be called electronics stores or online market. The main feature of online stores is consumers use the Internet to browse and purchase goods. But the online store is a virtual store; consumers only rely on photos, images, and product description which the Web site provides to know the status of goods. Therefore, the transaction process has considerable risk. And how to maintain good relations with buyers and sellers is a very important management mechanism of the online store's manager.

Information System Success

Many literatures have studied the influencing factors of e-shopper's loyalty, for example, Tankovic and Benazic have analyzed how e-servicescapes affect perceived e-shopping value and ultimately influence e-shopper's attitude loyalty, and they find that the dimensions (such as layout, functionality, and financial security) of e-servicescape influence and determine the perceived e-shopping value point (Tankovic and Benazic, 2018). Cachero-Martínez and Vázquez-Casielles have tested how the e-shopping experience impacts the customers' attitudinal and behavioral loyalty through emotional experience (Cachero-Martínez and Vázquez-Casielles, 2021). Bhaskar and Kumar theorize and identify three main factors: service quality, customer satisfaction, and trust as positively related to the

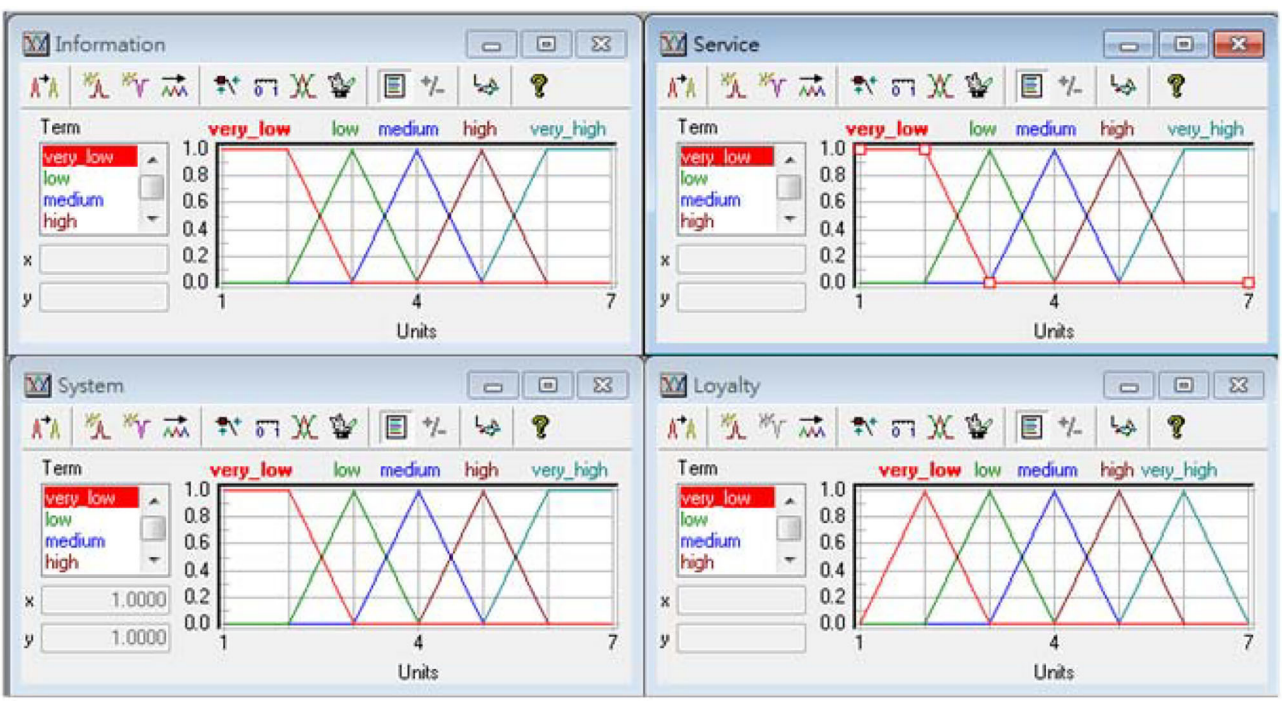


FIGURE 5 | Member functions.

customers' loyalty in e-commerce based on the satisfaction-trust-loyalty theory (Bhaskar and Kumar, 2016). Al-Khayyal et al. have examined the influence of e-service quality (including website design, privacy, security, efficiency, and customer service/communication) on e-shoppers' loyalty (Al-Khayyal et al., 2020). Shafiee and Bazargan have investigated by questionnaire and found that e-service quality (which is directly influenced by information security and website performance) has a positive impact on e-loyalty through its positive effects on e-recovery (Shafiee and Bazargan, 2018). To sum up, the existing research mainly focuses on the influence of e-shopping scenarios, e-shopping experience, e-service quality, and other factors on customers' e-loyalty by the empirical methods of statistical data analysis, and there are no studies which have integrated system, information, and service quality into a unified framework to examine its influences on customers' e-loyalty (see **Figure 1**).

DeLone and McLean (1992) extensively reviewed previous studies on information system success and presented an information system success model. They posit six dimensions which are system quality, information quality, use, user satisfaction, individual impact, and organizational impact to assess. The research results that the system quality and information quality are two important dimensions of the system characteristics. Both system and information quality are influential for user satisfaction.

But the DeLone and McLean model 1992 did not discuss the service quality. However, a number of scholars found the importance of service quality in information system (Kettinger and Lee, 1997; Pitt et al., 1997; Van Dyke et al., 1997). Therefore, DeLone and McLean proposed an updated information system success model in 2003 (DeLone and McLean, 2003). Use the system quality, service quality, use, user satisfaction, and net benefits to measure whether the success of information system. DeLone and McLean said that the updated model was suitable for the e-commerce environment. And more related research has confirmed the service quality which has a positive and significant impact to behavioral intention, satisfaction, and loyalty (Lai, 2004; Parasuraman et al., 2005; Yang et al., 2005; Hu et al., 2009; Kuo et al., 2009).

Fuzzy Logic

Zadeh (1965) proposed a "Fuzzy sets" which start the beginning of the concept of fuzzy logic. It applied to define the human

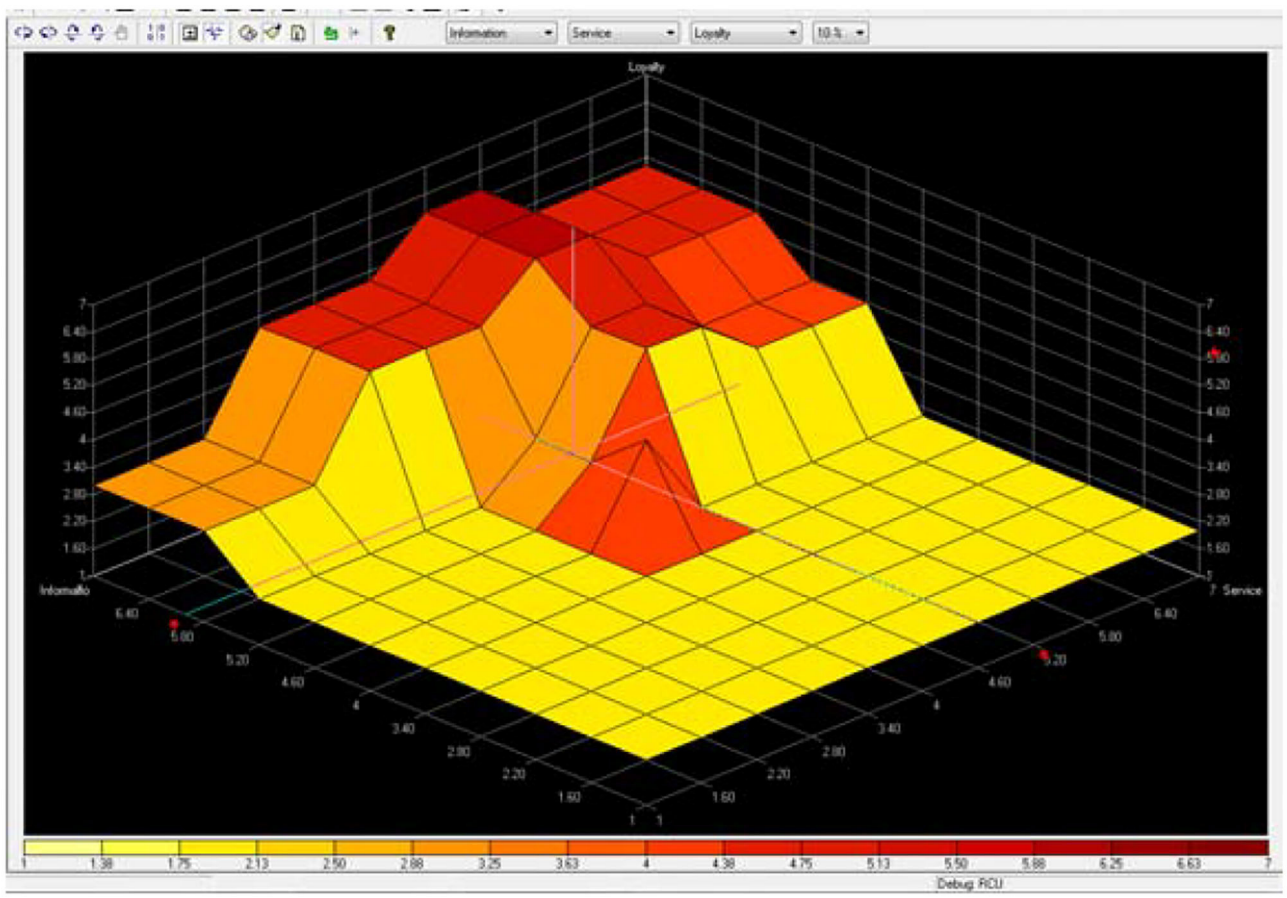


FIGURE 6 | Loyalty is positively to information and service.

thinking. Thus, to solve the transitional concept "crisp set" it cannot define such as "usually" or "very far." Fuzzy logic is a multi-valued logic focusing on developing better reasoning and decision-making models. Essentially, it is a qualitative approach for analyzing behaviors in complex systems, in which linguistic but not numerical variables are described.

Unlike traditional set theory, fuzzy set uses the concept of membership to classify elements into a continuous set. The membership function not only gives 0 or 1, but it also give values between 0 and 1. For example, a doctor agrees that the standard value is 39°C to consider something as a fever. The classical set of "get fever" is higher than 39°C. But 38.99°C is not part of a fever. However, it is not reasonable for the only difference of 0.01°C that categorize between getting fever or not. **Figure 2** shows the difference between classical set and fuzzy set. In the online shopping process, users often rely on common sense and use ambiguous terminology when making purchase decisions. Considering the choice of similar alternative products and services, the online customer usually creates a certain ambiguity in his/her mind (Akhter et al., 2005; Mohanty and Bhasker, 2005; Castro-Schez et al., 2011; Sadikoglu, 2017).

Fuzzy logic controller has gained wide applications for its simplicity to apply as mathematical modeling and is not a pre-requisite. Typical fuzzy logic controller comprises four principal components: Fuzzifier, Fuzzy Rule Base, Inference Engine, and Defuzzifier.

The Fuzzy Rule Base keeps record of the process operation containing "if-then" rules. The Inference Engine is the core of a Fuzzy logic controller. Based on approximate reasoning, the controller has the capability of simulating human decision making. During the process, it derives a reasonable action for specific situation based on the given rule base. Lastly, the Defuzzifier converts the fuzzy control action to the non-fuzzy action that fits the real world.

STRUCTURE AND PROCEDURES

In recent years, because of the rapid development of Internet applications and Information Technology, online shopping adopted information system use to create a competitive advantage. In this study, DeLone and McLean (2003) proposed information system success model. They measure the loyalty

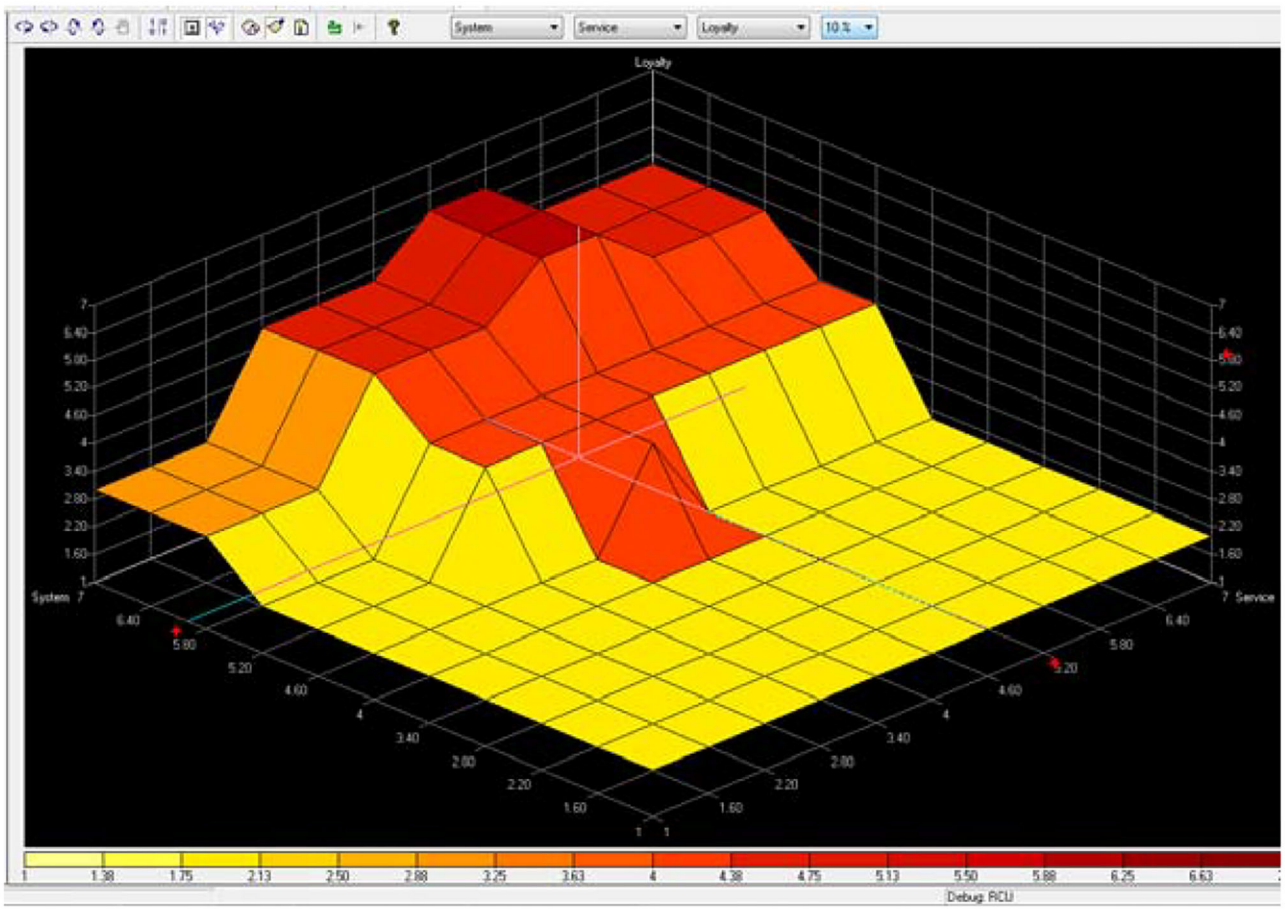


FIGURE 7 | Loyalty is positively to system and service.

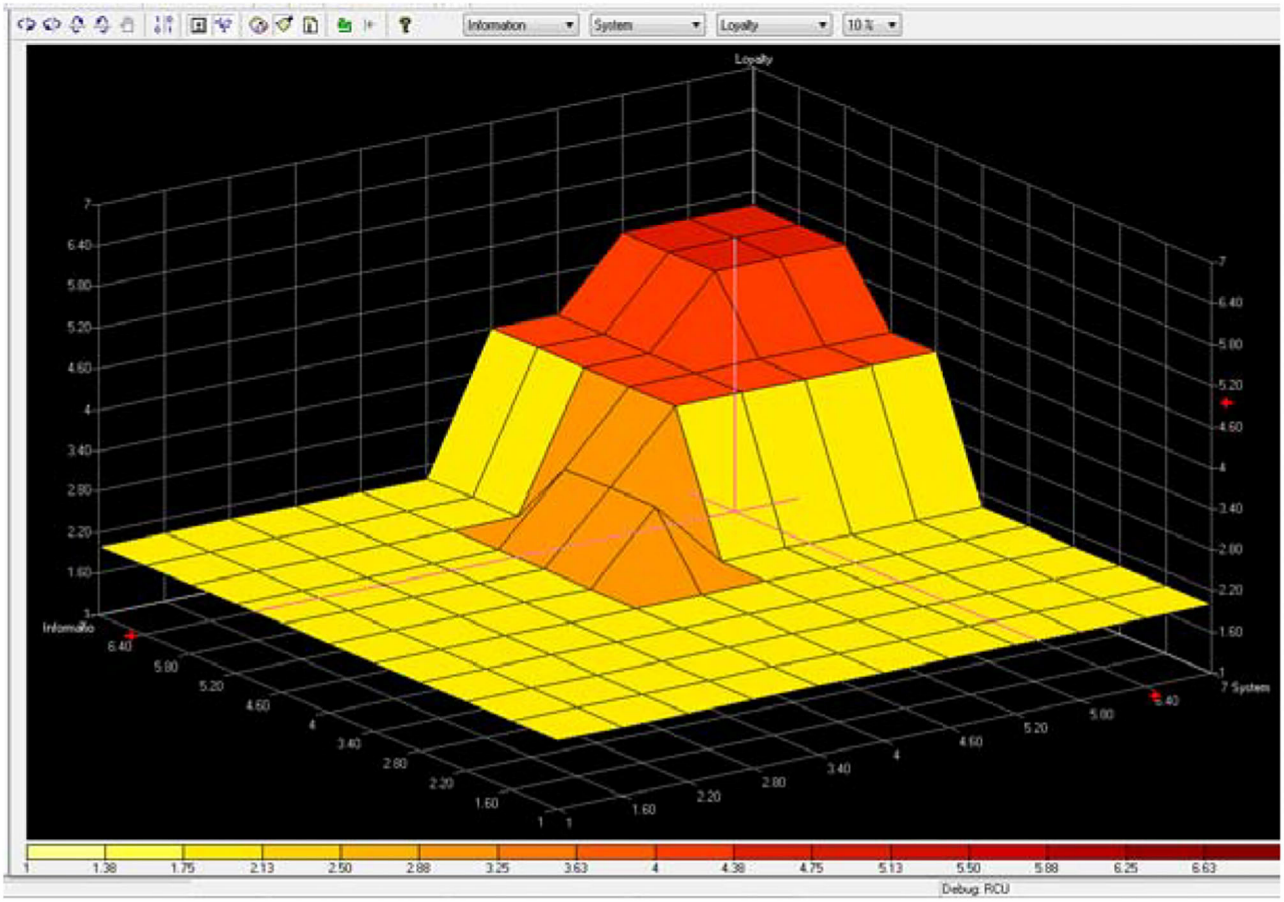


FIGURE 8 | Loyalty is positively to system and information.

of the e-shopping, whether it has significant impact on the information quality, service quality, and system quality. This study takes the fuzzy with three inputs and one output as an example. The architecture of fuzzy is shown in **Figure 3**. **Table 1** presents the respective linguistic members of the summarized variables. Decision rules can usually be represented in the form "If … Then …" **Figure 4** shows partial decision rules in spreadsheet format. The membership functions of respective decision variables are depicted in **Figure 5**.

RESULTS, DISCUSSIONS, AND CONCLUSION

Compared to other e-shopping studies (Zhang, 2006; Khalifa and Liu, 2007; Zhou et al., 2007), which mainly use the complex mathematical formulas to solve the problem, this study uses the Fuzzy logic rule to represent the human mind, and more and more studies use Fuzzy logic to represent the human mind (Akhter et al., 2005; Lu and Sy, 2009; Liu, 2010). Increasing choices for consumers is obvious in the context of online shopping with diverse products. In this study, the vendor would benefit from the survey data aggregated over time to refine existing rule-sets. The vendor can also utilize the data to ascertain the loyalty of the site as per user's perception and rectify if needed. **Figure 6** presents that the highest gradient for loyalty is when information is "very-high" and service is "medium" to "high." This suggests that when consumers somewhat have information with online shopping, then a small increase in service from medium to high will boost their loyalty in a significant way. **Figure 7** presents that the highest gradient for loyalty is when system is "very-high" and service is "medium" to "high." This suggests that the system quality for loyalty is influenced. So to simplify, an easy to operate system for consumers is a very important factor. **Figure 8** presents that the highest gradient for loyalty is when system is "very-high" and information is "very-high." This suggests that consumers have high quality for system and information. Easy to use and with good information quality is a very important factor for e-commerce.

THEORETICAL AND PRACTICAL IMPLICATIONS

Many existing studies have found that the system, information, and service quality of online commerce has a significant positive

impact on customers' continuous use behavior (DeLone and McLean, 1992, 2003; Van Dyke et al., 1997; Tankovic and Benazic, 2018; Cachero-Martínez and Vázquez-Casielles, 2021), however, does the highest system/information/service online quality necessarily lead to the highest customer loyalty behavior? Our study results show that we cannot make a simple affirmative answer to this. From **Figures 6**, **7**, we can find that when the quality of online service is medium to high, and the quality of information and system is very high, which leads to the highest customer loyalty, thus we believe that the relationship between system/information/service quality and loyalty is non-linear and uncertain, nor is it that the higher the quality of online services, the higher the loyalty, and there may exist the best combination of system-information-service quality that has the best impact on online customer loyalty. Therefore, our study is a further improvement and supplement to the related theoretical research on the influencing factors for customer loyalty in e-shopping.

In addition, our study also has important practical applications. First, vendors can use survey data to build a multi-dimensional graph of the relationship between system-information-service quality and customer loyalty behavior. Second, vendors can analyze and determine the spatial position of their system/information/service quality in the multi-dimensional relationship diagram. Finally, based on the spatial position, vendors can make the best decisions to increase customer loyalty. For example, with limited resources and capabilities, if the vendor's service quality is below the medium level and the information/system quality is below the high level, then the vendor can choose the method that has the least investment but the biggest effect on improving customer loyalty. For another example, if the vendor's service quality is very high, but the system/information quality is below very high, the vendor can appropriately reduce the service quality investment and increase the system/information quality investment, which can improve customer loyalty.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

L-XG conceived and designed the research and provided guidance throughout the entire research process and made main revisions to the original manuscript during the interactive process of submission. C-CL and P-FH wrote and supplemented the English paper. S-YJ participated in data processing. S-CC and F-ST reviewed and edited the paper and are responsible for all R&R works. All authors contributed to the article and approved the submitted version.

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REFERENCES

Akhter, F., Hobbs, D., and Maamar, Z. (2003). "How users perceive trust in virtual environment," in *International Conference on Information and Knowledge Engineering* (Las Vegas, NV), 23–26.

Akhter, F., Hobbs, D., and Maamar, Z. (2005). A fuzzy logic-based system for assessing the level of business-to-consumer (B2C) trust in electronic commerce. *Exp. Syst. Appli.* 28, 623–628. doi: 10.1016/j.eswa.2004.12.039

Al-Khayyal, A., Alshurideh, M., Al Kurdi, B., and Aburayya, A. (2020). The impact of electronic service quality dimensions on customers' e-shopping and e-loyalty via the impact of e-satisfaction and e-trust: A qualitative approach. *Int. J. Innov. Creat. Change* 14, 257–281.

Bellman, R. E., and Zadeh, L. A. (1970). Decision-Making in a fuzzy environment. *Manage. Sci*. 17, 141–164. doi: 10.1287/mnsc.17.4.B141

Bhaskar, P. P., and Kumar, D. P. (2016). Customer loyalty on e-commerce. *Int. J. Manage. Res. Rev*. 6:1661.

Cachero-Martínez, S., and Vázquez-Casielles, R. (2021). Building consumer loyalty through e-shopping experiences: the mediating role of emotions. *J. Retail. Cons. Serv*. 60:102481. doi: 10.1016/j.jretconser.2021.102481

Castro-Schez, J. J., Miguel, R., Vallejo, D., and López-López, L. M. (2011). A highly adaptive recommender system based on fuzzy logic for B2C e-commerce portals. *Exp. Syst. Applic.* 38, 2441–2454. doi: 10.1016/j.eswa.2010.08.033

Chen, S. J., and Hwang, C. L. (1992). *Fuzzy Multiple Attribute Decision Making: Methods and Applications*. Berlin: Springer-Verlag. doi: 10.1007/978-3-642-46768-4_5

DeLone, W. H., and McLean, E. R. (1992). Information system success: the quest for the dependent variable. *Inform. Syst. Res*. 3, 60–95. doi: 10.1287/isre.3.1.60

DeLone, W. H., and McLean, E. R. (2003). The delone and mclean model of information system: a ten-year update. *J. Manage. Inform. Syst*. 19, 9–30. doi: 10.1080/07421222.2003.11045748

Haynes, T. (1995). *The Electronic Commerce Dictionary*. Menlo Park, *CA:* Robleda Company.

Hu, P. J. H., Brown, S. A., Thong, J. Y. L., Chan, F. K. Y., and Tam, K. Y. (2009). Determinants of service quality and continuance intention of online services: the case of eTax. *J. Am. Soc. Inform. Sci. Technol*. 60, 292–306. doi: 10.1002/asi.20956

Kettinger, W. J., and Lee, C. C. (1997). Pragmatic perspectives on the measurement of information systems quality. *MIS Q*. 21, 223–240. doi: 10.2307/249421

Khalifa, M., and Liu, V. (2007). Online consumer retention: contingent effects of online shopping habit and online shopping experience. *Euro. J. Inform. Syst*. 16, 780–792. doi: 10.1057/palgrave.ejis.3000711

Kuo, Y. F., Wub, C. M., and Deng, W. J. (2009). The relationships among service quality, perceived value, customer satisfaction, and post-purchase intention in mobile value-added services. *Comput. Hum. Behav*. 25, 887–896. doi: 10.1016/j.chb.2009.03.003

Lai, T. L. (2004). Service quality and perceived value's impact on satisfaction, intention and usage of short message service (SMS). *Inform. Syst. Front*. 6, 353–368. doi: 10.1023/B:ISFI.0000046377.32617.3d

Liu, C. H. (2010). A group decision-making method with fuzzy set theory and genetic algorithms in quality function deployment. *Qual. Quant*. 44, 1175–1189. doi: 10.1007/s11135-009-9304-1

Lu, K. Y., and Sy, C. Y. (2009). A real-time decision-making of maintenance using fuzzy agent. *Exp. Syst. Appli*. 36, 2691–2698. doi: 10.1016/j.eswa.2008.01.087

Mohanty, B. K., and Bhasker, B. (2005). Product classification in the Internet business—a fuzzy approach. *J. Dec. Supp. Syst.* 38, 611–619. doi: 10.1016/j.dss.2003.10.002

Parasuraman, A., Zeithaml, V., and Malhotra, A. (2005). E-S-Qual: a multiple-item scale for assessing electronic service quality. *J. Serv. Res.* 7, 213–233. doi: 10.1177/1094670504271156

Pitt, L. F., Watson, R. T., and Kavan, C. B. (1997). Measuring information systems service quality: concerns for a complete canvas. *MIS Q.* 21, 209–222. doi: 10.2307/249420

Sadikoglu, G. (2017). Modeling of the travelers' shopping motivation and their buying behavior using fuzzy logic. *Proc. Comp. Sci.* 120, 805–811. doi: 10.1016/j.procs.2017.11.311

Shafiee, M. M., and Bazargan, N. A. (2018). Behavioral customer loyalty in online shopping: the role of e-service quality and e-recovery. *J. Theo. Appl. Electro. Comm. Res.* 13, 26–38. doi: 10.4067/S0718-18762018000100103

Tankovic, A. C., and Benazic, D. (2018). The perception of e-servicescape and its influence on perceived e-shopping value and customer loyalty. *Online Inform. Rev*. 42, 1124–1145. doi: 10.1108/OIR-12-2016-0354

Troy, J. S., and Shaw, M. J. (1997). Characteristics of electronic markets. *Dec. Supp. Syst*. 21, 185–198. doi: 10.1016/S0167-9236(97)00028-6

Turban, E., Lee, J., Lee, J. K., King, D., and Chung, H. M. (1999). *Electronic Commerce: A Managerial Perspective*. London: Prentice Hall.

Van Dyke, T. P., Kappelman, L. A., and Prybutok, V. R. (1997). Measuring information systems service quality: concerns on the use of the SERVQUAL questionnaire. *MIS Q*. 21, 195–208. doi: 10.2307/249419

Wigand, T. (1997). Electronic commerce: definition, theory, and context. *Inform. Soc*. 13, 1–16. doi: 10.1080/019722497129241

Yang, Z., Cai, S., Zhou, Z., and Zhou, N. (2005). Development and validation of an instrument to measure user perceived service quality of information presenting web portals. *Inform. Manage.* 42, 575–589. doi: 10.1016/S0378-7206(04)00073-4

Zadeh, L. A. (1965). Fuzzy sets. *Inform. Control* 8, 338–353. doi: 10.1016/S0019-9958(65)90241-X

Zhang, J. (2006). The roles of players and reputation: evidence from eBay online auctions. *Dec. Supp. Syst*. 42, 1800–1818. doi: 10.1016/j.dss.2006.03.008

Zhou, L., Dai, L., and Zhang, D. (2007). Online shopping acceptance model- a critical survey of consumer factors in online shopping. *J. Electr. Comm. Res.* 8, 41–62.

Conflict of Interest: S-YJ is employed by China Life Insurance Co., Ltd., Taiwan. He joined the research when he was a graduate student in a master's program.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Examining the Impact of E-Government on Corporate Social Responsibility Performance: The Mediating Effect of Mandatory Corporate Social Responsibility Policy, Corruption, and Information and Communication Technologies Development During the COVID era

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During the Covid-19 era, this research will explore and analyze the link between e-government and corporate social responsibility. In addition, mandatory corporate social responsibility, institutional quality, information and communication technology, and corruption as mediators will also be explored in this study. This research seeks to answer the issue of how e-government affects corporate social responsibility and how other mediating variables might influence this connection. Furthermore, this study developed a total of 13 hypotheses based on these questions, 4 of which have mediating effects. The theoretical underpinning for the proposed study paradigm is provided by stakeholder theory, which has been established based on prior literature. The general philosophy is positivism, and the research has a deductive nature. The information was gathered from 305 managers across four industries: information technology, online services, online education, and logistics and supply chain. Data was collected using a random convenience sampling approach. The Partial Least Square Sequential Equation Modeling (PLS-SEM) research analysis approach was applied in this study for the analysis. The measurement step demonstrated that all constructs and indicators are valid and trustworthy enough to be utilized in the future. The results of the structural model evaluation revealed that e-government had a negative influence on corporate social responsibility, with three of the four mediating roles proving to be completely mediated. As a result, the government and relevant stakeholders should take these results into account when formulating e-government policies.

Keywords: mandatory CSR policy, corruption, ICT development, e-government on CSR performance, Covid era

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INTRODUCTION

E-government has emerged as the presiding medium for connecting, managing, and servicing citizens (Bwalya and Healy, 2010). According to the World Bank, e-government is the use of Information and Communication Technologies (ICTs) to improve the business operations and service provision of government agencies. The growth of e-government depends on various factors such as information technology, human resource management, legislative willingness, infrastructure, and public trust (Khalil, 2011). E-government promotes citizens' participation in public administration, enhances awareness of citizens toward government programs, improves the transparency of public decisions, and reduces corruption (Shim and Eom, 2008; Sabani et al., 2019). As a consequence, governments around the world have been working hard to adopt specific e-government initiatives for e-government development (Deng et al., 2018).

Conversely, corruption has become a global issue, posing a threat to transparency, governance, and accountability (Wellalage et al., 2019). The literature on e-government provides evidence on the importance of e-government in combating corruption and implying that government digitalization may help to fight against corruption (Nam, 2018; Linhartová, 2019; Adam, 2020). Zhang and Sun (2013) argued e-government can also be utilized to enhance public administration's openness and legitimacy as well as to combat all types of corruption. In this regard, government services can improve government operational efficiency by decreasing its corruption levels (Suhendi et al., 2020). This demonstrates that e-government has a dominant part in anti-corruption policies and helps organizations to enhance their corporate social responsibility (CSR) performance (An et al., 2021). In this era, ICTs are becoming progressively popular. The rapid growth of ICT may provoke both open opportunities and challenges in terms of creating, accessing, processing, and utilizing the correct information. It has been argued that ICTs play a significant role in eliminating corruption due to the vast range of digital options available worldwide (Alhammadi, 2009; Park and Kim, 2020). ICT's development is also found as a crucial component of a country that may serve as a foundation for e-government implementation. As ICTs development creates an effective mechanism for ICT access and structuring e-government (Huo et al., 2021; Xialong et al., 2021). Therefore, e-governments should employ effective information technologies for their better performance.

Government and companies are being widely involved in attempts to resolve environmental and social concerns and reduce corporate vulnerabilities. CSR performance may help to reinforce, normalize, and eliminate economic disparities in a society (Bapuji et al., 2020). The corporations that paid more attention to the development of CSR activities enjoy a good reputation among their stakeholders (Lin-Hi and Blumberg, 2018). Particularly in this era of ICTs development, any information related to corporations like their opinions on CSR can influence a stakeholder's decisions (Elfeky, 2017). While arguments related to mandatory CSR policy are continuously shifting in response to academic research agendas, corporate scandals, and economic climate (Chen et al., 2021; Li et al., 2021; Wu et al., 2021).

In the prior literature, the association between corruption and e-government has been explored extensively, and concludes as e-government initiatives do not eliminate all forms of corruption (Ali et al., 2021; Maqsoom et al., 2021b). While limited studies have documented the influence of ICT development and e-government on corruption (Srivastava and Vyas, 2015; Srivastava et al., 2016). It has been stated that governments have eradicated and reduced corruption levels significantly as a result of e-government development platforms (Ojha and Palvia, 2012). More corruption may be reduced via initiatives that encourage transparency and accountability (Mistry, 2012). This shows that the literature has not addressed the influence of e-government development on CSR performance through the mediating role of ICTs, CSR policy, corruption, and institutional quality. In order to address this gap, this study develops a model to empirically evaluate the influence of e-government development on CSR performance through the mediating role of considered variables.

The remainder of the paper is organized as follows: section "Review of Literature" discusses the literature review on considered variables and the development of the hypothesis. The section "Research Methods" is related to research methodology, which is employed to test the hypothesis, and the section "Data Analysis" discusses the study analysis and results. The last section brings us to the Discussion and Conclusion.

REVIEW OF LITERATURE

E-Government Development

E-government refers to the government's use of ICTs to improve citizen access to and delivery of government activities and services (Bélanger and Carter, 2012). E-government also refers to the use of technology to boost public services and communication, as well as making government more effective and efficient (Krishnan et al., 2013). More it refers to a broad variety of government functions and activities that are affected by the ongoing integration of ICTs with certain other management paradigms (Ziemba et al., 2016). The usage of e-government aids the anti-corruption fight against self-serving tax dodging by state officials and others who plot large political corruption schemes (Singh et al., 2010). E-government can be considered from multiple perspectives such as e-society, e-administration, and e-citizens. Its successful implementation can lead to increased internal efficiency, stakeholder satisfaction, and service improvement because of standardized operational processes, the transformation of paper-based information into electronic form, and divergent databases (Nawaz et al., 2019; Hao et al., 2020b; Wu et al., 2020). Such types of activities help the stakeholders in easy access to government services. More in e-government platforms public services are not only supplied

by the government but also incorporate citizens' participation enabled by ICTs development (Anttiroiko et al., 2014).

Mandatory Corporate Social Responsibility Policy

Corporate social responsibility is described as a voluntary commitment by corporations to contribute to a better society and cleaner environment. Several governments have lost patience with a firm's willingness to make adequate voluntary contributions to CSR activities; therefore, governments have taken steps to make mandatory CSR policy for promoting transparency and accountability. Gatto (2002) claims that mandatory CSR enhances corporate commitment and empowers numerous external stakeholders around firms. The use of mandatory CSR policy has been recommended as a way to persuade certain businesses to invest in CSR initiatives (Mukherjee et al., 2018). Scholars have argued that mandatory CSR is based on a country's particular hard law rather than a soft law based on self-regulation (Scherer et al., 2016). Corporations are willing to turn the expectations of nation-states in terms of socioeconomic growth. The ramifications of mandatory CSR policy allow company executives to better understand and handle the concerns of local stakeholders and their intermediaries (Ioannou and Serafeim, 2012).

Corruption

Corruption is characterized as the use of state authority or position for personal gain (Rose-Ackerman, 1999). Whereas Rodriguez et al. (2006) termed corruption as misuse of economic and social power for personal objectives. The corruption may be caused by a monopoly of power, lack of accountability, discretion, and transparency (Kaufmann, 2011). Hence, the companies that deliberately operate in illegal and corrupt circumstances endanger their reputations (Ioannou and Serafeim, 2012; Keig et al., 2015). Corruption at the organizational level is usually performed by the employees and managers on behalf of the corporation (Hao et al., 2020a; Nawaz et al., 2020a). Managers and employees are more likely to participate in unlawful conduct when the company's transparency and morale are low. The literature on e-government (Nam, 2018; Linhartová, 2019; Adam, 2020) provides evidence on the importance of e-government in combating corruption and suggesting that government digitalization may help to fight against corruption.

Information and Communication Technologies Development

Information and Communication Technologies are becoming increasingly popular due to the development of e-government. ICT as a technical solution can significantly enhance the effectiveness of individuals and organizations (Matmati, 2001). Indeed, ICT has an influence on working habits and practices as well as relationships within an organization. Moreover, ICTs can also be used as a measure of government digitization, more digital operations, procedures, services, transactions, and applications lead to a higher level of e-government (Uyar et al., 2021). The ICT infrastructure comprises basic ICT access, which includes personal computers, telephone lines, Internet penetration and access in remote regions as well as the speed at which the public may access the Internet. ICTs development is also found as a crucial component of a country that may serve as a foundation for e-government implementation. As ICTs development creates an effective mechanism for ICT access and structuring e-government (Nawaz et al., 2021).

Institutional Quality

The institutional quality of a country serves as an intermediary for efficient e-government development (Adam, 2020). ICTs in the context of e-government may be a cost-effective and easy way of ensuring open and transparent government which leads to reduced corruption in systems (Bertot et al., 2010). Countries that have achieved success in enacting transparency legislations have been linked to based efforts via e-government (Keig et al., 2015). ICTs promote good governance, boost reform-oriented efforts, improve connection among government personnel as well as monitor and manage government employee and project behavior. As a result of e-government advancement, institutions can become more transparent in their managing information and procedures. A strong country requires adequate financial market laws, a robust rule of law, intellectual property rights, and high-quality institutions capable of successfully combatting corruption as compared to weak institutions (Liu et al., 2021;Zheng et al., 2021).

Corporate Social Responsibility Performance

Corporate social responsibility is a set of comprehensive policies related to corporate ethics, community service, and the environment that are integrated into a company's operations (Carroll, 1970). By implementing CSR activities efficiently firms can gain multiple benefits such as long-term self-interest, greater stakeholder's interest, and enhanced public image (Jain, 2020). Corruption at the organizational level is usually performed by the employees and managers on behalf of the corporation (Luo, 2005). Managers and employees are more prone to participate in unlawful conduct when the company's transparency and morale are low. Corruption and corporate activities are endogenously influenced by economic conditions and the business environment because corruption has a negative influence on CSR performance. Organizations should develop infrastructure based on ethical corporate culture, a long-term business model, and a strong compliance framework. Therefore, it may be assumed that excellent CSR performance encourages businesses in combating risk-engaging in corrupt activities (Reyes-Menendez et al., 2018).

E-Government Development and Corporate Social Responsibility Performance

The different economies and global agencies are becoming more concerned about their CSR practices. In this scenario e-government is an endeavor to utilize and use telecommunications to enhance government effectiveness and

efficiency, deliver better service to the community, provide more accessibility, and make government more responsible and transparent to society (Elbahnasawy, 2021). E-government plays a significant part in anti-corruption policies and helps organizations to enhance their CSR performance (Suhendi et al., 2020). Several prior research has illustrated e-government development has a beneficial influence on CSR performance (Azad and Faraj, 2014; Khan and Krishnan, 2019; Arayankalam et al., 2021). Based on the above-mentioned literature, we presented our hypothesis as follows:

H1: E-government has a positive impact on CSR performance.

E-Government Development and Mandatory Corporate Social Responsibility Policy

E-government allows the government to provide services to citizens in a more convenient manner. An e-government framework must restrict the strategic policies and phases of e-government in terms of their execution and development. With CSR activities, firms can gain multiple benefits such as long-term self-interest, greater stakeholder's interest, and enhanced public image (Krishnan and Teo, 2012; Lee et al., 2016; Roblek et al., 2020). Several governments have lost patience with a firm's willingness to make adequate voluntary contributions to CSR activities. Therefore, governments have taken steps to make mandatory CSR policy for promoting transparency and accountability. Gatto (2002) claims that mandatory CSR enhances corporate commitment and empowers numerous external stakeholders around firms. The use of mandatory CSR policy has been recommended as a way to persuade certain businesses to invest in CSR initiatives (Mukherjee et al., 2018). Based on the above-mentioned literature, we proposed our hypothesis as follows:

H2: E-government has a positive impact on the mandatory CSR policy.

E-Government Development and Corruption

Corruption is termed as misuse of public office for personal benefits. Corruption may be caused by selling the government property, bribery, kickbacks in government services, and misappropriation of state funds (Lu et al., 2021). E-government development in the country has a protentional effect on reducing corruption in organizations (Hardy and Williams, 2008). Similarly, Kim et al. (2009) argued corruption may be reduced through the development of e-government, transparency, and strong and efficient leadership. The firms that deliberately operate in illegal and corrupt situations cause critical damage to an organization's reputation (Ioannou and Serafeim, 2012; Keig et al., 2015). The level of corruption differs considerably among countries as a manifestation of the country's legal, cultural, economic, and political system (Kong et al., 2021). Based on the above-mentioned literature, we proposed our hypothesis as follows:

H3: E-government has a negative impact on corruption.

E-Government Development and Information and Communication Technologies Development

E-government is endeavored to create electronic services to improve the quality of services given to its stakeholders such as businesses, employees, residents, and other government entities. The ICTs development has resulted in the growth of e-participation, in which governments employ digital technologies to enhance stakeholders' participation and e-government development. ICTs development is also found as a crucial component of a country that may serve as a foundation for e-government implementation. As ICTs development creates an effective mechanism for ICT access and structuring e-government (McKnight et al., 2002; Dilham et al., 2020). According to previous literature, a direct link exists between e-government and ICT development (Ojha and Palvia, 2012). Based on the above-mentioned literature, we presented our hypothesis as follows:

H4: E-government has a positive impact on ICT development.

E-Government Development and Institutional Quality

E-government is a system that uses ICT as a tool to make communications and transactions among people, business organizations, and government agencies (Androniceanu et al., 2020; Roblek et al., 2020). ICTs in the e-government context may be a cost-effective and easy way of ensuring open and transparent government, which leads to reduced corruption in systems (Bertot et al., 2010). Countries that have achieved success in enacting transparency legislations have been linked to based efforts via e-government (Maqsoom et al., 2021b). ICTs promote good governance, boost reform-oriented efforts, improve connection among government personnel as well as monitor and manage government employee and project behavior (Chunhui Huo et al., 2020). As a result of e-government advancement, institutions can become more transparent in their managing information and procedures (Chang and Chu, 2006; Hwang and Choi, 2017; Dahwan and Raju, 2021). Based on the above discussions, we proposed our hypothesis as follows:

H5: E-government has a positive impact on institutional quality.

Mandatory Corporate Social Responsibility Policy and Corporate Social Responsibility Performance

A strand of literature on corporate social responsibility has documented many incentives for the company to participate in CSR initiatives. The organizations with high CSR score are believed to be morally responsible and have minimum risk of corruption (Nawaz et al., 2019; Maqsoom et al., 2021a). CSR activities provide incentives to an organization in several ways such as CSR initiatives entail the better engagement of a corporation with its major stakeholders and increase the firm's reputation. Moreover, participating in CSR activities can help to reduce the risk of unfavorable regulatory, legislative,

and budgetary actions (Androniceanu et al., 2020). The use of mandatory CSR policy has been recommended as a way to persuade certain businesses to invest in CSR initiatives (Krishnan and Teo, 2012). The implications of mandatory CSR policy enable business leaders to better understand more clearly local stakeholders' issues and manage their intermediaries (Khan et al., 2019). This shows that mandatory CSR policy significantly influences CSR performance.

H6: Mandatory CSR has a positive impact on CSR performance.

Corruption and Corporate Social Responsibility Performance

Corruption is referred to as the misuse of economic and social power for personal objectives. Companies engaging in corrupt activities due to their corrupt operations lead to a negative effect on performance (Richey et al., 2005). Corruption at the organizational level is usually performed by the employees and managers on behalf of the corporation (Chedrawi et al., 2020). Managers and employees are more likely to participate in unlawful conduct when the company's transparency and morale are low. Strategic and management flaws, as well as weak corporate ethics and misbehaviors, lead to ethical and social degradation. Firms must build strategic infrastructure that monitors and rectifies any unlawful activity to successfully prevent such risks particularly corruption (Idowu and Towler, 2004). Organizations should develop infrastructure based on ethical corporate culture, a long-term business model, and a strong compliance framework. Therefore, it is reasonable to assume that excellent CSR performance encourages businesses in combating risk-engaging in corrupt activities (Awan et al., 2021). Based on the above discussion, we proposed the hypothesis as follows:

H7: Corruption harms CSR performance.

Information and Communication Technologies Development and Corporate Social Responsibility Performance

Numerous studies have described ICT development as it has a significant influence on CSR performance. ICT as a technical solution can significantly enhance the effectiveness of individuals and organizations (Tuan, 2018). Indeed, ICT has an influence on working habits and practices as well as relationships within an organization. The contribution of ICT to the company may also be viewed as the creation of specialized capability that allows the firm to gain a competitive edge over its competitors (Liang et al., 2010). The corporations that paid more attention to the development of CSR activities enjoy a good reputation among their stakeholders (Vahdati et al., 2015). Particularly, in this era of ICTs development, any information related to corporations like their opinions on CSR can influence stakeholders' decisions (Chunhui Huo et al., 2020; Nawaz et al., 2020b). Based on the above-mentioned literature, we proposed our hypothesis as follows:

H8: ICT development has a positive impact on CSR performance.

Institutional Quality and Corporate Social Responsibility Performance

The institutional quality of a country serves as an intermediary for efficient e-government development. ICTs in the e-government context may be a cost-effective and easy way of ensuring open and transparent government which leads to reduced corruption in systems (Tang et al., 2020). Countries that have success in enacting transparency legislation have been connected to based efforts via e-government (Carvalho et al., 2010). A strong country requires adequate financial market laws, a robust rule of law, intellectual property rights, and a high-quality institution capable of successfully combatting corruption (Hur and Kim, 2017). The ICTs development has resulted in the growth of e-participation and institutional quality in which governments employ digital technologies to enhance stakeholders' participants and e-government development (Frankental, 2001).

H9: Institutional quality has a positive impact on CSR performance.

Mediating Role of Mandatory Corporate Social Responsibility Policy

Mandatory CSR policy is usually policy implemented by the regulatory bodies and institutions on organizations to follow some set of obligations of CSR not for the sake of profit but imposed by law to follow (Moisescu, 2015). During the e-government initiatives, some developing countries recently imposed a mandatory CSR policy like India has mandated the mandatory CSR policy in the Indians Companies Act 2013 (Section-135) (Bhattacharyya and Rahman, 2019). The imposition of mandatory CSR policy in organizations does not only improve CSR performance but firm performance as well (Nawaz et al., 2021).

Moreover, today's firms are not solely fulfilling the mandatory CSR requirements but also on other CSR practices to remove sustainability risk either social or economic (Hossan Chowdhury and Quaddus, 2021). Therefore, organizations are focusing on CSR practices to improve the overall CSR performance for the best interest of stakeholders and fulfilling the stakeholders' expectations in CSR. Additionally, mandatory CSR improves the firm performance as well as has a strong positive impact on the externalities; moreover, areas with mandatory CSR policies helped to decrease the CO_2 emission level and the wastewater in China (Chen et al., 2018). Therefore, we propose that,

H_{10}: Mandatory CSR policy mediates the relationship between E-government and CSR performance.

Mediating Role of Corruption

Corruption has been a terrible element in the development of countries. Government always tries to eliminate and minimize it but somehow it exists in every phase of government. But the e-government initiatives can minimize corruption in places

like Nigeria (Adam, 2020). Corruption is significantly related to corporate social responsibility and cultural elements and corruption are key elements of corporate social responsibility (Agyei-Mensah and Buertey, 2019). Moreover, Agyei-Mensah and Buertey (2019) argued that corruption is a part of culture because it depends on how the people and society understand the rules and guidelines in a state or community. Moreover, the performance of corporate social responsibility is negatively linked with the risk of corruption therefore firm-level determinants are related to corruption risk (Lopatta et al., 2017). Another study by Chantziaras et al. (2020) investigated the association between religious norms and CSR reporting and found a weaker positive relationship between these factors, particularly where there is a higher corruption level. Based on previous studies, the author proposes that,

H_{11}: Corruption mediates the relationship between e-government and CSR performance.

Mediating Role of Information and Communication Technologies Development

Information and communication technologies development plays a crucial role in terms of introducing an e-government initiative because it provides a suitable platform for them to launch e-government initiatives to irradicate corruption in the country (Adam, 2020). ICT development has an important relationship with sustainability as ICT development creates enormous benefits for e-business and sustainable development (Nicolae and Sabina, 2012). E-government advancements may result in more public access to ICTs, as well as improved skills and training for using e-government networks. This means that a country's e-government initiative might lead to a far broader ICT development agenda than when ICT advancements are undertaken to support specific government initiatives (Adam, 2020). Moreover, ICT development influences CSR engagement (Hendricx, 2020). There is limited evidence of ICT, e-government, and CSR; thus, we propose the hypothesis as,

H12: ICT development mediates the relationship between e-government and CSR performance.

Mediating Role of Institutional Quality

The mediating role of institutional quality between e-government and corruption was studied by Adam (2020). He found that institutional quality is important to eliminate corruption in the country as well as provides a potentially strong platform to launch e-government initiatives. Interestingly, organizational related factors are also important as organizational size also leaves a significant impact on CSR engagement (Hendricx, 2020). Moreover, Heckelman and Powell (2010) suggested that institutional quality deteriorates, corruption severely damages growth, therefore confirming the claim that political institutional quality influences the connection between corruption and growth. Corruption is detrimental to economic progress, and it is exacerbated in nations with poor political systems (Méon and Sekkat, 2005). Evidence has lately emerged suggesting the rule of law may help to mitigate the link between transparency and corruption (Dar et al., 2021). Therefore, the author proposes that,

H13: Intuitional development mediates the relationship between e-government and CSR performance.

Stakeholder's Theory

In this study, the stakeholder's theory of CSR is used to explain the influence of e-government development on CSR performance through the mediating role of ICTs, CSR policy, corruption, and institutional quality. Freeman and Medoff (1985) defined stakeholders as "any individual or group who has an effect on or is influenced by the achievements of organizational goals." All the stakeholders external and internal such as employees, consumers, governments, creditors, media, etc. may influence the performance of an organization (Nawaz et al., 2021; Qin et al., 2021). Corporations that perform well in terms of CSR activities may also be able to establish a strong bonding with their stakeholders (Cho et al., 2019). Therefore, when a company discloses its CSR, it is indicating that the company is socially responsible by communicating its attitude, activities, and outcomes in response to claims of its stakeholders. This study proposes 13 hypotheses and provides theoretical background. A graphical representation is presented in **Figure 1**.

RESEARCH METHODS

This study analyzes the relationship of e-government on CSR performance and the mediating effect of mandatory CSR policy on corruption and ICT development. The overall research philosophy is positivism. Positivism is where research is conducted to investigate the positive relationship between variables (Nawaz et al., 2020a). This is a deductive research by design where authors usually propose hypotheses and then test them. This quantitative study is based on a cross-sectional study where data is collected in single point time. To analyze the quantitative data, a structured questionnaire technique was used that covers 30 items. The data was collected through a convenience random sampling. A convenience random sampling technique is when the researcher collects data randomly from those respondents who are easily accessible to researchers (Nawaz et al., 2021). The data was collected from the managerial staff and top management stakeholders from China. Overall, 305 responses were collected to maintain the reliability of outcomes.

There are a few questions related to demographics that will be added to understand the description such as respondent's demography which includes age, gender, education, current position, and experience. The data will be collected through a structured questionnaire and the data is collected from China so based on top management focused the questionnaire is made in English as many of the top managerial staff understand English as a language. To measure all of these variables, this study considered the instruments and scale from the previous studies.

Instrument Development

All the constructs in the model will measure through the previous studies' measurements. The e-government will be

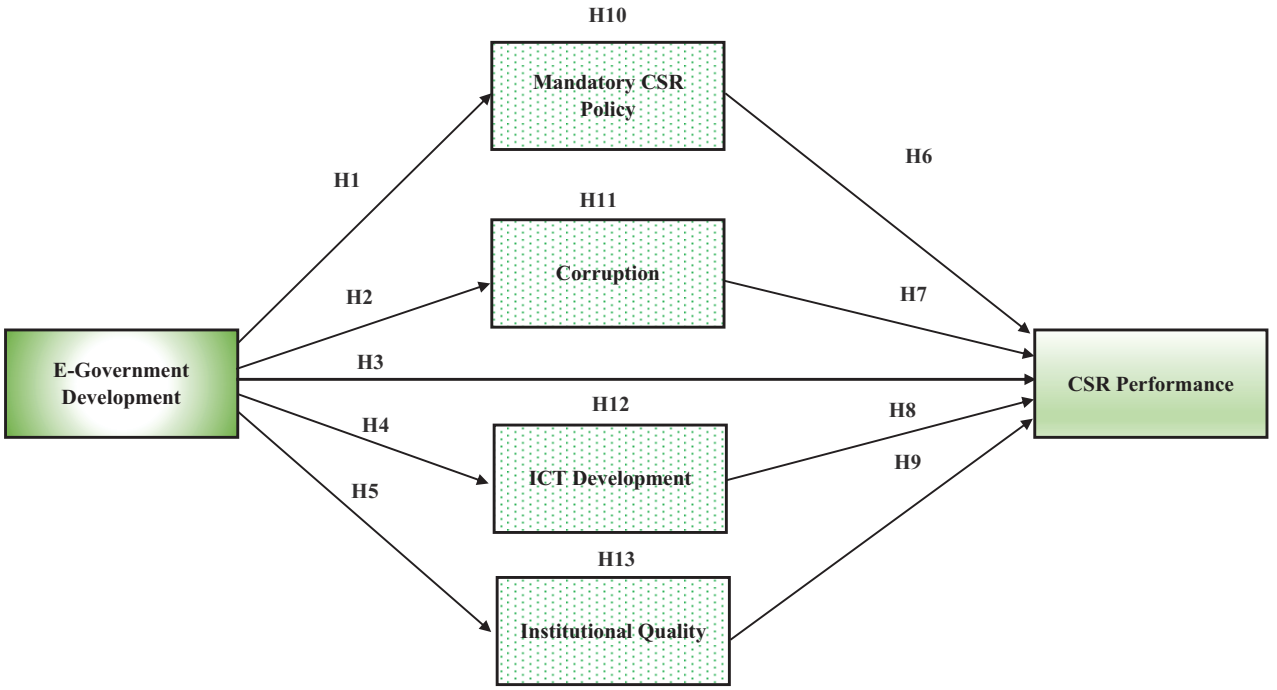

FIGURE 1 | The conceptual model.

measured through three indicators (online service index, telecommunication infrastructure index, and human capital index), the ICT development through ICT development index based on three indicators (access, skill, and use), the institutional quality will be measured through Country Policy and Institutional Assessment (CPIA) index by World Bank based on four indicators (economic management, policies for social equity/inclusion, public sector management, and institutions and structural policies). We developed this measurement scale of all these constructs based on the previous indicators and analyzed the reliability and validity analysis through CFA and EFA or PLS-algorithm in Smart-PLS. We proposed a five-point Likert scale that varies from strongly disagree (1) to strongly agree (5). The questionnaire is made on the previous indicators used in the study (Adam, 2020). For further constructs, the Mandatory CSR Policy construct will be measured through four indicators introduced by the author based on previous studies (Cheng and Kung, 2016; Ramdhony, 2018). Moreover, for corruption, four indicator scales will be modified from the study of Mahmoudi and Bagheri Majd (2021). In the end, the CSR performance will be measured from Liu et al. (2014) study based on 10 items.

TABLE 1 | Demographic summary.

Summary	Frequency	%
Gender		
Male	161	52.79
Female	144	47.21
Age		
<25	120	39.34
25–30	89	29.18
31–40	45	14.75
41–50	30	9.84
50>	21	6.89
Education		
Higher secondary	39	12.79
Bachelor	134	43.93
Masters	80	26.23
Doctorate	24	7.87
Others	28	9.18
Industry type		
Information technology	121	39.67
Online services	80	26.23
Online education	45	14.75
Logistics and supply chain	59	19.34

n = 305.

DATA ANALYSIS

The data analysis is mainly based on three stages: demographic and descriptive statistics, measurement model assessment, and structural model assessment. The suggested conceptual model was tested using the Smart-PLS version 3.3.3 software, which employed the Smart-Partial Least Square Structural Equation Modeling (PLS-SEM). The method is divided into two parts: measurement model evaluation and structural model evaluation. According to a previous study, these two processes should be turned off simultaneously. The measurement evaluation exposes

TABLE 2 | Measurement model and descriptive statistics.

Constructs	Code	FD	α	CR	AVE	M	SD
e-government			0.891	0.932	0.821	3.895	1.035
	EG1	0.901					
	EG2	0.92					
	EG3	0.898					
Information and communication technologies			0.775	0.87	0.692	3.948	1.054
	ICT1	0.844					
	ICT2	0.759					
	ICT3	0.887					
Institutional quality			0.903	0.932	0.775	3.936	1.038
	INQ1	0.874					
	INQ2	0.89					
	INQ3	0.872					
	INQ4	0.885					
Mandatory CSR			0.895	0.927	0.761	3.888	1.101
	MCSR1	0.883					
	MCSR2	0.856					
	MCSR3	0.878					
	MCSR4	0.872					
Corruption			0.795	0.874	0.65	3.872	1.044
	COR1	0.43					
	COR2	0.892					
	COR3	0.884					
	COR4	0.914					
Social corporate responsibility			0.931	0.942	0.645	3.795	1.033
	CSR1	0.834					
	CSR2	0.826					
	CSR3	0.815					
	CSR4	0.810					
	CSR5	0.825					
	CSR6	0.777					
	CSR7	0.805					
	CSR8	0.847					
	CSR9	0.704					
	CSR10	0.805					

FD, factor loadings; CR, construct reliability; AVE, average variance extracted; α, Cronbach Alpha.

how the model's variables are measured, whereas the structural model evaluation reveals how the model's variables are linked.

The demographic details are illustrated in **Table 1**. Demographic summary delineates those respondents that are both male and female with the percentage of 52.79 and 47.21%, respectively. Respondents belong to multiple age groups (<25, 25–30, 31–40, 41–50, 50>). Respondents share multiple education qualification levels; however, around 70% of them have bachelor's and master's degrees. These respondents were from four different industries which are more related to the nature of the study such as information technology, online services, online education, and logistics and supply chain. This information demonstrates the profile of the focus group in this study and the diversity of information will help to generalize these findings.

The second stage of analysis is measurement model assessment that is usually the first stage in the sequential equation modeling (SEM) in which the reliability validity is being measured for all the constructs in the conceptual model and indicators of these constructs. Further, in the measurement model, there are two validity measures overall: discriminant and convergent validity and reliability measures such as CR and Cronbach Alpha. The results of the measurement model are illustrated in **Table 2** and a graphical representation is in **Figure 2**.

Convergent validity measures the extent to which the measures are correlated with each other. Constructs reliability is measured through CR and Cronbach Alpha as the values of both CR and Cronbach Alpha are greater than the threshold point which is 0.70 (Hair et al., 2017; Haq and Awan, 2020; Haq et al., 2020). Thus, the reliability of constructs is maintained, and all constructs are reliable to use for further analysis. Convergent validity is measured through factor loadings and AVE values. The thresholds for AVE and factor loadings are 0.50 and 0.70, respectively (Hair et al., 2017; Haq et al., 2020).

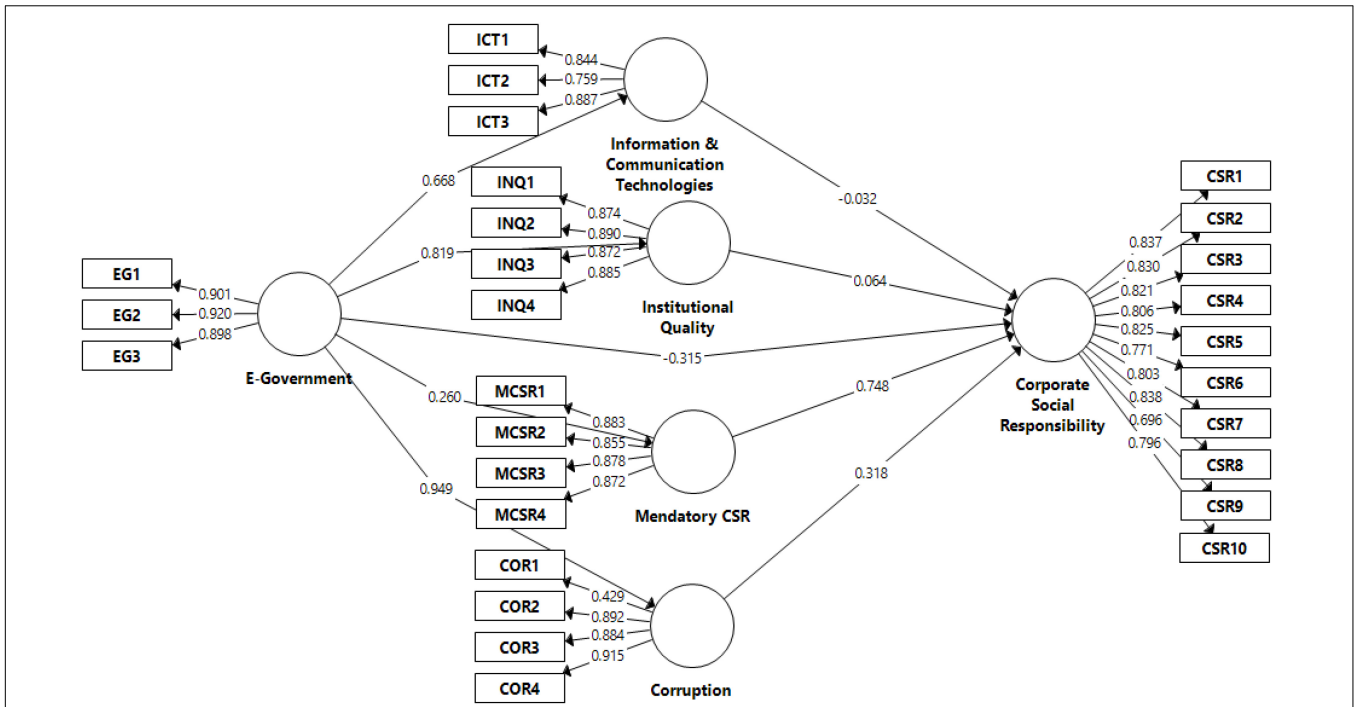

FIGURE 2 | Partial least square-algorithm for the measurement model.

TABLE 3 | Fornell and Larcker criterion.

	CSR	COR	EG	ICTs	INQ	MCSR
CSR	**0.803**					
COR	0.343	**0.806**				
EG	0.218	0.949	**0.906**			
ICTs	0.063	0.649	0.668	**0.832**		
INQ	0.291	0.834	0.819	0.633	**0.880**	
MCSR	0.804	0.381	0.260	0.074	0.307	**0.872**

CSR, corporate social responsibility; COR, corruption; EG, e-government; ICTs, information and communication technologies; INQ, institutional quality; MCSR, mandatory corporate social responsibility. The meaning of the bold values is shows significance.

TABLE 4 | HTMT ratio.

	CSR	COR	EG	ICTs	INQ	MCSR
CSR	–					
COR	0.492	–				
EG	0.243	1.088	–			
ICTs	0.105	0.788	0.802	–		
INQ	0.319	0.971	0.913	0.752	–	
MCSR	0.873	0.547	0.291	0.152	0.341	–

CSR, corporate social responsibility; COR, corruption; EG, e-government; ICTs, information and communication technologies; INQ, institutional quality; MCSR, mandatory corporate social responsibility.

All values for AVE are above 0.50 and factor loadings are greater than 0.70; therefore, the convergent validity is maintained and satisfactory.

Discriminant validity was measured through the Fornell and Larcker ratio criterion and Heterotrait-Monotrait (HTMT) ratio of association or correlation. The Fornell and Larcker ratio criterion is a measure of discriminant validity where all diagonal values in the table must be larger than their beneath values (Hair et al., 2017; Haq and Awan, 2020).

Table 3 illustrates that all values in bold on the diagonal are greater than their below values. Thus, the condition of discriminant validity was met. Moreover, the second measure to estimate discriminant validity is the HTMT ratio where all values must be less than 0.90 (Hair et al., 2017). Thus, all values are less than the threshold point other than a few values as illustrated in **Table 4**. There is a bit of multicollinearity problem found in HTMT; however, the results of the Fornell and Larcker ratio criterion are appropriate. The structural model assessment is the third stage in analysis but that is usually the second stage in SEM. The structural model estimates the path or relationships between variables. It includes both direct and indirect effects. Direct effects are defined as the relationship between two variables; however, the indirect effects are mediating the roles of other constructs. This study employed *t*-statistics, *p*-values, R^2, and Beta values or (O) to confirm the statistical significance and the direction either positive or negative and results for measurement and structural model assessment are illustrated in **Table 5** and **Figure 3**. The H1 is tested and confirmed as there is a negative and significant association between e-government and CSR with $t - statistic = 2.938 : p - value = 0.002$. Likewise, the next four hypotheses were also accepted and predicted a positive significant relationship of e-government

TABLE 5 | Direct and indirect effects.

Paths	H	(O)	(M)	(STDEV)	*T* Statistics	*P* Values	R^2	Results
EG → CSR	*H1*	−0.322	−0.314	0.109	2.938***	0.002	0.66	Supported
EG → MCSR	*H2*	0.26	0.258	0.076	3.436***	0.000	0.07	Supported
EG → COR	*H3*	0.949	0.949	0.006	167.619***	0.000	0.90	Supported
EG → ICTs	*H4*	0.668	0.672	0.039	17.319***	0.000	0.45	Supported
EG → INQ	*H5*	0.819	0.819	0.031	26.042***	0.000	0.67	Supported
MCSR → CSR	*H6*	0.743	0.745	0.037	20.082***	0.000		Supported
COR → CSR	*H7*	0.321	0.315	0.121	2.657***	0.004		Supported
ICTs → CSR	*H8*	−0.037	−0.039	0.054	0.696	0.243		Not supported
INQ → CSR	*H9*	0.082	0.083	0.057	1.439**	0.075		Supported
EG → COR → CSR	*H10*	0.305	0.298	0.114	2.666***	0.004		Supported
EG → MCSR → CSR	*H11*	0.193	0.192	0.056	3.472***	0.000		Supported
EG → ICTs → CSR	*H12*	−0.025	−0.026	0.036	0.691	0.245		Supported
EG → INQ → CSR	*H13*	0.067	0.068	0.047	1.431**	0.076		Supported

*** = 0.005%, ** = 0.10% significance level. H, hypothesis; O, original sample; M, sample mean; STDEV, standard deviation; CSR, corporate social responsibility; COR, corruption; EG, e-government; ICTs, information and communication technologies; INQ, institutional quality; MCSR, mandatory corporate social responsibility.*

with mandatory CSR, corruption, ICTs development and institutional quality with $t-statistic = 3.436 : p-value = 0.000$, $t-statistic = 167.619 : p-value = 0.000$, $t-statistic = 17.319 : p-value = 0.000$, and $t-statistic = 26.042 : p-value = 0.000$, respectively. Moreover, among the next four hypotheses such as (H6, H7, H8, and H9), H6, H7, and H9 were accepted with $t-statistic = 20.082 : p-value = 0.000$, $t-statistic = 2.657 : p-value = 0.004$, and $t-statistic = 1.439 : p-value = 0.075$, however, the H8 were rejected where *p*-value is not satisfactory thus no statistical significance was found between ICTs development and CSR performance $t-statistic = 0.696 : p-value = 0.243$.

Four indirect effects (mediating variables) were introduced and proposed. Among those four mediating roles, three of them were accepted. The hypothesis H10 confirmed that corruption positively mediated the relationship between e-government and CSR where it implies that it is a full mediation with $t-statistic = 2.666 : p-value = 0.004$. Likewise, H11 and H13 confirmed and mandatory CSR and institutional quality proved a positive mediation between e-government and CSR. These mediating effects were also proved as full mediation under $t-statistic = 3.472 : p-value = 0.004$ and $t-statistic = 1.431 : p-value = 0.004$. But the H12 were rejected where $t-statistic = 0.691 : p-value = 0.245$.

DISCUSSION AND IMPLICATION

Social corporate responsibility is an important factor for business success these days. Besides, it offers a productive workplace environment. Moreover, social corporate responsibility got great attention from government participants and policymakers in current circumstances due to Covid-19. This study explores the relationship between e-government and corporate social responsibility. Moreover, this study explores the direct and indirect effects. In other words, this study explores the mediating role of corruption, mandatory CSR, institutional quality, and ICTs development. This study is the first in the previous strand that investigated the direct effect of e-government and social corporate responsibility. Covid-19 forced a rapid e-government focus and electronic development and CSR is a core aspect of the recovery plan from the Covid-19 crisis (Bae et al., 2021). However, the first hypothesis showed that due to Covid-19 e-government is negatively associated with CSR these days. The direct hypothesis proved a positive impact of e-government on corruption, mandatory CSR, and institutional quality. The reason behind increased corruption is the lack of Internet access and information asymmetry. In contrast, mandatory CSR policy, corruption, and institutional quality were found to be positively linked with CSR. Moreover, the efficiency of e-government development is mediated by a country's institutional quality (Adam, 2020). Likewise, the positive impact of corruption, mandatory CSR, and institutional quality on CSR implies that these factors are crucial for CSR performance and play a vital role in increasing the CSR overall in Covid-19. Some developing nations have lately implemented an obligatory CSR policy as part of their e-government ambitions, such as India, which has legislated a mandatory CSR policy under the Indian Companies Act 2013 (Section-135). The implementation of a mandated CSR policy in businesses improves not just CSR but also company performance (Bhattacharyya and Rahman, 2019). Furthermore, today's businesses are focusing on various CSR activities in addition to the statutory CSR obligations to mitigate social and economic sustainability risks (Hossan Chowdhury and Quaddus, 2021). This study is based on the effect of e-government on CSR performance. The findings of the research will provide policy implications for those countries which introduce initiatives of e-government. This will also provide implications for the policymakers to introduce e-government programs for better CSR performance in the country. Additionally, this study will bring insight for the regulatory authorities to focus on improving institutional quality and ICT development. The development of ICT provides support to launch effective and

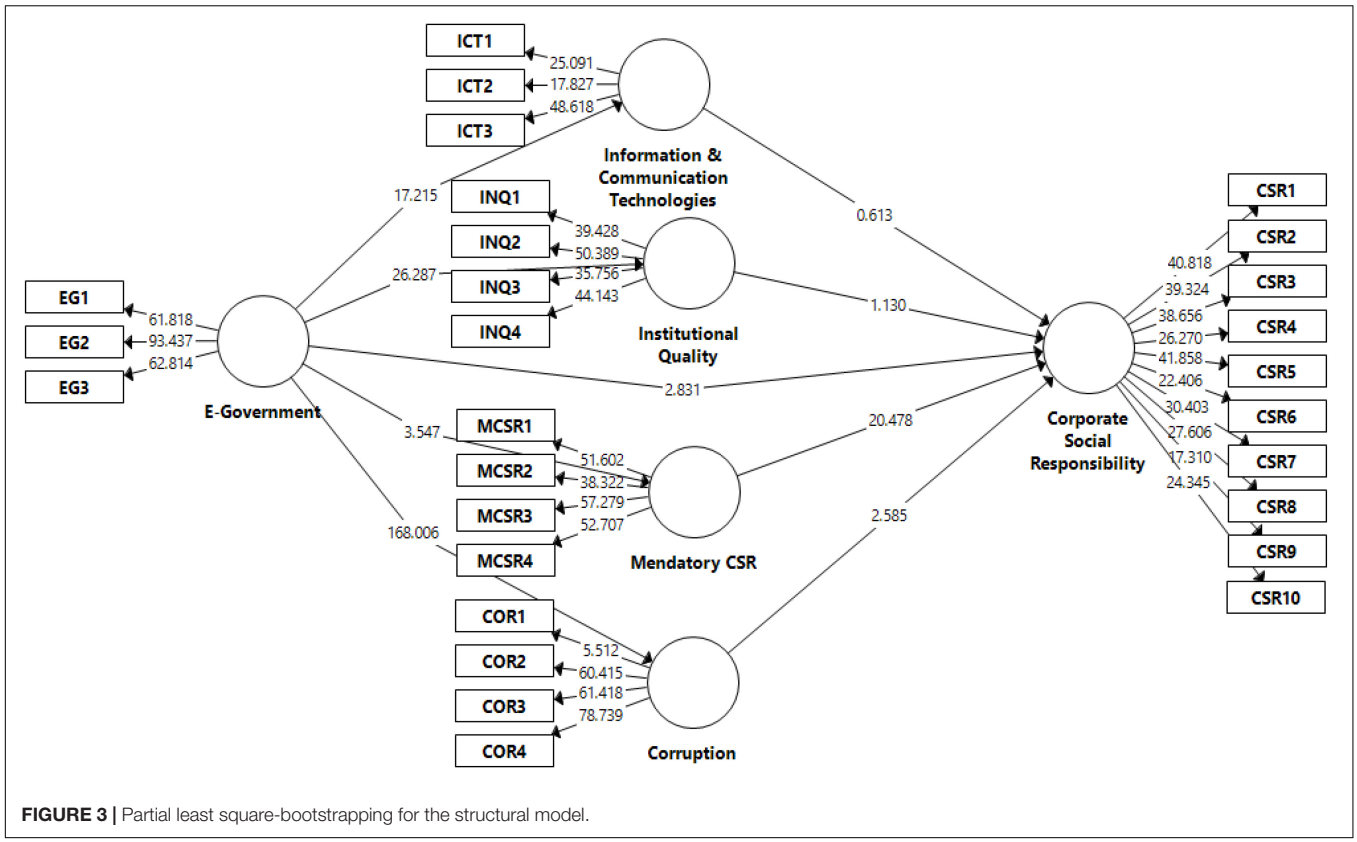

FIGURE 3 | Partial least square-bootstrapping for the structural model.

successful e-government initiatives for governments. Moreover, the relationship of corruption with CSR performance will produce significant implications for corruption control measures and adverse effects of corruption on CSR performance. It will also give a picture of how mandatory CSR policy can be useful in terms of improving the overall CSR performance of the country or state. This means that solid institutional foundations and a robust legal system may serve as strong pillars for the growth of e-government. It is critical to building institutions so that citizens do not seek consolation in the pre-e-government environment's physical bureaucracy, which fostered corruption.

CONCLUSION

Nowadays, social corporate responsibility is a critical component of company success. It also provides a productive work atmosphere. Furthermore, due to Covid-19, social business responsibility has received a lot of attention from government players and politicians. Therefore, the link between e-government and corporate social responsibility is investigated in this study. PLS-SEM research analysis technique was employed using Smart-PLS 3.3.3 as an analysis tool. This study is based on survey and structured questionnaire. Moreover, the data was collected through convenience sampling. The findings of the study reveals that e-government has a negative impact on CSR performance. The e-government meaningfully predicts the corruption, ICTs development, mandatory CSR discourse, and institutional quality. However, these constructs are positively related with CSR performance. Mandatory CSR, institutional quality, and corruption proved to be a mediator between e-government and CSR performance. This study has several contributions to the current strand of literature. At first, this study aims to develop and investigate the relationship between e-government and corporate social responsibility during Covid-19. Second, this research investigated mandatory corporate social responsibility, institutional quality, ICTs, and corruption as mediators. This study aims to answer the question of how e-government impacts corporate social responsibility and how this relationship can be influenced by other mediating forces. Therefore, government and related stakeholders should consider these findings to form the policy related to e-government. There are a few limitations to this study. The data for this study was obtained at a single moment in time and is cross-sectional. As a result, longitudinal research can give a more accurate representation of current results. Second, this research took into account the opinions of respondents and was based on primary data. As a result, it accurately depicts what Chinese citizens and experts believe. Secondary data and actual data, on the other hand, can provide a more realistic picture of China's administration and its ramifications. Finally, because this research was done in China, the results cannot be applied to other nations. As a result, these findings may not apply to nations that are not focused on e-government. Future research should explore the related concepts, i.e., e-banking service quality (Haq and Awan, 2020) with CSR.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

AARNA conceived and designed the concept literature review, data collection, and wrote the manuscript. YC, AA, and YY helped to provide technical support and contributed to analysis tools. AARNA and TS reviewed the work to improve the outcomes. All authors read and agreed to the published version of the manuscript.

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REFERENCES

Adam, I. O. (2020). Examining E-government development effects on corruption in Africa: the mediating effects of ICT development and institutional quality. *Technol. Soc.* 61:101245. doi: 10.1016/j.techsoc.2020.101245

Agyei-Mensah, B. K., and Buertey, S. (2019). The effect of corruption and culture on corporate social performance: an empirical study. *Soc. Responsibil. J.* 15, 1071–1086. doi: 10.1108/SRJ-12-2017-0271

Alhammadi, I. (2009). *The Role of E-Government in Combating Corruption in Transition Countries*. Available online at: https://doi.org/10.48009/2_iis_2009_66-75

Ali, L., Nawaz, A., Iqbal, S., Basheer, M. A., Hameed, J., Albasher, G., et al. (2021). *Dynamics of Transit Oriented Development, Role of Greenhouse Gases and Urban Environment: A Study for Management and Policy*. Basel: MDPI.

An, H., Razzaq, A., Nawaz, A., Noman, S. M., and Khan, S. A. R. (2021). Nexus between green logistic operations and triple bottom line: evidence from infrastructure-led Chinese outward foreign direct investment in Belt and Road host countries. *Environ. Sci. Pollut. Res.* 28, 51022–51045. doi: 10.1007/s11356-021-12470-3

Androniceanu, A., Kinnunen, J., and Georgescu, I. (2020). E-government clusters in the EU based on the gaussian mixture models. *Admin. Si Manag. Public* 35, 6–20. doi: 10.24818/amp/2020.35-01

Anttiroiko, A. V., Valkama, P., and Bailey, S. J. (2014). Smart cities in the new service economy: building platforms for smart services. *AI Soc.* 29, 323–334. doi: 10.1007/s00146-013-0464-0

Arayankalam, J., Khan, A., and Krishnan, S. (2021). How to deal with corruption? Examining the roles of e-government maturity, government administrative effectiveness, and virtual social networks diffusion. *Int. J. Inform. Manage.* 58:102203. doi: 10.1016/j.ijinfomgt.2020.102203

Awan, T. M., Khan, M. S., Haq, I. U., and Kazmi, S. (2021). Oil and stock markets volatility during pandemic times: a review of G7 countries. *Green Finance* 3, 15–27. doi: 10.3934/GF.2021002

Azad, B., and Faraj, S. (2014). What shapes global diffusion of e-government: comparing the influence of national governance institutions* Bijan. *J. Global Inform. Manage.* 18, 85–104. doi: 10.4018/jgim.2010040104

Bae, K. H., El Ghoul, S., Gong, Z., and Guedhami, O. (2021). Does CSR matter in times of crisis? Evidence from the COVID-19 pandemic. *J. Corporate Finance* 67:101876. doi: 10.1016/j.jcorpfin.2020.101876

Bapuji, H., Patel, C., Ertug, G., and Allen, D. G. (2020). Corona crisis and inequality: why management research needs a societal turn. *J. Manage.* 46, 1205–1222. doi: 10.1177/0149206320925881

Bélanger, F., and Carter, L. (2012). Digitizing government interactions with constituents: an historical review of E-government research in information systems. *J. Assoc. Inform. Syst.* 13, 363–394. doi: 10.17705/1jais.00295

Bertot, J. C., Jaeger, P. T., and Grimes, J. M. (2010). Using ICTs to create a culture of transparency: E-government and social media as openness and anti-corruption tools for societies. *Govern. Inform. Quart.* 27, 264–271. doi: 10.1016/j.giq.2010.03.001

Bhattacharyya, A., and Rahman, M. L. (2019). Mandatory CSR expenditure and firm performance. *J. Contemporary Account. Econ.* 15:100163. doi: 10.1016/j.jcae.2019.100163

Bwalya, K., and Healy, M. (2010). Harnessing e-government adoption in the SADC region: a conceptual underpinning. *Electr. J. E-government* 8, 23–32.

Carroll, A. B. (1970). The pyramid of corporate the morai management of social responsibiiity: toward organizational stakeholders. *Munchener Medizinische Wochenschrift* 112, 2011–2016.

Carvalho, S. W., Sen, S., de Oliveira Mota, M., and de Lima, R. C. (2010). Consumer reactions to CSR: a Brazilian perspective. *J. Bus. Ethics* 91, 291–310. doi: 10.1007/s10551-010-0620-0

Chang, E. C. C., and Chu, Y. (2006). Corruption and trust: exceptionalism in Asian democracies? *J. Politics* 68, 259–271. doi: 10.1111/j.1468-2508.2006.00404.x

Chantziaras, A., Dedoulis, E., Grougiou, V., and Leventis, S. (2020). The impact of religiosity and corruption on CSR reporting: the case of U.S. banks. *J. Bus. Res.* 109, 362–374. doi: 10.1016/j.jbusres.2019.12.025

Chedrawi, C., Osta, A., and Osta, S. (2020). CSR in the lebanese banking sector: a neo-institutional approach to stakeholders' legitimacy. *J. Asia Bus. Stud.* [Epub ahead-of-print]. doi: 10.1108/JABS-03-2018-0093

Chen, X., Huang, C., Wang, H., Wang, W., Ni, X., and Li, Y. (2021). Negative emotion arousal and altruism promoting of online public stigmatization on COVID-19 pandemic. *Front. Psychol.* 12:652140. doi: 10.3389/fpsyg.2021.652140

Chen, Y. C., Hung, M., and Wang, Y. (2018). The effect of mandatory CSR disclosure on firm profitability and social externalities: evidence from China. *J. Accoun. Econ.* 65, 169–190. doi: 10.1016/j.jacceco.2017.11.009

Cheng, C. L., and Kung, F. H. (2016). The effects of mandatory corporate social responsibility policy on accounting conservatism. *Rev. Account. Finance* 15, 2–20. doi: 10.1108/RAF-12-2014-0135

Cho, S. J., Chung, C. Y., and Young, J. (2019). Study on the relationship between CSR and financial performance. *Sustainability* 11, 1–26. doi: 10.3390/su11020343

Dahwan, A. A. A., and Raju, V. (2021). The role of E-readiness rank on the implementation of E-government in military institutions in yemen. *Ann. Roman. Soc. Cell Biol.* 25, 1029–1043.

Dar, A. A., Pan, B., Qin, J., Zhu, Q., Lichtfouse, E., Usman, M., et al. (2021). Sustainable ferrate oxidation: reaction chemistry, mechanisms and removal of pollutants in wastewater. *Environ. Pollut.* 290:117957. doi: 10.1016/j.envpol.2021.117957

Deng, H., Karunasena, K., and Xu, W. (2018). Evaluating the performance of e-government in developing countries: a public value perspective. *Int. Res.* 28, 169–190. doi: 10.1108/IntR-10-2016-0296

Dilham, A., Yulinda, P., and Fawzeea Sembiring, B. K. (2020). Village office development model for E-government based village apparatus performance. *Int. J. Manage.* 11, 358–365.

Elbahnasawy, N. G. (2021). Can E-government limit the scope of the informal economy? *World Dev.* 139:105341. doi: 10.1016/j.worlddev.2020.105341

Elfeky, M. I. (2017). The extent of voluntary disclosure and its determinants in emerging markets: evidence from Egypt. *J. Finance Data Sci.* 3, 45–59. doi: 10.1016/j.jfds.2017.09.005

Frankental, P. (2001). Corporate social responsibility–a PR invention? *Corporate Commun. Int. J.* 6, 18–23. doi: 10.1108/13563280110381170

Freeman, R. B., and Medoff, J. L. (1985). What do unions do? By Richard B. Freeman and James L. Medoff. *ILR Rev.* 38, 244–263. doi: 10.1177/001979398503800207

Gatto, A. J. C. (2002). *The European Union and Corporate Social Responsibility: Can the EU Contribute to the Accountability of Multinational Enterprises for Human*

Rights?, 32. Available online at: https://www.law.kuleuven.be/iir/nl/onderzoek/working-papers/WP32e.pdf

Hair, J. F. J., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. (2017). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Available online at: https://www.beck-elibrary.de/10.15358/9783800653614/partial-least-squares-strukturgleichungsmodellierung

Hao, W., Shah, S. M. A., Nawaz, A., Asad, A., Iqbal, S., Zahoor, H., et al. (2020b). The impact of energy cooperation and the role of the one belt and road initiative in revolutionizing the geopolitics of energy among regional economic powers: an analysis of infrastructure development and project management. *Complexity* 2020:8820021. doi: 10.1155/2020/8820021

Hao, W., Mehmood, S., Shah, A., Nawaz, A., Atif, M., and Noman, S. M. (2020a). The impact of CPEC on infrastructure development, a-double mediating role of project success factors & project management. *Revista Argentina de Clínica Psicológica* XXIX, 737–750.

Haq, I. U., and Awan, T. M. (2020). Impact of e-banking service quality on e-loyalty in pandemic times through interplay of e-satisfaction. *J. Manag.* 17, 39–55.

Haq, I. U., Paracha, A., and Shakeel, W. (2020). A multiple parallel mediation between transformational leadership and project-based performancea process model. *J. Financ. Eng.* 7:2050026. doi: 10.1142/S2424786320500267

Hardy, C. A., and Williams, S. P. (2008). E-government policy and practice: a theoretical and empirical exploration of public e-procurement. *Govern. Inform. Quart.* 25, 155–180. doi: 10.1016/j.giq.2007.02.003

Heckelman, J. C., and Powell, B. (2010). Corruption and the institutional environment for growth. *Comparat. Econ. Stud.* 52, 351–378. doi: 10.1057/ces.2010.14

Hendricx, J. (2020). *Does Firm Size Matter? How Access to ICT Influences The Relationship Between Firm Size and Csr Engagement*. Available online at: https://theses.ubn.ru.nl/handle/123456789/9492

Hossan Chowdhury, M. M., and Quaddus, M. A. (2021). Supply chain sustainability practices and governance for mitigating sustainability risk and improving market performance: a dynamic capability perspective. *J. Clea. Produ.* 278:123521. doi: 10.1016/j.jclepro.2020.123521

Huo, C., Hameed, J., Nawaz, A., Adnan Raheel Shah, S., Albahser, G., Alqahtani, W., et al. (2021). Scientific risk performance analysis and development of disaster management framework: a case study of developing Asian countries. *J. King Saud Univ. Sci.* 33:101348. doi: 10.1016/j.jksus.2021.101348

Chunhui Huo, A., Dar, A., Nawaz, A., Hameed, J., Albashar, G., Pan, B., et al. (2020). Groundwater contamination with the threat of COVID-19: insights into CSR theory of Carroll's pyramid. *J. King Saud Univ. Sci.* 33:101295. doi: 10.1016/j.jksus.2020.101295

Hur, W., and Kim, Y. (2017). How does culture improve consumer engagement in CSR initiatives? The mediating role of motivational attributions. *Corporate Soc. Responsibil. Environ. Manage.* 24, 620–633. doi: 10.1002/csr.1432

Hwang, K., and Choi, M. (2017). Effects of innovation-supportive culture and organizational citizenship behavior on e-government information system security stemming from mimetic isomorphism. *Govern. Inform. Quart.* 34, 183–198. doi: 10.1016/j.giq.2017.02.001

Idowu, S. O., and Towler, B. A. (2004). A comparative study of the contents of corporate social responsibility reports of UK companies. *Manage. Environ. Q. Int. J.* 15, 420–437. doi: 10.1108/14777830410540153

Ioannou, I., and Serafeim, G. (2012). The consequences of mandatory corporate sustainability reporting. *SSRN Electro. J.* 49. Available online at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1799589

Jain, H. (2020). Mandatory corporate social responsibility: a utilitarian and deontological perspective. *Open J. Bus. Manage.* 8, 2278–2284. doi: 10.4236/ojbm.2020.85139

Kaufmann, D. (2011). Myths and realities of governance and corruption. *SSRN Electr. J.* 8089, 81–98. doi: 10.2139/ssrn.829244

Keig, D. L., Brouthers, L. E., and Marshall, V. B. (2015). Formal and informal corruption environments and multinational enterprise social irresponsibility. *J. Manage. Stud.* 52, 89–116. doi: 10.1111/joms.12102

Khalil, O. E. M. (2011). E-government readiness: does national culture matter? *Govern. Inform. Quart.* 28, 388–399. doi: 10.1016/j.giq.2010.06.011

Khan, A., and Krishnan, S. (2019). Conceptualizing the impact of corruption in national institutions and national stakeholder service systems on e-government maturity. *Int. J. Inform. Manage.* 46, 23–36. doi: 10.1016/j.ijinfomgt.2018.11.014

Khan, S. A. R., Jian, C., Zhang, Y., Golpîra, H., Kumar, A., and Sharif, A. (2019). Environmental, social and economic growth indicators spur logistics performance: from the perspective of South Asian Association for Regional Cooperation countries. *J. Clean. Produc.* 214, 1011–1023. doi: 10.1016/j.jclepro.2018.12.322

Kim, S., Kim, H. J., and Lee, H. (2009). An institutional analysis of an e-government system for anti-corruption: the case of OPEN. *Govern. Inform. Quart.* 26, 42–50. doi: 10.1016/j.giq.2008.09.002

Kong, D., Shu, Y., and Wang, Y. (2021). Corruption and corporate social responsibility: evidence from a quasi-natural experiment in China⋆. *J. Asian Econ.* 75:101317. doi: 10.1016/j.asieco.2021.101317

Krishnan, S., and Teo, T. S. H. (2012). Moderating effects of governance on information infrastructure and e-government development. *J. Am. Soc. Inform. Sci. Technol.* 63, 1929–1946. doi: 10.1002/asi.22660

Krishnan, S., Teo, T. S. H., and Lim, V. K. G. (2013). Examining the relationships among e-government maturity, corruption, economic prosperity and environmental degradation: a cross-country analysis. *Inform. Manage.* 50, 638–649. doi: 10.1016/j.im.2013.07.003

Lee, S., Oh, S. W., and Nam, K. (2016). Transformational and transactional factors for the successful implementation of enterprise architecture in public sector. *Sustainability* 8:456. doi: 10.3390/su8050456

Li, X., Li, Z., Jia, T., Yan, P., Wang, D., and Liu, G. (2021). The sense of community revisited in Hankow, China: combining the impacts of perceptual factors and built environment attributes. *Cities* 111:103108. doi: 10.1016/j.cities.2021.103108

Liang, T. P., You, J. J., and Liu, C. C. (2010). A resource-based perspective on information technology and firm performance: a meta analysis. *Indust. Manage. Data Syst.* 110, 1138–1158. doi: 10.1108/02635571011077807

Linhartová, V. (2019). Curbing corruption in the public sector by utilizing electronic public administration. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis* 67, 1039–1048. doi: 10.11118/actaun201967041039

Lin-Hi, N., and Blumberg, I. (2018). The link between (Not) practicing CSR and corporate reputation: psychological foundations and managerial implications. *J. Bus. Ethics* 150, 185–198. doi: 10.1007/s10551-016-3164-0

Liu, M. T., Wong, I. A., Shi, G., Chu, R., and Brock, J. L. (2014). The impact of corporate social responsibility (CSR) performance and perceived brand quality on customer-based brand preference. *J. Serv. Mark.* 28, 181–194. doi: 10.1108/JSM-09-2012-0171

Liu, Y., Lv, X., and Tang, Z. (2021). The impact of mortality salience on quantified self behavior during the COVID-19 pandemic. *Personal. Indiv. Diff.* 180:110972. doi: 10.1016/j.paid.2021.110972

Lopatta, K., Jaeschke, R., Tchikov, M., and Lodhia, S. (2017). Corruption, corporate social responsibility and financial constraints: international firm-level evidence. *Eur. Manage. Rev.* 14, 47–65. doi: 10.1111/emre.12098

Lu, W. M., Kweh, Q. L., Nourani, M., and Lin, C. Y. (2021). Political governance, corruption perceptions index, and national dynamic energy efficiency. *J. Clean. Produc.* 295:126505. doi: 10.1016/j.jclepro.2021.126505

Luo, Y. (2005). An organizational perspective of corruption. *Manage. Organ. Rev.* 1, 119–154. doi: 10.1111/j.1740-8784.2004.00006.x

Mahmoudi, F., and Bagheri Majd, R. (2021). The effect of lean culture on the reduction of academic corruption by the mediating role of positive organizational politics in higher education. *Int. J. Educ. Dev.* 80:102319. doi: 10.1016/j.ijedudev.2020.102319

Maqsoom, A., Babar, Z., Shaheen, I., Abid, M., Kakar, M. R., Mandokhail, S. J., et al. (2021b). Influence of construction risks on cost escalation of highway-related projects: exploring the moderating role of social sustainability requirements. *Iran. J. Sci. Technol. Trans. Civil Eng.* 45, 2003–2015. doi: 10.1007/s40996-021-00601-2

Maqsoom, A., Aslam, B., Khalil, U., Kazmi, Z. A., Azam, S., Mehmood, T., et al. (2021a). Landslide susceptibility mapping along the China Pakistan Economic Corridor (CPEC) route using multi-criteria decision-making method. *Mod. Earth Syst. Environ.* doi: 10.1007/s40808-021-01226-0

Matmati, M. (2001). Les enjeux de l'intranet dans la GRH. *Actes Du XIIe Congrès de l'AGRH* 11, 986–1004.

McKnight, D. H., Choudhury, V., and Kacmar, C. (2002). Developing and validating trust measures for e-commerce: an integrative typology. *Inform. Syst. Res.* 13, 334–359. doi: 10.1287/isre.13.3.334.81

Méon, P. G., and Sekkat, K. (2005). Does corruption grease or sand the wheels of growth? *Public Choice* 122, 69–97. doi: 10.1007/s11127-005-3988-0

Mistry, A. J. (2012). The role of egovernance in mitigating corruption. *Accoun. Public Interest* 12, 137–159. doi: 10.2308/apin-10287

Moisescu, O. I. (2015). Development and validation of a measurement scale for customers ' perceptions of corporate social. *Manage. Mark. J.* XIII, 311–332.

Mukherjee, A., Bird, R., and Duppati, G. (2018). Mandatory corporate social responsibility: the Indian experience. *J. Contemporary Accoun. Econ.* 14, 254–265. doi: 10.1016/j.jcae.2018.06.002

Nam, T. (2018). Examining the anti-corruption effect of e-government and the moderating effect of national culture: a cross-country study. *Govern. Inform. Quart.* 35, 273–282. doi: 10.1016/j.giq.2018.01.005

Nawaz, A., Su, X., Din, Q. M. U., Khalid, M. I., Bilal, M., and Shah, S. A. R. (2020a). Identification of the h&s (Health and safety factors) involved in infrastructure projects in developing countries-a sequential mixed method approach of OLMT-project. *Int. J. Environ. Res. Public Health* 17:635. doi: 10.3390/ijerph17020635

Nawaz, A., Su, X., Iqbal, S., Zahoor, H., Asad, A., Asghar, S., et al. (2020b). Validating a phenomenological mathematical model for public health and safety interventions influencing the evolutionary stages of recent outbreak for long-term and short-term domains in Pakistan. *Complexity* 2020:8866071. doi: 10.1155/2020/8866071

Nawaz, A., Su, X., and Nasir, I. M. (2021). *BIM Adoption and Its Impact on Planning and Scheduling Influencing Mega Plan Projects-(CPEC-) Quantitative Approach*. London: Hindawi. doi: 10.1155/2021/8818296

Nawaz, A., Waqar, A., Shah, S. A. R., Sajid, M., and Khalid, M. I. (2019). An innovative framework for risk management in construction projects in developing countries: evidence from Pakistan. *Risks* 7:24. doi: 10.3390/risks7010024

Nicolae, J. C., and Sabina, D. B. M. (2012). The ICT implication on CSR in the tourism of emerging markets. *Procedia Econ. Finance* 3, 702–709. doi: 10.1016/S2212-5671(12)00217-1

Ojha, A., and Palvia, S. (2012). E-government and the fight against corruption: conceptual Modeland five case studies from India†. *J. Inform. Technol. Case Appl. Res.* 14, 11–29. doi: 10.1080/15228053.2012.10845710

Park, C. H., and Kim, K. (2020). E-government as an anti-corruption tool: panel data analysis across countries. *Int. Rev. Administr. Sci.* 86, 691–707. doi: 10.1177/0020852318822055

Qin, Z., Ji, C., Su, X., and Nawaz, A. (2021). Probability analysis of construction risk based on noisy-or gate bayesian networks. *Reliabil. Eng. Syst. Safety* 21:107974. doi: 10.1016/j.ress.2021.107974

Ramdhony, D. (2018). The implications of mandatory corporate social responsibilitya literature review perspective. *Theor. Econ. Lett.* 08, 432–447. doi: 10.4236/tel.2018.83031

Reyes-Menendez, A., Saura, J. R., Palos-Sanchez, P. R., and Alvarez-Garcia, J. (2018). Understanding user behavioral intention to adopt a search engine that promotes sustainable water management. *Symmetry* 10:584. doi: 10.3390/sym10110584

Richey, R. G., Genchev, S. E., and Daugherty, P. J. (2005). The role of resource commitment and innovation in reverse logistics performance. *Int. J. Phys. Distribut. Logist. Manage.* 35, 233–257. doi: 10.1108/09600030510599913

Roblek, V., Bach, M. P., Meško, M., and Bertoncel, T. (2020). Best practices of the social innovations in the framework of the e-government evolution. *Amfiteatru Econ.* 22, 275–302. doi: 10.24818/EA/2020/53/275

Rodriguez, P., Siegel, D. S., Hillman, A., and Eden, L. (2006). Three lenses on the multinational enterprise: politics, corruption, and corporate social responsibility. *J. Int. Bus. Stud.* 37, 733–746. doi: 10.1057/palgrave.jibs.8400229

Rose-Ackerman, S. (1999). Political corruption and democracy. *J. Int. Law* 14, 363–378.

Sabani, A., Deng, H., and Thai, V. (2019). Evaluating the development of E-government in Indonesia. *ACM Int. Conf. Proc. Seri.* 254–258. doi: 10.1145/3326365.3326422

Scherer, A. G., Rasche, A., Palazzo, G., and Spicer, A. (2016). Managing for political corporate social responsibility: new challenges and directions for PCSR 2.0. *J. Manage. Stud.* 53, 273–298. doi: 10.1111/joms.12203

Shim, D. C., and Eom, T. H. (2008). E-government and anti-corruption: empirical analysis of international data. *Int. J. Public Admin.* 31, 298–316. doi: 10.1080/01900690701590553

Singh, G., Pathak, R. D., Naz, R., and Belwal, R. (2010). E-governance for improved public sector service delivery in India, Ethiopia and Fiji. *Int. J. Public Sector Manage.* 23, 254–275. doi: 10.1108/09513551011032473

Srivastava, M., and Vyas, R. (2015). Empowering leadership: a study of team leaders & team members. *Indian J. Industr. Relations Econ. Soc. Dev.* 50, 696–712.

Srivastava, S. C., Teo, T. S. H., and Devaraj, S. (2016). You can't bribe a computer: dealing with the societal challenge of corruption through ICT. *MIS Quart. Manage. Inform. Syst.* 40, 511–526. doi: 10.25300/MISQ/2016/40.2.14

Suhendi, C., Rohman, A., and Purwanto, A. (2020). Corruption prevention based on E-government with islamic religiosity as a moderating variable. *Asia Pacific Manage. Accoun. J.* 15, 133–150. doi: 10.24191/APMAJ.v15i1-07

Tang, P., Yang, S., and Yang, S. (2020). How to design corporate governance structures to enhance corporate social responsibility in China's mining state-owned enterprises? *Resourc. Policy* 66:101619. doi: 10.1016/j.resourpol.2020.101619

Tuan, L. T. (2018). Activating tourists' citizenship behavior for the environment: the roles of CSR and frontline employees' citizenship behavior for the environment. *J. Sustain. Tourism* 26, 1178–1203. doi: 10.1080/09669582.2017.1330337

Uyar, A., Nimer, K., Kuzey, C., Shahbaz, M., and Schneider, F. (2021). Can e-government initiatives alleviate tax evasion? The moderation effect of ICT. *Technol. Forecast. Soc. Change* 166:120597. doi: 10.1016/j.techfore.2021.120597

Vahdati, H., Mousavi, N., and Tajik, Z. M. (2015). The study of consumer perception on corporate social responsibility towards consumers attitude and purchase behavior. *Asian Econ. Financial Rev.* 5, 831–845. doi: 10.18488/journal.aefr/2015.5.5/102.5.831.845

Wellalage, N. H., Locke, S., and Samujh, H. (2019). Corruption, gender and credit constraints: evidence from South Asian SMEs. *J. Bus. Ethics* 159, 267–280. doi: 10.1007/s10551-018-3793-6

Wu, B., Jin, C., Monfort, A., and Hua, D. (2021). Generous charity to preserve green image? Exploring linkage between strategic donations and environmental misconduct. *J. Bus. Res.* 131, 839–850. doi: 10.1016/j.jbusres.2020.10.040

Wu, H., Shah, S. M. A., Nawaz, A., Mahmood, A., Albashar, G., Shah, S. A. R., et al. (2020). Disaster management policy development and engineering economics: an analysis of game-changing impact of COVID 19 on oil-power industry, environment, and economy. *Revista Argentina de Clínica Psicológica* 29:550.

Xialong, T., Gull, N., Iqbal, S., Asghar, M., Nawaz, A., Albashar, G., et al. (2021). Exploring & validating the effects of mega projects on infrastructure development influencing sustainable environment & project management. *Front. Psychol.* 12:1251. doi: 10.3389/fpsyg.2021.663199

Zhang, P., and Sun, H. (2013). The complexity of different types of attitudes in initial and continued ICT use. *J. Am. Soc. Inform. Sci. Technol.* 64, 1852–1863.

Zheng, Y., Han, W., and Yang, R. (2021). Does government behaviour or enterprise investment improve regional innovation performance?-evidence from China. *Int. J. Technol. Manage.* 85, 274–296. doi: 10.1504/IJTM.2021.115266

Ziemba, E., Zelazny, R., Papaj, T., and Jadamus-Hacura, M. (2016). Factors influencing the success of E-government. *J. Comput. Inform. Syst.* 56, 156–167. doi: 10.1080/08874417.2016.1117378

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The Economic Effects of Direct and Indirect Employee Involvement: Evidence From Corporate Social Responsibility Reports of Chinese Listed Companies

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Employee direct involvement and indirect involvement have been identified as essential forms of an enterprise's democratic management in the digital economy. Research on the complementary effects of direct and indirect involvement is still in a blank state in China, which limits the external validity and accumulation of employee participation theory. The present study aimed to investigate the complementary effects of employee direct involvement and indirect involvement on the firm's financial performance. Although previous research suggests that the influence of employee direct or indirect involvement on corporate financial performance has been examined separately, it is unclear whether the association between employee direct involvement and indirect involvement is complementary or conflictual. Based on strategic human resource management theory, we semantically encode 2,680 corporate social responsibility reports and the annual reports of 268 state-owned listed enterprises published from 2014 to 2018 *via* content analysis method, and the economic effects of employee direct involvement and indirect involvement were concurrently measured. We use configuration theory to explore the complementary effects between employee direct involvement and indirect involvement. Our results reveal that (1) employee involvement in Chinese enterprises was unbalanced, (2) both employee direct involvement and indirect involvement were positively related to enterprise's financial performance, and (3) there is a complementary effect between the two forms of employee involvement. Theoretical and practical implications of these findings are discussed.

Keywords: employee direct involvement, employee indirect involvement, corporate financial performance, the complementary effect, corporate social responsibility reports

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INTRODUCTION

From 2000 to 2019, the number of labor dispute cases accepted and parties to such cases showed an upward trend: The number of labor dispute cases accepted reached 1,069,638 in 2019, for an increase of 691% over 2000 (National Bureau of Statistics in China, 2020). Notably, China's problems with labor relations are serious. Consequently, employee involvement has

great practical significance for the creation of a harmonious society. In recent years, with the development of a new generation of network information technology – cloud computing, big data, artificial intelligence, and blockchain – the digital economy is expanding at unprecedented speed, and it has led to major changes in technical characteristics and behavior on both the demand and supply side (Sutherland and Jarrahi, 2018). Corporate employees want to have more opportunities to express their views and be more involved in the democratic management of their enterprise (Breeze and Wiepking, 2020). In turn, employee involvement is conducive to communication between employees and the company and facilitates harmonious labor relations (Zhu et al., 2015). Therefore, it is crucial that we examine employee involvement in the digital economy.

Employee involvement is considered that employees involve in corporate management practices that affect their own work or working conditions to a certain extent in a specific way takes two forms: direct involvement and indirect involvement (Kandathil and Joseph, 2019). Employee direct involvement means that employees directly influence or control management practices associated with their work (Markey and Townsend, 2013), and employee indirect involvement refers to management practices that indirectly affect their working conditions through labor unions, employee congresses, and other institutions (Zeitoun and Pamini, 2021). Many scholars believe that employee direct involvement is conducive to improving corporate financial performance to a certain degree (Kim et al., 2010). In contrast, some studies have found that employee direct involvement does not promote corporate financial performance (Nayak and Sahoo, 2015). Overall, research on the impact of employee indirect involvement on corporate performance failed to reach a consistent conclusion (Cotton et al., 1988). Moreover, the literature on both employee direct involvement and indirect involvement is notably scant (Devaro, 2010).

Research on the complementary effects of direct and indirect involvement is still in a blank state in China, which limits the external validity and accumulation of employee participation theory. Employee direct involvement and indirect involvement usually occur at the same time in the course of business, and how different forms of employee involvement can be combined to affect corporate financial performance is at the forefront of Western employee involvement theory (Marchington, 2015). Some scholars propose that there should be complementary effects between different forms of employee involvement (Oehmichen et al., 2018), whereas other studies have found that there is no complementary effect, or even mutual interference, between the different forms of employee involvement (Teodorovicz et al., 2019). At present, few studies have used empirical methods to explore the possible interaction between employee direct and indirect involvement, and research conclusions differ (Zhu et al., 2018).

In the digital economy, what are the characteristics of the level of employee involvement in Chinese companies? Can employee involvement promote corporate financial performance? Are employee direct involvement and indirect involvement mutually reinforcing or do they interfere with each other? Research on employee involvement is mainly concentrated in the context of the Western free-market economic system; other institutional settings have rarely been examined in the literature (Peccei and Van De Voorde, 2019). To solve above problems, we adopt a strategic human resource management (SHRM) perspective, as well as human capital theory and resource-based theory, to examine the association between employee involvement and corporate financial performance. Additionally, we use configuration theory to explore the complementary effects between employee direct involvement and indirect involvement.

Accordingly, our study attempts to make several contributions to the literature. First, in accordance with the Guidelines for Compiling Chinese Corporate Social Responsibility Reports (CASS-CSR3.0), content analysis method is used to measure the two forms of employee involvement at the same time. Second, taking listed companies in China as the research object, we examine the economic effects of employee direct and indirect involvement, respectively, on a company's financial performance. Third, for the first time in the context of the Chinese economic system, we also empirically test the complementary effects between employee direct and indirect involvement. The analysis proceeds as follows. The next section explains the theoretical basis of employee involvement' effects on corporate performance and proposes the research hypotheses. Then, we present the research design, data sources, sample selection criteria, and variable definitions, and constructs the research model. Following that section, the results of the hypothesis tests are presented, and the last section discusses conclusions and makes suggestions for future research.

LITERATURE REVIEW AND RESEARCH HYPOTHESES

Theoretical Issues

Strategic human resource management, which emerged in the 1980s, is a series of planned and SHRM planning and management actions taken by enterprises to achieve strategic goals (Lee et al., 2020). Early SHRM theory mainly emphasized situational theory, as well as the matching and contradictions between human resource practice and various strategies. Midterm SHRM theory mainly discussed the contribution of human capital and social capital to corporate strategy, and recent SHRM theory focuses on international human resource management in the digital economy (Wright and McMahan, 1992). Our brief literature review suggests that the association between human resource management practices and corporate financial performance is the research focus of SHRM (Guest, 2011). Therefore, SHRM provides an important theoretical basis for research on the association between employee involvement and corporate financial performance. Of these, resource-based theory, human capital theory, and configuration theory are the main theoretical foundations of SHRM. SHRM is a model for organizations to systematically plan and manage various human resource deployments and activities in order to achieve strategic objectives. It is an indispensable organic part of organizational strategy and one of the most important components of human resource

management. Compared with traditional human resources management, SHRM is positioned to support the role and function of human resources management in the strategy of enterprises. That is a series of planned and strategic human resource deployment and management behaviors that enterprises can achieve their goals.

Employee Direct Involvement and Corporate Performance

Resource-based theory holds that valuable, scarce, inimitable, and unique resources enable an enterprise to obtain a competitive advantage and emphasizes that resources are the decisive factor in organizational system and management (Wernerfelt, 1984; Barney et al., 2021). Enterprises succeed by acquiring and retaining scarce, valuable, and inimitable resources. Scholars have tried to explain how different corporate resources lead to better performance for companies (Chapman et al., 2018). For example, Xiao (2018) proposed that the scarcity of resources is characterized by hard to emulate. Although competitors can imitate a few human resource practices, it is difficult to duplicate the human resource management system formed by dominant companies through the organic combination of human resource practices. Wright et al. (2016) showed that even if competitors can completely copy the human resource system of an enterprise, such mimicry hard to produce the same effect because various enterprises have their own strategies and internal resources.

Drawing on resource-based theory, the SHRM school believes that human resource management practices can promote corporate performance (Barney, 2018). Under the pressure of fierce competition, most employees hope to have more say in their work through self-management. Every excellent employee is also eager for a fair evaluation and feedback on his work results and a scientific horse racing mechanism to stand out. Specifically, prior research showed that good human resource management practices will enable employees to form a positive work attitude, prompt them to have confidence in their future career development, and efficiently provide customers with excellent products and services. And a positive working atmosphere and better performance appraisal will lead to preferable employee output. This improves production efficiency to a certain extent, improves organizational output, and in turn affects corporate financial performance (Marin-Garcia and Bonavia, 2015). By setting goals together with employees, employees have a clear direction and correct ideas in their work, so that employees are willing to accept the constraints and guidance of work goals and generate great work motivation. Employee direct involvement is a human resource management practice often adopted by enterprises; this approach consists of individual-based involvement in the form of quality circles, work- and life-quality plan, self-management teams, employee symposia, high-level exchange meetings, factory affairs disclosure systems, employee satisfaction surveys, etc. The enterprise's combination of these human resource management practices is a scarce resource that may have a positive effect on the company's financial performance.

No consensus has been reached about the impact of employee direct involvement on corporate financial performance. Some experimental research shows that employee direct involvement has no direct impact on corporate financial performance. For instance, Rangus and Slavec (2016) found that the quality circle – an important form of employee direct involvement – did not make a beneficial contribution to corporate performance. In contrast, some empirical studies have found that employee direct involvement has a positive impact on corporate financial performance. For example, Salajegheh et al. (2015) used 132 employees of the Iranian Trade Bank as their sample and used analytic methods such as correlation analysis and regression analysis to empirically test whether a work- and life-quality plan can promote the improvement of corporate financial performance. In addition, corporate financial performance can be measured by corporate profitability, corporate operating capacity, corporate labor productivity, etc. (Ayuningtyas and Misnaniarti, 2016; Jones et al., 2016). Based on both resource-based theory and empirical results, it is possible that employee direct involvement is positively associated with corporate financial performance. Thus, we hypothesize:

H1: Employee direct involvement is positively related to corporate financial performance.
H1a: Employee direct involvement is positively related to corporate profitability.
H1b: Employee direct involvement is positively related to corporate operational capabilities.
H1c: Employee direct involvement is positively related to corporate labor productivity.

Employee Indirect Involvement and Enterprise Performance

Human capital theory is another important theory of strategic human resource (Marginson, 2019). Human capital is a broad term that is used to describe the sum of economically valuable knowledge, skills, abilities, health, and other factors that exist in the human body, is acquired, and has great value to the organization (Becker, 1962). In other words, human capital can be thought of as an important strategic resource that is used to help companies gain substantial competitive advantages (Wright et al., 2016). Employee indirect involvement means that employees are involved in company affairs through their representatives, and representatives are usually elected by employee groups, for instance, trade unions, workers' congresses, employee supervisory systems, employee committees, and joint advisory committees (Zeitoun and Pamini, 2021). According to previous literature, Brazen (2004) found that human capital investment has a significant role in promoting the return on investment (ROI) of enterprises and can bring economic value to the business. Skaggs and Youndt (2004) used 243 service companies as a sample and found that human capital has a significant positive impact on the return on equity and ROI of companies.

It is stated in human capital theory that companies need to invest in employees' human capital through various human

resource management practices – such as on-the-job training, the creation of corporate culture, and employee involvement – to improve corporate performance (Crook et al., 2011). In general, these institutional arrangements are conducive to enhancing workers' collective bargaining power, seeking more human capital investment opportunities and benefits for employees, and accumulating human capital. Therefore, the indirect involvement of employees can increase the level of human capital investment in enterprises and promote the improvement of corporate performance. Prior research has shown that research on employee indirect involvement and corporate financial performance has not reached a consistent conclusion. For example, Laroche and Wechtler (2011) found that trade unions – an important form of indirect involvement – have not only failed to have a positive impact on enterprises, but have reduced enterprise productivity, product quality, and investment intensity. However, some empirical researchers have shown that employee indirect involvement has a positive impact on corporate financial performance (Shin et al., 2018). More importantly, China's trade unions are different from those in the West. Western trade unions and employers usually have antagonisms, while the interests of China's trade unions and units are consistent (John, 2010).

Taken together, it is rational to refer a positive correlation between employee indirect involvement and corporate financial performance. Therefore, this study proposes the following hypothesis:

H2: Employee indirect involvement is positively related to corporate financial performance.
H2a: Employee indirect involvement is positively related to corporate profitability.
H2b: Employee indirect involvement is positively related to corporate operational capabilities.
H2c: Employee indirect involvement is positively related to corporate labor productivity.

The Complementary Effects of Employee Direct and Indirect Involvement

Configuration theory is one of the main perspectives on SHRM theory (Miles et al., 1978). Prior research has shown that the human resource management system is composed of multiple practical elements that interact to form a specific configuration and produce an overall synergistic effect. Different element-combination configuration methods – specifically, human resource configuration – will lead to differences in the overall effect of the system (Posthuma et al., 2013). As such, supporters of configuration theory believe that the combination of human resource practices has a significant association with the degree of employee-organization matching (Vekeman et al., 2019), and the human resource configuration can promote the knowledge management process of the enterprise and improve the enterprise's performance (Singh, 2014).

Employee direct and indirect involvement have been widely adopted by modern enterprises as a form of human resource management practice that often exists in enterprise governance at the same time. According to configuration theory, when an enterprise simultaneously implements both direct and indirect involvement of employees, their effective allocation can create a synergistic effect and facilitate realization of the enterprise's business objectives (Kato, 2006). However, Sengupta (2008) stated that they have failed to confirm the synergy of direct and indirect employee involvement. On the contrary, some scholars have found a mutual promotion effect between employee direct involvement and indirect involvement (Joseph et al., 2015). Thus, it is plausible that configuration theory might account for the association between two forms of employee involvement and enterprise financial performance, and we propose the following hypothesis:

H3: Employee direct involvement and employee indirect involvement have complementary effects in promoting enterprise financial performance.

MATERIALS AND METHODS

Sample and Procedure

Because employee direct involvement and indirect involvement belong to the enterprise's internal management know-how, companies usually do not publicly disclose this information; the exception is listed companies. In addition, China's Company Law requires employee representatives on the supervisory boards of state-owned enterprises, but there are no mandatory regulations for non-state-owned enterprises. Therefore, we determined state-owned listed companies as the research target.

Data on employee direct involvement were collected in content analysis of listed companies' corporate social responsibility reports. To ensure the continuity of data, 283 state-owned listed companies that have continuously disclosed corporate social responsibility reports on the Shanghai Stock Exchange since 2014 were selected as sample companies. After deleting companies with incomplete data, we obtained a valid sample of 268 listed companies. Data on employee indirect involvement are derived from the annual reports of listed companies. We conducted data extraction and content analysis of 1,340 annual reports and 1,340 corporate social responsibility reports of sample companies from 2014 to 2018. All data are derived from the Shanghai Stock Exchange and the China Stock Market & Accounting Research Database (CSMAR).

Measures

Corporate Financial Performance

Profitability, operational capability, and productivity were designed to conduct a comprehensive and multi-angled empirical investigation of the financial performance of listed companies.

Profitability is expressed by the return on total assets – that is, the sum of total profits and financial expenses divided by average total assets. Operating capacity is expressed by the

total asset turnover rate, which is the ratio of sales revenue to average total assets. Productivity is expressed by the logarithm of labor productivity (operating income per employee).

Employee Direct Involvement

We use content analysis to obtain measurement data on employee direct involvement by semantically coding social responsibility reports of sample enterprise. The specific coding method is as follows. If the listed company's corporate social responsibility report does not disclose relevant information on employee direct involvement, it receives 1 point; if there is a keyword related to employee direct involvement, such as "suggestion box," it receives 2 points; and if there are two keywords, it receives 3 points, and so on. If there are six or more keywords related specifically to employee direct involvement, it receives 7 points. Finally, we will obtain the scores of the variable DI, and the higher the score, the higher the degree of direct involvement of employees.

Employee Indirect Involvement

For employee indirect involvement (II), we obtain data on the level of employee indirect involvement in listed companies by counting the ratio of employee supervisors. Because some listed companies do not disclose information on this ratio, we use the following coding method: Companies that do not disclose this information receive 1 point; companies with a ratio greater than 0 but less than 0.3 receive 2 points; companies with a ratio equal to or greater than 0.3 and less than 0.4 receive3 points, and companies with a ratio greater than or equal to 0.4 receive 4 points.

Control Variables

In preliminary analyses, we evaluate whether other variables that may have an impact on the corporate financial performance should be controlled to rule out potential confounds. As a result, five variables that may affect financial performance are chosen be control variables: SIZE, LEVEL, AGE, LN (K/L), and LN (M/L). SIZE is the size of the company, measured by the natural logarithm of total assets at the end of the year; LEVEL is financial leverage, measured by the asset-liability ratio; AGE is the age of the company, which is 2018 minus the year is established; LN(K/L) is the natural logarithm of the capital-labor ratio – that is, the sum of net fixed assets and net intangible assets divided by the natural logarithm of the number of employees; Ln (M/L) is the natural logarithm of intermediate material input, which is measured by dividing the natural logarithm of operating costs minus salaries by the number of employees (Lopes and Godinho, 2019).

Model Specification

Multivariable linear regression analysis is an appropriate tool to evaluate the links between the employee involvement and corporate financial performance variables. In particular, enterprise operating capacity is measured by the turnover rate of total assets, and profitability is measured by the rate of return on total assets.

The first sets of equations were estimated to test the influence of employee direct and indirect involvement on the company's operating capacity and profitability and take the form:

$$AT_i = C + \beta_1 DI_i + \beta_2 CONTROL_i + \varepsilon_i \quad (1)$$

$$AT_i = C + \beta_1 II_i + \beta_2 CONTROL_i + \varepsilon_i \quad (2)$$

$$AT_i = C + \beta_1 DI_i + \beta_2 II_i + \beta_3 CONTROL_i + \varepsilon_i \quad (3)$$

$$ROA_i = C + \beta_1 DI_i + \beta_2 CONTROL_i + \varepsilon_i \quad (4)$$

$$ROA_i = C + \beta_1 II_i + \beta_2 CONTROL_i + \varepsilon_i \quad (5)$$

$$ROA_i = C + \beta_1 DI_i + \beta_2 II_i + \beta_3 CONTROL_i + \varepsilon_i \quad (6)$$

where for company i, AT_i is total asset turnover rate, ROA_i is return on total assets, C is a constant term, DI_i is employee direct involvement, II_i is employee indirect involvement, ε_i is an error term presumed to independent identical distribution, and $CONTROL_i$ is a vector of company characteristics. The control variables include size of company, age of company, and asset-liability ratio. Using this extremely overall set of controls decreases the usual worry over omitted variable bias.

To test the impact of employee direct and indirect involvement on enterprise labor productivity and the complementary effects between the two, we augment Equation (7) with the Cobb–Douglas production function and estimate:

$$LN(Y/L)_i = C + \beta_1 DI_i + \beta_2 II_i + \beta_3 DI_i * II_i + \beta_4 CONTROL_i + \varepsilon_i \quad (7)$$

where for company i, $LN(Y/L)_i$ is the natural logarithm of the labor productivity, $CONTROL_i$ is a vector of company characteristics and other controls for company i, specifically, size of company, age of company, asset-liability ratio, the natural logarithm of the capital-labor ratio, and the natural logarithm of intermediate material input.

The β_3 coefficients will preliminarily indicate the complementarity between employee direct involvement and indirect involvement.

RESULTS

Preliminary Analysis

We used SPSS 23.0 statistical software to perform descriptive statistics on the data. As shown in **Table 1**, the average value of employee direct involvement (DI) in listed companies is only 2.47, and it indicates that the level of employee DI in state-owned listed companies is relatively low. In turn, it shows that China's state-owned listed companies are not paying enough attention to DI of employees. In the process of performing content analysis on the listed companies' corporate social responsibility reports, we found that listed companies not only have traditional employee DI methods – such as factory affairs disclosure systems, suggestion boxes, rationalization proposal, quality circles, employee symposia, and corporate intranet communication platforms – but also use innovative forms of employee DI, such as work- and life-quality plans, independent

management teams, high-level exchange meetings, general manager reception days, employee satisfaction surveys, and new media communication platforms, such as WeChat and Weibo. However, the DI score for many enterprises is low, indicating that the degree of employee DI in enterprise management decision-making is not high. The variance of employee DI is 3.483, which reflects the imbalance in the level of employee DI in management in listed companies.

The average value of employee indirect involvement (II) is 2.79, and it shows that state-owned listed companies have complied with the provisions of the Company Law and have a sufficient number of employee supervisors on the board of supervisors, which meets the basic requirements for employees to participate in management in terms of organizational form.

However, there are also a few companies that have not appointed employee supervisors or have not disclosed relevant information, which is contrary to national laws and regulations. The variance of employee II is 1.380, which reflects relatively balanced employee II at the management level in listed companies.

Then, **Table 1** shows the correlations for our factor constructs. It was found that employee direct involvement was significantly and positively correlated with labor productivity ($r = 0.095$, $p < 0.01$). Thus, Hypothesis 1c is initially supported. The maximum correlation coefficient between employee direct involvement and employee indirect involvement and each variable is 0.152. There is no high correlation, so the multicollinearity problem can be excluded.

Granger Test

Granger causality test is used to test whether one group of time series is the cause of another group of time series. Assuming that neither is a Granger cause, for both hypotheses the Granger causality test will give the value of F and the probability p that is greater than that value. If value of F is large and value of p is less than 0.05, then the null hypothesis is rejected and one variable can be regarded as the Granger cause of the other variable. Conversely, if the null hypothesis is accepted, one variable is not the Granger cause of the other. The Granger causality test between employee direct involvement and employee indirect involvement (**Table 2**) found no significant Granger causality between employee direct and indirect involvement. Therefore, it can be further confirmed that there is no multicollinearity problem among important explanatory variables.

Hypothesis Testing

Table 3 summarizes the findings of the hypothesis testing. The regression results of Models 1 and 2 show that employee direct involvement (DI) has a significant positive impact ($\beta = 0.059$, $p < 0.05$) on the total asset turnover (AT). On the other hand, employee indirect involvement (II) turned out to have a positive impact on the total asset turnover ($\beta = 0.070$, $p < 0.05$). Hypotheses 1b and 2b are therefore supported. The positive impact of employee direct involvement on the total asset turnover means that the higher level of employee direct involvement, the stronger the total asset turnover rate of the company – that is, the better the operational capabilities of the company. In addition, we found that the higher the level of employee indirect involvement, the stronger the enterprise's total asset turnover – that is, the better the company's operational capabilities.

For Model 3, we add variable II based on the Model 1. Model 3 shows that the regression coefficients between employee DI and company's total AT are significant ($\beta = 0.062$, $p < 0.05$), and the regression coefficients of employee II on company's total AT are significant ($\beta = 0.073$, $p < 0.001$). This once again shows that both direct and indirect involvement are significantly positively correlated with the company's operating capacity. Hypotheses 1b and 2b are confirmed.

The regression results of Models 4 and 5 show that employee direct involvement (DI) has a significant positive impact ($\beta = 0.057$, $p < 0.05$) on the company's total return on assets (ROA). On the other hand, the regression coefficient between employee II and the company's total ROA was 0.038, but it is not statistically significant. Hence, supporting Hypotheses 1a but Hypothesis 2a is not supported. The positive impact of employee direct involvement on the company's total ROA indicates that the higher the degree of employee direct involvement, the higher the ROA of the enterprise and the stronger the profitability of the enterprise. In addition, Model 5 indicates that employee indirect involvement does not affect the company's profitability.

Model 6 use both employee direct and indirect involvement to perform a regression on total ROA. The results indeed suggest that employee direct involvement has a significant positive impact on total ROA ($\beta = 0.058$, $p < 0.05$). In contrast to that, we found a positive but non-significant association between employee indirect involvement and total ROA. Hence, Hypothesis 1a is supported again.

After controlling for variable, such as SIZE, LEVEL, AGE, LN (K/L), and LN (M/L), a plausible interpretation of the positive and significant associations between the presence of employee DI and company labor productivity ($\beta = 0.032$, $p < 0.05$) is that employee direct involvement and company labor productivity are significantly positively related. Thus, Hypothesis 1c is supported. Furthermore, the results of model 6 in **Table 3** show that employee II has an impact positive significant on labor productivity of the enterprise ($\beta = 0.021$, $p < 0.05$). Hypothesis 2c is supported.

As we have observed, significant results are obtained for the interaction between employee direct involvement and indirect involvement ($\beta = 0.058$, $p < 0.001$). Following the recommendation of Pinsonneault and Kraemer (1993), the interaction effect was further tested. The high value of II was formed by adding the mean value of variable II to one standard deviation, and the low value of II was formed by subtracting the mean value of variable II from one standard deviation. When II was high, $Y = -0.198DI + 0.018$, and when II was low, $Y = -0.062DI - 0.615$. In line with above two regression equations, the DI regression coefficients have identical sign directions, and it indicates that employee indirect involvement has an enhanced interaction effect on employee direct involvement (**Figure 1**).

TABLE 1 | Descriptive statistics and correlations ($N = 1,340$).

S. No.	Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10
1.	DI	2.47	1.866										
2.	II	2.7858	1.17464	−0.026									
3.	LN(Y/L)	14.1634	0.88655	0.095**	0.053								
4.	AT	0.6065	0.47888	0.030	0.040	0.307**	1						
5.	ROA	0.0286	0.05375	0.030	0.004	0.125**	0.123**	1					
6.	SIZE	23.8486	1.93284	0.152**	0.148**	0.360**	−0.162**	−0.021	1				
7.	AGE	17.1866	5.09458	0.051	−0.042	0.134**	−0.050	−0.063*	0.033	1			
8.	LEVEL	0.5647	0.20430	0.060*	0.068*	0.281**	−0.112**	−0.398**	0.539**	0.139**	1		
9.	LN(M/L)	14.0426	0.90549	0.092**	0.044	0.962**	0.389**	0.019	0.238**	0.118**	0.262**	1	
10.	LN(K/L)	14.1634	0.88655	0.060*	−0.041	0.203**	−0.182**	−0.041	0.135**	−0.027	−0.014	0.191**	1

*DI, direct involvement; II, indirect involvement; LN(Y/L), the logarithm of labor productivity; AT, total asset turnover rate; ROA, return on total assets; SIZE, size of the company; AGE, age of the company; LEVEL, financial leverage; LN(M/L), the natural logarithm of intermediate material input; LN(K/L), the natural logarithm of the capital-labor ratio. *$p < 0.05$ and **$p < 0.01$.*

Similarly, when DI has a high value, $Y = -0.231II - 0.51$, and when DI has a low value, $Y = -0.014II - 0.63$. The II regression coefficients have identical sign directions, indicating that direct employee involvement also has an enhanced interaction effect on employee indirect involvement (**Figure 2**). Therefore, Hypothesis 3 was supported, which show that employee direct involvement and employee indirect involvement have complementary effects in promoting corporate financial performance.

To summarize, Hypothesis 1 is supported, Hypothesis 2 is mostly supported, and Hypothesis 3 is supported. The positive impact of employee direct involvement on the total asset turnover means that the higher level of employee direct involvement, the stronger the total asset turnover rate of the company – that is, the better the operational capabilities of the company. In addition, we found that the higher the level of employee indirect involvement, the stronger the enterprise's total asset turnover – that is, the better the company's operational capabilities. Employee direct involvement and employee indirect involvement have complementary effects in promoting corporate financial performance. This once again shows that both direct and indirect involvement are significantly positively correlated with the company's operating capacity.

DISCUSSION

As scholars focused on network technology and the value of digital resource, it is hard not to notice the upsurge of employee involvement in the digital economy. Not only can technical breakthroughs offer convenience in the form of involvement, but they also have a clear effect on the financial performance of enterprises. In this study, we used state-owned listed companies that have continuously disclosed corporate social responsibility reports from 2014 to 2018 as our sample and simultaneously measured direct and indirect employee involvement for the first time and the effect of direct and indirect employee involvement on corporate financial performance. We found that there is an economic effect between direct employee involvement and indirect employee involvement.

Theoretical Implications

Our findings in the current study have several important theoretical implications. First, this study extends previous research by providing support for resource-based theory, human capital theory, and configuration theory (Becker, 1962; Kato, 2006; Kozlenkova et al., 2014), which deepens our understanding of two forms of employee involvement. At present, China's state-owned listed companies have generally established an employee supervisory system on the board of supervisors, and employees are indirectly involved in an organizational form that satisfies the requirements of China's Company Law. However, listed companies do not attach enough importance to the direct involvement of employees, and the level of employee direct involvement in management is unbalanced. This reflects the main characteristics of the unbalanced and insufficient development of the level of employee involvement in Chinese enterprises in the digital economy.

Moreover, our study contributes to the enhanced theoretical understanding of the association between employee involvement and financial performance. In particular, our findings that employee direct involvement and indirect involvement are positively related to corporate performance provides support for resource-based theory and human capital theory (Sarason and Tegarden, 2003; Wright et al., 2016). Our results reveal that employee direct involvement and indirect involvement are significantly positively correlated with a company's total asset turnover, return on total assets, and labor productivity. The results also show that the enterprise's financial performance will be significantly improved when it attaches importance to employee direct involvement and indirect involvement, and employees' voices are critical for the enterprise's decision-making system. Our findings corroborate previous empirical studies that are consistent with the conclusions of Townsend et al. (2014). However, this study differs from previous studies, in that it simultaneously examines the impact of employee direct and indirect involvement on corporate financial performance.

Last but not the least, our study advances current knowledge by using a theoretical understanding of complementary effect. Specifically, our study demonstrates that employee indirect involvement has significant complementary effects in promoting corporate financial performance, which means that corporate financial performance improves when companies implement both employee direct involvement and indirect involvement practices. Our study adds the direct and indirect involvement interaction items (DI*II) of employees to the Cobb–Douglas production function model and finds that the direct and indirect involvement of employees has an enhanced interaction effect on corporate financial performance, this is consistent with the conclusion of Joseph et al. (2015). However, their research is based on a Western scenario, and the measurement method of employee involvement is different from our study. In general, we used a theoretical model that not only elaborates on why the two forms of employee involvement are related to corporate financial performance but also on their complementary effect.

TABLE 2 | Results of the Granger test with employee direct involvement and employee indirect involvement.

Original hypothesis	Number	*F*-Statistic	Probability
The direct involvement of employees is not the indirect involvement of employees in Granger	267	1.73666	0.1887
The indirect involvement of employees is not the direct involvement of employees in Granger	267	0.07939	0.7783

p > 0.05 means there is no significant Granger causality between employee direct and indirect involvement.

Managerial Implications

Our findings provide several important practical implications. Our findings demonstrate that employee direct involvement and indirect involvement are positively related to corporate financial performance and that both have enhanced complementary effects. Employees' participation in enterprise management will not result from the situation of managers competing for power. They can only reasonably exercise the power given by the enterprise with

TABLE 3 | Regression analysis results.

Variables	AT			ROA			LN(Y/L)
	Model1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
DI	0.059** (2.153)		0.062** (2.285)	0.057** (2.279)		0.058** (2.328)	0.032** (2.018)
II		0.070** (2.561)	0.073*** (2.675)		0.038 (1.504)	0.040 (1.578)	0.021** (1.965)
DI*II							−0.058*** (3.250)
LN(M/L)							0.936*** (138.500)
LN(K/L)							0.003 (0.499)
SIZE	−0.144*** (−4.447)	−0.144*** (−4.465)	−0.155*** (−4.760)				0.175*** (22.354)
AGE	−0.018 (−0.651)	−0.011 (−0.038)	−0.014 (−0.478)	0.011 (0.414)	0.016 (0.604)	0.014 (0.533)	0.034*** (5.058)
LEVEL	−0.036 (−1.111)	−0.038 (−1.187)	−0.036 (−1.112)	−0.404*** (−15.938)	−0.404 (−15.891)	−0.407*** (−16.023)	−0.062*** (−7.999)
∑YEAR	control	control	control	control	control	control	control
Constant	1.445*** (7.834)	1.389*** (7.532)	1.413*** (7.663)	0.079*** (11.444)	0.077*** (10.112)	0.073*** (9.474)	−0.649*** (−5.439)
Observations	1,340	1,340	1,340	1,340	1,340	1,340	1,340
F	6.870***	7.120***	6.929***	38.187***	37.686***	33.762***	1981.668***
Adj. R^2	0.034	0.035	0.038	0.163	0.161	0.164	0.947

*DI, direct involvement; II, indirect involvement; DI*II, the interactive effect of direct involvement and indirect involvement; LN(M/L), the natural logarithm of intermediate material input; LN(K/L), the natural logarithm of the capital-labor ratio; SIZE, size of the company; AGE, age of the company; LEVEL, financial leverage; AT, total asset turnover rate; ROA, return on total assets; LN(Y/L), the logarithm of labor productivity. The numbers in parentheses are t-test values. **p < 0.01 and ***p < 0.001.*

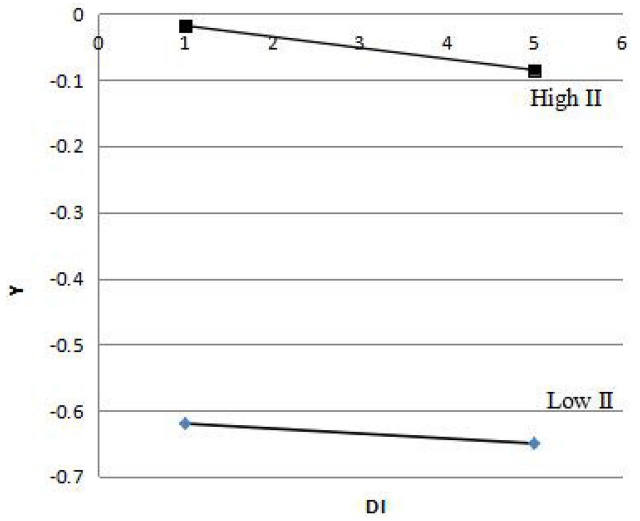

FIGURE 1 | The interaction effect of employee indirect involvement on employee direct involvement. DI, direct involvement; II, direct involvement.

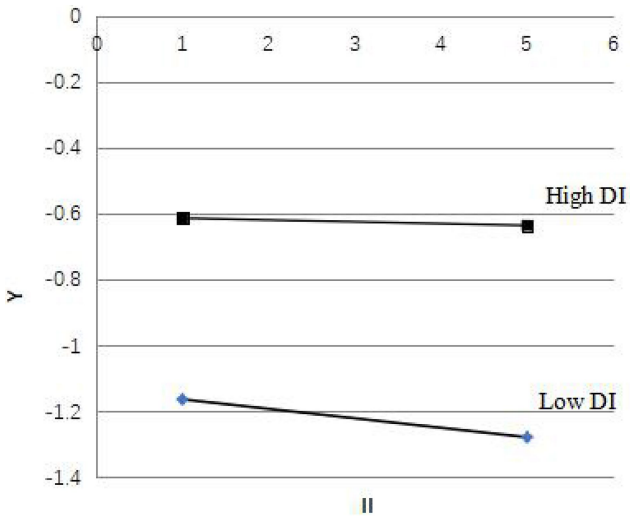

FIGURE 2 | The interaction effect of employee direct involvement on employee indirect involvement. DI, direct involvement; II, direct involvement.

the managers within their respective scope according to law, so that the enterprise can develop continuously. At the same time, employees can also improve their personal working ability. In encouraging employees to participate in all aspects, enterprises should proceed from reality and give reasonable play to the role of employee participation in enterprise management. In this light, we suggest that managers must attach great importance to employee involvement.

First and foremost, the state should incorporate employee involvement in legislation and implement top-level designs to respond to the increasing need for involvement by employees in China's digital economy and strengthen the enforcement and supervision of laws and regulations, such as the Company Law, and gradually correct the unbalanced level of employee involvement by establishing an incentive and restraint mechanism whereby employees are involved in management.

Moreover, companies need to strictly abide by the provisions of the Company Law regarding the employee involvement system and implement their strategy for employee representation on the corporate board of directors and supervisors. Furthermore, companies must attach importance to employee involvement in system design and innovation. Companies must improve the disclosure system of corporate factory affairs and actively carry out high-level exchange meetings, symposia, democratic life meetings, and other activities to listen to employees. At the same time, companies must take full advantage of the technological dividends brought by big data and Internet technology and innovatively use the Internet, WeChat, Weibo, and other platforms to collect employee suggestions and conduct useful communication with employees. This is beneficial for breaking down the barriers of information imbalance and providing direct channels for employees to be involved in the company's decision-making processes and management.

Finally, according to configuration theory, we found that employee involvement is not just a simple combination of participation practices (Kreiser et al., 2021). In order to maximize the effectiveness of employee involvement, companies must organically integrate the direct and indirect involvement practices of employees to derive the synergistic effect of $1+1>2$.

Limitations and Future Research Recommendations

The results of this research should be considered their limitations that may inspired future research directions. First, when measuring employee involvement, this study used publicly and objective data such as the annual reports and corporate social responsibility reports of listed companies. One limitation is that available sample is too small, and there are no available surveys of companies. Thus, future research may carry out large-scale corporate field surveys. In addition, this paper did not compare the impact of different types of enterprise employee involvement, and therefore, we recommend that future research conduct comparative studies on different types of enterprises. Finally, there may be some defects in the data acquisition of the research results, which may lead to a certain degree of autocorrelation or multicollinearity of the empirical results, which needs to be solved in the future research.

CONCLUSION

To date, previous employee researches have been insufficient for understanding the complementary or conflictual association between employee direct involvement and indirect involvement. As such, our study aimed to resolve these deficiencies by employing a content analysis method and the semantic encoding of corporate social responsibility reports and the annual reports analyzing the economic effects of employee direct involvement and indirect involvement concurrently. Our results support

resource-based theory, human capital theory, and configuration theory as a way to understand the nuanced association between employee direct involvement and indirect involvement. Our results also show the value of distinguishing the relationships between employee direct involvement and indirect involvement because they have significant complementary effects in promoting corporate financial performance. Our findings also suggest that organizational managers should implement sustainable organization strategy for employee representation on the corporate board of directors and supervisors and utilize the Internet technologies collecting employees' voice to meet their growing psychological needs in digital economy.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

YJ was responsible for the research design and conception, wrote the introduction and discussion sections, and revised accordingly. XH conducted theoretical analysis, proposed research hypotheses, and assisted in writing the research design. YZ collected and collated data, conducted data analysis, and assisted in results writing. GW collated the data and made the final revision of the paper. XG revised the paper for important intellectual content. All authors contributed to the paper and approved the submitted version.

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REFERENCES

Ayuningtyas, D., and Misnaniarti, D. (2016). Determinants of quality of work life as an important issue to improve health workers performance in Indonesia. *Indian J. Public Health* 7, 155–159. doi: 10.5958/0976-5506.2016.00085.1

Barney, J. B. (2018). Why resource-based theory's model of profit appropriation must incorporate a stakeholder perspective. *Strateg. Manag. J.* 39, 3305–3325. doi: 10.1002/smj.2949

Barney, J. B., Ketchen, D. J. Jr., and Wright, M. (2021). Resource-based theory and the value creation framework. *J. Manage.* 47, 1936–1955. doi: 10.1177/01492063211021655

Becker, G. S. (1962). Investment in human capital: a theoretical analysis. *J. Polit. Econ.* 70, 9–49. doi: 10.1086/258724

Brazen, L. (2004). The ROI of human capital: measuring the economic value of employee performance. *AORN J.* 80, 1146–1147. doi: 10.1016/S0001-2092(06)60696-0

Breeze, B., and Wiepking, P. (2020). Different drivers: exploring employee involvement in corporate philanthropy. *J. Bus. Ethics* 165, 453–467. doi: 10.1007/s10551-018-4093-x

Chapman, E. F., Sisk, F. A., Schatten, J., and Miles, E. W. (2018). Human resource development and human resource management levers for sustained competitive advantage: combining isomorphism and differentiation. *J. Manage. Organ.* 24, 533–550. doi: 10.1017/jmo.2016.37

Cotton, J. L., Vollrath, D. A., Froggatt, K. L., Lengnick-Hall, M. L., and Jennings, K. R. (1988). Employee participation: diverse forms and different outcomes. *Acad. Manag. Rev.* 13, 8–22. doi: 10.5465/amr.1988.4306768

Crook, T. R., Todd, S. Y., Combs, J. G., Woehr, D. J., and Ketchen, D. J. Jr. (2011). Does human capital matter? A meta-analysis of the relationship between human capital and firm performance. *J. Appl. Psychol.* 96, 443–456. doi: 10.1037/a0022147

Devaro, J. (2010). The effects of self-managed and closely managed teams on labor productivity and product quality: an empirical analysis of a cross-section of establishments. *Ind. Relat.* 47, 659–697. doi: 10.1111/j.1468-232X.2008.00540.x

Guest, D. E. (2011). Human resource management and performance: still searching for some answers. *Hum. Resour. Manag. J.* 21, 3–13. doi: 10.1111/j.1748-8583.2010.00164.x

John, A. (2010). German works councils and the anatomy of wages. *Ind. Lab. Relat. Rev.* 63, 247–270. doi: 10.1177/001979391006300204

Jones, D. C., Kalmi, P., Kato, T., and Mäkinen, M. (2016). Complementarities between employee involvement and financial participation: do institutional context, differing measures, and empirical methods matter? *Ind. Lab. Relat. Rev.* 70, 395–418. doi: 10.1177/0019793916657538

Joseph, B., Richard, F., and Douglas, K. (2015). Do broad-based employee ownership, profit sharing and stock options help the best firms do even better? *Brit. J. Ind. Relat.* 54, 55–82. doi: 10.1111/bjir.12135

Kandathil, G., and Joseph, J. (2019). Normative underpinnings of direct employee participation studies and implications for developing ethical reflexivity: a multidisciplinary review. *J. Bus. Ethics* 157, 685–697. doi: 10.1007/s10551-017-3689-x

Kato, T. (2006). Determinants of the extent of participatory employment practices: evidence from Japan. *Ind. Relat. J. Econ. Soc.* 45, 579–605. doi: 10.1111/j.1468-232X.2006.00444.x

Kim, J., MacDuffie, J. P., and Pil, F. K. (2010). Employee voice and organizational performance: team versus representative influence. *Hum. Relat.* 63, 371–394. doi: 10.1177/0018726709348936

Kozlenkova, I. V., Samaha, S. A., and Palmatier, R. W. (2014). Resource-based theory in marketing. *J. Acad. Market Sci.* 42, 1–21. doi: 10.1007/s11747-013-0336-7

Kreiser, P. M., Kuratko, D. F., Covin, J. G., Ireland, R. D., and Hornsby, J. S. (2021). Corporate entrepreneurship strategy: extending our knowledge boundaries through configuration theory. *Small Bus. Econ.* 56, 739–758. doi: 10.1007/s11187-019-00198-x

Laroche, P., and Wechtler, H. (2011). The effects of labor unions on workplace performance: new evidence from France. *J. Labor. Res.* 32, 157–180. doi: 10.1007/s12122-011-9106-9

Lee, C. F., Mengtian, X., and Yang, C. (2020). Still in search of strategic human resource management? A review and suggestions for future research with China as an example. *Hum. Resour. Manag.* 60, 89–118. doi: 10.1002/HRM.22029

Lopes, L. F., and Godinho, M. M. (2019). Innovation and productivity in services: a methodological approach. *Int. J. Technol. Manag.* 16, 1–26. doi: 10.1142/S0219877019500342

Marchington, M. (2015). Analysing the forces shaping employee involvement and participation (EIP) at organisation level in liberal market economies (LMEs). *Hum. Resour. Manag. J.* 25, 1–18. doi: 10.1111/1748-8583.12065

Marginson, S. (2019). Limitations of human capital theory. *Stud. High. Educ.* 44, 287–301. doi: 10.1080/03075079.2017.1359823

Marin-Garcia, J. A., and Bonavia, T. (2015). Relationship between employee involvement and lean manufacturing and its effect on performance in a rigid continuous process industry. *Int. J. Prod. Res.* 53, 3260–3275. doi: 10.1080/00207543.2014.975852

Markey, R., and Townsend, K. (2013). Contemporary trends in employee involvement and participation introduction. *J. Ind. Relat.* 55, 475–487. doi: 10.1177/0022185613489389

Miles, R. E., Snow, C., and Coleman, M. (1978). Organization strategy, structure and process. *Acad. Manag. Rev.* 3, 546–562. doi: 10.5465/amr.1978.4305755

National Bureau of Statistics in China (2020). Available at: http://www.stats.gov.cn/ (Accessed May 23, 2021).

Nayak, T., and Sahoo, C. K. (2015). Quality of work life and organizational performance the mediating role of employee commitment. *J. Health Manag.* 17, 263–273. doi: 10.1177/0972063415589236

Oehmichen, J., Wolff, M., and Zschoche, U. (2018). Employee participation in employee stock ownership plans: cross-level interaction effects of institutions and workgroup behavior. *Hum. Resour. Manag.* 57, 1023–1037. doi: 10.1002/hrm.21885

Peccei, R., and Van De Voorde, K. (2019). The application of the multilevel paradigm in human resource management-outcomes research: taking stock and going forward. *J. Manage.* 45, 786–818. doi: 10.1177/0149206316673720

Pinsonneault, A., and Kraemer, K. (1993). Survey research methodology in management information systems: an assessment. *J. Manage. Inform. Syst.* 10, 75–105. doi: 10.1080/07421222.1993.11518001

Posthuma, R. A., Campion, M. C., and Masimova, M. (2013). A high performance work practices taxonomy: integrating the literature and directing future research. *J. Manage.* 39, 1184–1220. doi: 10.1177/0149206313478184

Rangus, K., and Slavec, A. (2016). The interplay of decentralization, employee involvement and absorptive capacity on firms' innovation and business performance. *Technol. Forecast. Soc.* 120, 195–203. doi: 10.1016/j.techfore.2016.12.017

Salajegheh, S., Chamanifard, R., Chamanifard, S., and Nikpour, A. (2015). The relationship between quality of work life and organizational performance: the moderating role of demographic variables (a case study of foreign exchange units of Tejarat Bank, Iran). *IEEE Trans. Med. Imaging* 5, 128–141. doi: 10.5958/2249-7307.2015.00178.4

Sarason, Y., and Tegarden, L. F. (2003). The erosion of the competitive advantage of strategic planning: a configuration theory and resource based view. *J. Bus. Manag.* 9, 1–20.

Sengupta, S. (2008). The impact of employee-share-ownership schemes on performance in unionised and non-unionised workplaces. *Ind. Relat. J.* 39, 170–190. doi: 10.1111/j.1468-2338.2007.00483.x

Shin, M., Kim, S., Shin, J., and Lee, J. (2018). Labor union effect on corporate cash holdings and their marginal value. *Emerg. Mark. Finance Trade* 54, 1391–1413. doi: 10.1080/1540496X.2017.1289085

Singh, N. P. (2014). *Managing in Recovering Markets*. New Delhi, India: Springer.

Skaggs, B. C., and Youndt, M. (2004). Strategic positioning, human capital, and performance in service organizations: a customer interaction approach. *Strateg. Manage. J.* 25, 85–99. doi: 10.1002/smj.365

Sutherland, W., and Jarrahi, M. H. (2018). The sharing economy and digital platforms: a review and research agenda. *Int. J. Inform. Manage.* 43, 328–341. doi: 10.1016/j.ijinfomgt.2018.07.004

Teodorovicz, T., Cabral, S., and Lazzarini, S. (2019). Insider econometrics: a guide to management scholars. *RAUSP Manage. J.* 54, 446–458. doi: 10.1108/RAUSP-05-2019-0116

Townsend, K., Wilkinson, A., and Burgess, J. (2014). Routes to partial success: collaborative employment relations and employee engagement. *Int. J. Hum. Resour. Manage.* 25, 915–930. doi: 10.1080/09585192.2012.743478

Vekeman, E., Devos, G., and Valcke, M. (2019). The relationship between principals' configuration of a bundle of HR practices for new teachers and teachers' person–organisation fit. *Int. J. Hum. Resour. Manage.* 30, 835–855. doi: 10.1080/09585192.2016.1239221

Wernerfelt, B. (1984). A resource-based view of the firm. *Strateg. Manag. J.* 5, 171–180. doi: 10.1002/smj.4250050207

Wright, P. M., and McMahan, G. C. (1992). Theoretical perspectives for strategic human resource management. *J. Manage.* 18, 295–320. doi: 10.1177/014920639201800205

Wright, P. M., Mcmahan, G. C., and Mcwilliams, A. (2016). Human resources and sustained competitive advantage: a resource-based perspective. *Int. J. Hum. Resour. Manage.* 5, 301–326. doi: 10.1080/09585199400000020

Xiao, J. (2018). A preliminary study on the new generation employees' human resource management and enterprise sustained competitive advantage—from the perspective of resource-based view. *Am. J. Ind. Bus. Manage.* 8, 2364–2374. doi: 10.4236/ajibm.2018.812158

Zeitoun, H., and Pamini, P. (2021). A promise made is a promise kept: union voice, HRM practices, implicit contracts and workplace performance in times of crisis. *Hum. Resour. Manag. J.* 31, 277–292. doi: 10.1111/1748-8583.12308

Zhu, C., Liu, A., and Chen, G. (2018). High performance work systems and corporate performance: the influence of entrepreneurial orientation and organizational learning. *Front. Bus. Res. China* 12, 1–22. doi: 10.1186/s11782-018-0025-y

Zhu, Y., Xie, Y., Warner, M., and Guo, Y. (2015). Employee participation and the influence on job satisfaction of the 'new generation' of Chinese employees. *Int. J. Hum. Resour. Manage.* 26, 2395–2411. doi: 10.1080/09585192.2014.990397

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Service Marketing in Online Shopping Platform: Psychological and Behavioral Dimensions

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This conceptual analysis critically discusses how service marketing is workable for online shopping platforms and how important service-related and influenced factors played their roles the aforementioned issue. The concepts of service, service marketing, and related factors were re-visited, or at least reflected, in the new context of online platforms. Mostly, we framed the essence and importance of those discussed factors from the psychological and behavioral angles. Implications for theory, practices, and policy-making were offered seriously.

Keywords: service marketing, online shopping, platform, psychological antecedents, behavioral antecedents

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INTRODUCTION

Recent years have witnessed the huge interests in the trending research on service marketing (Rust and Huang, 2014). The researchers have highlighted that service is one of the most important section of marketing that could be felt by consumers before the consumption, and thus could influence the purchase decision directly (Rust and Huang, 2014). With the development of service marketing, this concept has been extended from physical to virtual marketplace in various forms (Schultz et al., 2013). When people reach nearly all the shopping platforms, the concept of "service" goes beyond the traditional understanding and increasingly covers other new conceptual elements (Shareef et al., 2016; Al-kumaim et al., 2021).

Nevertheless, with the development of online shopping, it is increasingly difficult to evaluate which high-quality standards online shopping platforms should have. Such unclear standards caused interest of researcher, to systematically examine how service marketing could be applied in the online shopping platforms to contribute to platform performance. Doing so, a conceptual analysis provided by this paper can contribute in three ways. First, we could explicate the erratic and fuzzy standards to judge the effectiveness of service in online platform contexts, which help improve the comprehensiveness and conceptualization for further (qualitative and quantitative) studies. Second, for practitioners of online shopping, the review and analytical arguments of this study could provide theoretical support about how to develop the quality service mechanisms (procedures, rules, references, etc.). Third, for policymakers, a clearer description about the standards of service marketing in online shopping platforms can facilitate reasonable policies formation to deal with both the civil and commercial disputes related to the services of online shopping platforms.

Service marketing has become one of main subfields of marketing. The value of service marketing lies in the expectations and reactions of consumers (Fan and Dong, 2021). The services may be offered directly or indirectly to the consumers in business to consumer (B2C) or business to businesses (B2B) (Rust and Huang, 2014). With increasing popularity, the online shopping platforms have shown their potentials to replace the traditional shopping mechanisms. Generally, the traditional marketing mix is also working in the online shopping platforms, for which the consumers are still influenced by 4Ps (Product, Price, Place, and Promotion) even if the effects of "place" has been weakened to some extents (Rust and Huang, 2014). Namely, the traditional 4Ps are still able to be extended by service marketing in the online platforms. However, as an invisible form of marketing, it is more difficult to be managed when it is applied on a virtual network platform. Customer service is crucial for online shopping platforms that demands high level of customer loyalty based on customer perceptions of the platform's service quality.

Unfortunately, there is still a lack of commonly accepted answer about what standards could be used for online platforms. Due to such vagueness, various online shopping platforms are unable to create their own high-quality service marketing clearly and effectively. Even if their service quality is improving, with deep understanding of service, the cost of these attempts is not only capital investment but also the patience and evaluation of the consumers (Chang et al., 2016).

Against such background, this article tends to reference related literature to conduct an integrative conceptual analysis for the issues mentioned above.

THE CONCEPTUAL ANALYSIS

Most of the extant studies direct to a common goal of explaining why online shopping platforms should improve service. In the earlier research, the importance of service and service marketing did not receive enough attention, for some studies even believed that the online shopping did not incorporate service concepts. However, with development of service, this claim has been overturned by further studies who claimed that the service quality could increase the retention rate of consumers. In addition, the studies form Hsieh and Tsao (2014) also stressed that the high-quality service of online shopping platform would reduce the perceived risk of consumers and further increase the consumer loyalty.

After that, the researcher discussed the factors which could influence the service marketing in online shopping platforms to find out the method to improve service quality. Afterward, claimed customer commitment would also influence the consumer perception of services of online shopping (Singh and Pandy, 2016), which has been proved by other studies. Finally, for consumers, the perceived services would also be different according to the different values (Blasco-Arcas et al., 2014; Chang et al., 2016).

Finally, the researcher collected related opinions about how online shopping platforms could improve the service quality. In some studies, it was mentioned that the consumer satisfaction of service quality is highly depended on the ease of use of website pages rather than the personalization. Moreover, with the development of online shopping portals, the uses of shopping platforms are not only limited for purchasing but also used as communication channels at present. Therefore, Lazarus et al. (2014) put forward that online shopping platforms, especially for some platforms that highly rely on the mobile channels, some factors should be given priority to the consideration, such as convenience, security, and emotional values. The last but not the least, Chang et al. (2016) and Zheng et al. (2017) found out that the coupon proneness and value consciousness play important roles in explaining the e-loyalty.

Service Marketing

In the existing studies, the importance of service marketing has been accepted widely by scholars and practitioners.

With the forming of unique concept of service, service marketing has become an important subject of marketing. According to Haynes and Grugulis (2014), the service is believed to include four main characteristics, such as involving intangibility, inseparability, perishability, and variability, which is a commonly accepted opinion. First, service is a concept that lacks physical form, which means that service does not interact with consumers through any conventional senses. The value of service is created by the consumption or experience, as its ownership could not be transferred, so that the quality of service is unable to be evaluated before purchasing. Inseparability simply means that the production and consumption are inseparable, so that the service marketing is also influenced by this characteristic that the process of service marketing is highly contacted and labor-intensive. Through the impact of inseparability, the companies that focus on the service marketing are easier to be influenced by the capital for labor and human error. Moreover, service is ephemeral and unable to be stored. In other words, the supply of service could not have buffer between the supply and demand, because all supply should be provided timely. The last characteristic of service is the variability, also known as heterogeneity, which states that the services are inherently variable in quality and substance. Namely, service quality is difficult to manage and there are fewer opportunities to standardize the service marketing delivery. According to the abovementioned characteristics, the unique characteristics of services give rise to the problems and challenges of service marketing that are rarely paralleled in product marketing. These challenges and problems would be further discussed as follow.

The Classification of Service

In current theories, the framework of service marketing has been controversial according to various standards to distinguish different types of services. The first classification is related to who or what is being processed, involving people processing, mental stimulus processing, possession processing, and information processing (Lazarus et al., 2014). This type of classification mainly relates to the sources of core value generated with service. In addition, there is another method to classify service marketing

according to the degree of customer interaction, involving high low contact services (Yahyaoui et al., 2015).

However, the quality of services is difficult to judge before purchasing (Yahyaoui et al., 2015), so that economists believe that nearly all of service marketing could be classified with a processual framework of "Search → Experience → Credence (SEC)" (Girard and Dion, 2010). According to this framework, most products fall into the search goods category, those which possess attributes that can be evaluated prior to purchase or consumption. Experience goods mean products or services that can be accurately evaluated only after the product has been purchased and experienced, which could be seen as another side of search products. It is different to the above two classifications, credence claims are the goods that are difficult or impossible to evaluate even after consumption has occurred (Girard and Dion, 2010). These goods are called credence products because the quality evaluations of the consumers depend entirely on the trust given to the product manufacturer or service provider (Girard and Dion, 2010). According to these different classifications, the forms of service marketing operated in online shopping platforms are also different, so that the content of this section would be used in further discussion below.

Service and Service Marketing in Online Shopping Platforms

Due to the virtuality of online shopping platform, the importance of service and service marketing did not pay enough attention, to which some earlier research even believed that the online shopping did not have the concept of service. Service goes with different face in physical vs. online world. In a previous study, the researchers claimed that the online shopping is a new concept that could subvert over the position of traditional shopping and get rid of the limitation of services provided by humans. Some researchers also put forward a similar opinion that the online shopping based on machinery and procedures did not have the ability to exchange emotion with consumers, so that consumers would not have demands and expectation emotionally, which could create a fair competitive channel because the consumer would only focus on the quality of products (see also Wei, 2021). This claim seems reasonable according to the background of era, but it has been denied at present. In the further analytical study, they found out the optimal service level on the "fulfillment and responsiveness" function for the risk averse uniquely exists. Customer loyalty is more positively correlated to the service level, which could cause the largest optimal service level. Moreover, the business organizations do not have to worry about the increase of cost on service-construction would reduce profits, because it was found out that the optimal service level is independent of the profit target, which states that the profits of organizations would not be reduced by the improvement of service. In other words, if the organization could achieve nearly optimal service level, no matter how organizations create its targets, the service quality would only increase the retention rate of consumers.

Based on the above discussion, in nature, physical vs. online service marketing differ in the following ways. First, the medium of service marketing delivery is different (e.g., Majeed et al., 2020). While service marketing delivery can be done through touchable medium, which can be stored, transferred, and removed in physical ways, and online service marketing can only be passed *via* a virtual medium, which has higher level of dangers to be easily copied or removed. The different medium of service marketing delivery also affects the ways the stakeholders interact *via* the marketing medium (Méndez-Aparicio et al., 2017). Also, the customers experience differently (Wong et al., 2018). Second, the physical and online service marketing differ in the scope and speed of marketing outcomes. The range of influences can be broader by online service marketing, and for online service marketing the marketers could see the results of their strategies faster. Third, also due to the aforementioned difference in scope and speed, the online service marketing relatively relies on the technological advantages, such as artificial intelligence and big data, which offer more instant feedback for service marketing modification during the marketing contacts. The need for precision is higher in online service marketing as compared with the physical service marketing.

The Perceived Risk Determines Online Loyalty

As mentioned above, the service quality is more related to the consumer perception than profit target, but it also means that the service of online shopping highly relates to every factor that could be perceived by the consumers, such as risks. The study of Hsieh and Tsao (2014) is highly representative among all the studies discussed about perceived risks, in which they analyzed the role of perceived risk within the services of online shopping platform in-depth. To discuss the reason why it is necessary to mention perceived risk, Lazarus et al. (2014) provided a statement that perceived risk has a significant negative effect on online loyalty, which states low perceived risk means higher online consumer loyalty. In the study of Hsieh and Tsao (2014), they mentioned that system quality and information quality do not have significant negative effects on the perceived risk, which seems an opposite opinion with Lazarus et al. (2014). However, Lazarus et al. (2014) only claimed that the security should have a priority to consideration, but they did not mention it would influence the perceived risk. Therefore, the study of Hsieh and Tsao (2014) is a supplementary explanation of Lazarus et al. (2014). Moreover, Hsieh and Tsao (2014) found out that e-service quality has a significant negative effect on perceived risk, which means high-quality service of online shopping platform would reduce the perceived risk of consumers. Managerially, this paper offered a conceptual foundation for service marketing tactics for online platform.

The Consumer Loyalty Equal to Success

It is clear that the studies of Hsieh and Tsao (2014) mentioned that the service is related to the consumer loyalty, but they did not further explain how important consumer loyalty is in the operation of organizations. In fact, it has been mentioned by other researchers that the importance of consumer loyalty directly influenced the success of companies in long-term. The consumer loyalty, or called as customer retention, plays an

irreplaceable role in the operation of online shopping platforms, but the situation is that only a few of managers could really understand its significances. First of all, the direct influence of consumer loyalty is to increase the repurchase intention that the high evaluation of online services or high consumer loyalty could largely increase the possibility of repurchasing. According to the results of model based on the Information Systems (IS) use theory and social exchange theory, it was found that the shopping habit increases the influence of emotional evaluation on continuance, while habit weakens the impact of rational evaluation on continuance intention. Some researchers similarly conclude that trust and perceived benefits are the key predictors of the consumer attitudes toward online shopping, as 28% of the variation in online shopping attitudes was caused by the perceived benefits and trust. In other words, a higher brand loyalty or repurchase rate could reduce the impacts of rational evaluation, and further increase fault tolerance in competition and the rate of success.

Therefore, according to some research, the service quality will increase the retention rate of consumers directly, which is independent of the profit target. In addition to the high-quality services, the perceived risk of consumers played the important role when organizations intend to increase consumer loyalty, and consumer loyalty directly influenced the success of companies in long-term.

The Factors to Determine the Quality of Service in the Online Shopping Platforms

Personal Privacy

According to the existing studies, most of the researchers believe safety to be one of the most important factors that would influence the consumer perception of services. As a virtual trading platform, online shopping platforms are more prone to the security issues, which directly influence the service quality of platforms. In a previous study, it was mentioned that perceived Web security and personal privacy concerns can influence the consumer acceptance of online shopping. This opinion was accepted by some researchers in their study which claimed that the users form perceptions of security control that strongly determine how much trust they put in online services. However, security control is a difficult measure to observe the credence quality of online services that Internet users cannot easily assess through the research or experience. Moreover, in addition to qualitative analyses, the importance of safety is also supported by some quantitative data. For example, a survey was created and 120 questionnaires were distributed among the students and the general public. The results showed that people already shopping online prefer to purchase online in future, because of the most important privacy factors. Therefore, according to the current studies, the personal privacy is one of most influential factors to influence the consumer perception of service marketing in online platforms.

Commitment for Customers

In addition to safety, some studies claimed customer commitment would influence the consumer perception of services of online shopping. It was found out that different attitudes of consumers toward online shopping shows that they would still prefer the traditional shopping pattern because of various traits related to promises, such as value, trust, and comfortable. At the same time, the key antecedents and consequences of marketing in online retailing highly rely on four mediators, involving trust, commitment, relationship quality, and relationship satisfaction. A novel multiple-criteria decision-making (MCDM) approach is used to solve the decision of service quality for shopping platform services. They also claimed that similarity and seller expertise were found to have the strongest impact on the relational mediators. Indeed, the security control perceptions of the users arise solely from their predispositions, but online service providers can influence the consumers. Thus, existing studies concluded that the commitment of supplier in online platforms would highly influence the attitude of consumers because word of mouth was the most critical outcome of relationship marketing efforts.

Values of Consumers

However, it was showed that the determinants of online shopping acceptance differ among the service types, but the previous studies have limited the generalizability of their results to a few products at best. The "fulfillment and responsiveness" function is significantly related to the customer loyalty in online shopping platforms. However, they still identified a research gap about whether the customer loyalty would be influenced by the individual values. In the research of Chang et al. (2016), the researchers intended to discuss this research gap, and researchers used 866 samples to explore the relationships among the intrinsic motivation, extrinsic motivation, flow, cognitive attitudes, perceived satisfaction, and purchase intention of online shopping of the consumers from a cognitive attitude perspective. The results indicated that hedonic value, utilitarian value, security, and privacy significantly affected the cognitive attitudes (i.e., cognitive trust and perceived risk). The results of Shu-Hao Chang et al. (2016) initially proved that the individual values of consumers would influence the effects of consumer loyalty, which the perceived services would also be different according to different values. Blasco-Arcas et al. (2014) claimed that the online cues related to customer to customer (C2C) interactions and coproduction in the engagement platform determine the customer co-creation experiences (Razmus, 2021; Siddique et al., 2021). For example, if the customers perceive that they are co-creating the experience, their purchase intentions increase (Razmus, 2021; Siddique et al., 2021).

Thus, for the discussion about what factors would affect the service in online shopping platforms, some most important factors have been found out by existing study, such as personal privacy, commitment for customers, and values of consumers. Compared with the other factors, the personal privacy is the most influential factors to influence the consumer perception of service marketing in online platforms. In addition, the role of commitment of supplier in online platforms is that it highly influences the attitude of consumers, because word of mouth is the most critical outcome of relationship marketing efforts. Finally, even if the values of consumers are less influenced by

online platforms, individual values are still able to influence the effects of consumer loyalty, due to different perceived standards.

Online Platform Service Quality Improvement

The Ease of Use

As discussed before, there were three main factors that would highly influence the consumer perception of service in online shopping platforms. Thus, in this section, researcher intends to analyse how service marketing could be applied in online shopping platforms. In fact, this is not a new topic in academia; a research model was developed to examine the relationship among the service quality dimensions and overall service quality, customer satisfaction, and purchase intentions. The result seems outdated at present due to fast development of online shopping in past 10 years, but it still explained how early scholars understood service marketing of online shopping platforms. In this study, the researcher collected data from a survey of 297 online consumers to test the research model. The analytical results showed that the dimensions of website design, reliability, responsiveness, and trust affect overall service quality and customer satisfaction. Moreover, service quality is significantly related to the customer purchase intentions. However, the personalization dimension is not significantly related to overall service quality and customer satisfaction. In other words, in earlier period, the consumer satisfaction of service quality is highly depended on the ease of use of website pages rather than the personalization.

The Security of Shopping

With the development of online shopping, the uses of shopping platforms are not only limited to the purchasing but also as communication channels at present. Therefore, the uses of online shopping platforms have been classified into social networking rather than pure functional websites. As a result, Lazarus et al. (2014) used to mentioned that the interaction-centric capabilities for engaging consumers are the basis of "co-creation capabilities" of a firm. These capabilities can be used as the strategic tools to develop competitive advantage for service firms under service-dominant logic. Past literature has indicated that the consumption value is an important factor in consumer decision-making on whether to adopt online shopping. However, the previous studies of the indirect effects of personal characteristics on the adoption of online shopping have emphasized solely the importance of utilitarian values, but none have investigated the indirect effects of consumption values that include both utilitarian and hedonic aspects. As a result, in this research, the researchers discussed how online shopping platforms could use the consumption values and personal characteristics to carry out high-quality services. The results showed that online shopping platforms, especially for some platforms that highly rely on mobile channels, some factors should be given priority to consideration, such as convenience, security, and emotional values.

The Role of Promotion

As a type of shopping method, the promotion could play a positive role to increase the consumer satisfaction. Moreover, in the later research from Chang et al. (2016), 866 samples were collected and analyzed using the structural equation modeling for validation of the proposed model. They found out that the cognitive attitudes significantly affected the perceived satisfaction and purchase intention, respectively. Flow significantly and positively influenced the cognitive trust and purchase intentions, respectively. The cognitive trust is the mediators between motivations and perceived satisfaction/purchase intention. For how could improve the perceived satisfaction and purchase intention, in addition to the traditional or mentioned methods, Zheng et al. (2017) used a sample of 537 users of an online shopping platform to advance the theoretical understanding of e-loyalty by exploring the roles of coupon proneness and value consciousness in the context of online shopping platforms. They found out that coupon proneness and value consciousness play important roles in explaining the e-loyalty.

In other words, the quality of service operation on online platforms is highly depended on the ease of use of website pages rather than the personalization. However, with the development of technology, the demands of security are also increased in the past few years.

DISCUSSIONS

This research aimed to discuss the role of service marketing in online shopping platforms and in-depth discuss the importance of service marketing in the marketing of online shopping platforms. However, even if the concept of "service" has had a clear definition, it is still a visible product that its value only depends on the gap between the consumer expectation and real experience. Moreover, as one of subfields of marketing, service marketing and product marketing are always combined in the marketing strategies, so that the discussion of service marketing in online platforms cannot be fully independent of the influence of product marketing. Thus, another disadvantage of this type of studies is that the performance of service marketing is highly influenced by the products, as there are different products that are sold on online shopping platforms. In other words, invisibility of service marketing and dependency with product marketing caused the research aim difficult to be achieved.

In the current study, the importance of services for online shopping platforms has been discussed in-depth, in which the researchers not only analyzed how service influence the success of organizations but also what method could be used by these organizations. Service marketing, as one of main subfields of marketing, is more difficult to be managed when it is applied on a virtual network platform. However, with the development of service, this concept has been paid more attention than before at present, so business organizations need to put enough attention on the improvement of service quality.

Theoretical Implications

First, as an academic literature review, this paper reviewed numerous representative studies in past 15 years, so that this paper could give other researcher a guide of future projects. In addition, service marketing is becoming increasingly popular in recent years, as most of the marketing scholars are interested in

this field. Therefore, the topic area of this study is a hot topic that would not be outdated in a short time.

Even if this paper conceptually analyzed the extant literature systematically, there are still some possibilities for the future studies. These research gaps are divided into the guesses that have not been proved and the questions put forward by the current study. The first opportunity is related to the questions mentioned left by earlier studies. Previous studies mentioned that online shopping based on machinery and procedures did not have the ability to exchange emotion with consumers; however, it was found if an organization could achieve nearly optimal service level, the service quality would only increase the retention rate of consumers. However, the previous studies did not explain the optimal service level or provide the framework to test the optimal service level. Even if a researcher has found some factors that could influence the service quality, it is still unable to answer this question. Thus, the first opportunity is to know how online shopping platform could create the optimal service level or how these organizations divide into different levels.

Second, as early as 2005, Guang and Fen have found that the consumer satisfaction of service quality is highly dependent on the ease of use of website pages rather than the personalization. Even in 2015, Assarut and Eiamkanchanalai mentioned that online shopping platforms should provide priority to consider some factors, such as convenience. Both these studies did not discuss the role of personalization, but some research (e.g., Koch and Benlian, 2015; Zobov et al., 2016; Oberoi et al., 2017) claimed personalization has become increasingly important at present, so the second opportunity is to prove whether personalization has become more important than some factors, especially in the current era.

Third, the most important contribution of this study is that it provided experiences about long-term and voluminous literature review, laid the foundation of future research. Moreover, the topic of this project is about service marketing and online shopping platform, created a systemic review about the concepts about these fields in-depth.

Fourth, the current conceptual analysis discussed the psychological and behavioral aspects of the important issues separately. Future studies are encouraged to discuss, or empirically examine, the issues that are at the intersection of the two major perspectives. As individual psychology and behaviors could be mutually influential, more interesting phenomena and issues of service marketing in online shopping context might be explored by integrating the two perspectives.

Fifth, future research should take the role played by culture into account when investigating the service marketing in online shopping context. Here, culture not only refers to that in physical settings (societal, social, organizational, etc.) but also that embedded in virtual and neuro-psychological worlds. In the age of internet and more modernized technologies, the way culture forms and functions are very different from that in traditional business settings. Whether in physical or virtual settings, however, one thing stays for sure is that culture could affect the human cognition, interactions, decisions, and actions. But in the virtual world, culture becomes more difficult to capture and measure. So, it would be quiet challenging but contributively if scholars of online service marketing could bring the updated concept of culture into related studies.

Last, the performance of service marketing is highly influenced by the products as different products are sold on platforms. In other words, the invisibility of service marketing and dependency with product marketing caused the research aim difficult to be achieved.

Practical Implications

For related practitioners of online shopping, the results of this study could provide theoretical support about how to develop quality of service and how to increase the effectiveness of service marketing. The literatures reviewed in this paper involved the influential factors, operating method of service marketing, impacts of service marketing on consumers, and the methods of improvement, which intended to help online platforms to find out a method to create high-quality service. However, even if the concept of "service" has had a clear definition, it is still a visible product that its value only depends on the gap between the consumer expectation and real perception. This paper explained the related concepts of service in details, which could help practitioners to further understand the service and its importance. Moreover, with the development of technology, the online shopping is able to replace more and more functions of real stores, to become mainstream shopping method in the future. In addition, the findings of this research could contribute in changing online shopping platform to be more humane and more advanced, which could even change the current business philosophy of these platforms to pay more attention on service marketing.

Policy Implications

For policymakers, a clearer analysis of service marketing standards in online shopping platform context contributes to policy regulations for online shopping platforms' service-related disputes. Service marketing, as one of main subfields of marketing, is more difficult to be managed when it is applied on a virtual network platform. Thus, it is easier to have disputes between online retailers and consumers, due to service problems and lack of related laws to regulate the market. However, this paper provides a clear description about how consumers require the service quality of online shopping, so it helps the current market to establish the market standards.

Concluding Remarks

With the development of service marketing, this concept has not been limited only on real places, which it has be extended to online communication and been reflected by various forms. However, with the development of online shopping, it is increasingly difficult to evaluate what standards high-quality online shopping platforms should have. In this conceptual analysis, we discussed how service marketing is working in online shopping platforms and in-depth discuss how important role service has played in the marketing of

online shopping platforms. In addition, in the review of relevant literatures, we created a logic comparison among the different opinions, through discussion of the findings of current studies.

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All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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REFERENCES

Al-kumaim, N. H., Alhazmi, A. K., Ramayah, T., Shabbir, M. S., and Gazem, N. A. (2021). Sustaining continuous engagement in value co-creation among individuals in universities using online platforms: role of knowledge self-efficacy, commitment and perceived benefits. *Front. Psychol.* 12:637808. doi: 10.3389/fpsyg.2021.637808

Blasco-Arcas, L., Hernandez-Ortega, B., and Jimenez-Martinez, J. (2014). The online purchase as a context for co-creating experiences. drivers of and consequences for customer behavior. *Inter. Res.* 24, 393–412. doi: 10.1108/IntR-02-2013-0023

Chang, S. H., Chih, W. H., Liou, D. K., and Yang, Y. T. (2016). The mediation of cognitive attitude for online shopping. *Inform. Technol. People* 29, 618–646. doi: 10.1108/ITP-08-2014-0172

Fan, J., and Dong, L. (2021). A study on improving customer value based on the effect of word of mouth. *Front. Psychol.* 12:628665. doi: 10.3389/fpsyg.2021.628665

Girard, T., and Dion, P. (2010). Validating the search, experience, and credence product classification framework. *J. Bus. Res.* 63, 1079–1087. doi: 10.1016/j.jbusres.2008.12.011

Haynes, K., and Grugulis, I. (2014). *Managing Services: Challenges And Innovation*. Oxford England: Oxford University Press.

Hsieh, M. T., and Tsao, W. C. (2014). Reducing perceived online shopping risk to enhance loyalty: a website quality perspective. *J. Risk Res.* 17, 241–261. doi: 10.1080/13669877.2013.794152

Koch, O. F., and Benlian, A. (2015). Promotional tactics for online viral marketing campaigns: how scarcity and personalization affect seed stage referrals. *J. Interact. Market.* 32, 37–52. doi: 10.1016/j.intmar.2015.09.005

Lazarus, D., Krishna, A., and Dhaka, S. (2014). Co-creation willingness matrix and capability continuum for classification and scaling of services. *J. Glob. Market.* 27, 213–225. doi: 10.1080/08911762.2014.909551

Majeed, S., Zhou, Z., Lu, C., and Ramkissoon, H. (2020). Online tourism information and tourist behavior: a structural equation modeling analysis based on a self-administered survey. *Front. Psychol.* 11:599. doi: 10.3389/fpsyg.2020.00599

Méndez-Aparicio, M. D., Izquierdo-Yusta, A., and Jiménez-Zarco, A. I. (2017). Consumer expectations of online services in the insurance industry: an exploratory study of drivers and outcomes. *Front. Psychol.* 8:1254. doi: 10.3389/fpsyg.2017.01254

Oberoi, P., Patel, C., and Haon, C. (2017). Technology sourcing for website personalization and social media marketing: a study of e-retailing industry. *J. Bus. Res.* 80, 10–23. doi: 10.1016/j.jbusres.2017.06.005

Razmus, W. (2021). Consumer brand engagement beyond the "likes". *Front. Psychol.* 23:69200. doi: 10.3389/fpsyg.2021.692000

Rust, R. T., and Huang, M. H. (2014). *Handbook of Service Marketing Research*. Cheltenham: Edward Elgar Publishing.

Schultz, M., Doerr, J. E., and Frederiksen, L. (2013). *Professional Services Marketing: How the Best Firms Build Premier Brands, Thriving Lead Generation Engines, and Cultures of Business Development Success*. Hoboken, New Jersey: John Wiley and Sons.

Shareef, M., Dwivedi, Y., and Kumar, V. (2016). *Mobile Marketing Channel: Online Consumer Behavior*. Berlin, Germany: Springer International Publishing.

Siddique, J., Shamim, A., Nawaz, M., Faye, I., and Rehman, M. (2021). Co-creation or co-destruction: a perspective of online customer engagement valence. *Front. Psychol.* 11:591753. doi: 10.3389/fpsyg.2020.591753

Wei, J. (2021). The impacts of perceived risk and negative emotions on the service recovery effect for online travel agencies: the moderating role of corporate reputation. *Front. Psychol.* 12:685351. doi: 10.3389/fpsyg.2021.685351

Wong, K. P., Bonn, G., Tam, C. L., and Wong, C. P. (2018). Preferences for online and/or face-to-face counseling among university students in Malaysia. *Front. Psychol.* 9:64. doi: 10.3389/fpsyg.2018.00064

Yahyaoui, H., Own, H. S., and Malik, Z. (2015). Modeling and classification of service behaviors. *Expert Syst. Appl.* 42, 7610–7619. doi: 10.1016/j.eswa.2015.05.052

Zheng, X., Lee, M., and Cheung, C. M. (2017). Examining e-loyalty towards online shopping platforms. *Internet Research* 27, 709–726. doi: 10.1108/IntR-01-2016-0002

Zobov, A. M., Degtereva, E. A., Starostin, V. S., and Chernova, V. Y. (2016). Product personalization as a tool of individualized marketing. *Soc. Sci.* 11, 4469–4472.

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Corrigendum: Service Marketing in Online Shopping Platform: Psychological and Behavioral Dimensions

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In the published article, there was an error in the author list. An author name was incorrectly spelled as **Manzu Qi**. The correct spelling is **Manci Qi**.

The authors apologize for this error and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

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Examining Digital Entrepreneurship: The Goal of Optimization of Transformation Path Normal Education in China

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The education system in China needs optimization with the erupted pandemic for effective outcomes. The path for normal education is upgrading itself with online learning, hence offering a challenge for entrepreneurship. The education sector needs to tackle these offered challenges better that optimizes and exploits the situations. The way teachers and students communicate and utilize their learning to materialize new ideas is very important for keeping pace. Therefore, this study is aimed to investigate the role of mentorship in digital entrepreneurship. The population for the study was the teachers of normal education in China. The sampling design used was convenient random sampling, and data were collected with a self-administered questionnaire on five points Likert scale. This study has used Smart PLS 3.3.3 (USA) for the data analysis through structural equation modeling. In the first stage, the instrument analyzed the measurement model, and in the second stage, the hypotheses were checked using the data collected. The findings of the study show that mentorship plays a very important role in knowledge sharing and innovation, which further leads to digital entrepreneurship. The study will open a new path in the education field to incorporate knowledge hidings and transformational entrepreneurship.

Keywords: digital entrepreneurship, innovative education, transformation, mentorship and innovation, knowledge sharing, normal education

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INTRODUCTION

Digital entrepreneurs had a huge impact on the globe in the previous decade through their changing customer demands. Different kinds of searching engineering have impacted the corporate sector and how people connect in daily life. During this point, we live in a global environment where virtual reality may be utilized to improve the quality of judgments, and our vision of reality can be supplemented in a variety of ways to widen our viewpoint. When digital manufacturing of a device exposes flaws before the actual product is finished, it is easier to develop it quickly. Because the digitalization phenomenon has a wide range of consequences due to rapid and transformational change, and entrepreneurs and entrepreneurial scholars need to be aware of associated results and linkages and spot new emerging possibilities. We define digital entrepreneurship in this article as "the process of creating, establishing, and operating a new digital place for online education."

(Qin et al., 2021) with its distinguishing feature of "new value generation." However, entrepreneurship entails more than just launching a new company (Hull et al., 2007). Entrepreneurial activity comes through the interaction of institutions (such as education or company growth), users, and entrepreneur individuals, according to a holistic approach. Digital entrepreneurship is a phenomenon that has emerged as a result of technical assets, such as the internet and information and communications technologies (ICTs). Digital entrepreneurship may be defined as any entrepreneurial action that converts an asset, service, or key firm component to digital. When opposed to conventional businesses, digital entrepreneurs confront several challenges (Hull et al., 2007). Digital and non-digital entrepreneurs are distinguished by their products, marketing efforts, and work environments. Digital entrepreneurship has gotten a lot of attention as a new and rapidly developing field of study (Kraus et al., 2019). Creating new enterprises and changing current firms *via* innovative digital technologies and/or novel applications of such technologies are referred to as digital entrepreneurship. Recent research on digital entrepreneurship is characterized by less limited and much more networked processes, agencies, and results that span place and time. As a result, several demands have been made in the study on digital entrepreneurship to examine issues that transcend multiple levels, such as individual entrepreneurs, organizations, ventures, and the entire ecosystem (Nambisan et al., 2019). As a result, there appears to be a need for a more holistic and integrative approach to studying digital entrepreneurship, and the invention ecosystem is a useful idea for broadening a view of digital entrepreneurship to include a greater number of players and inter-connections. Moreover, because of the social nature of modern digital entrepreneurship, traditional research methodology may be restricted in their ability to uncover the interconnectivity and vibrant interplay among digitalization and entrepreneurship, as such innovative methodologies have indeed been welcomed to shed light on the occurrence(Chen et al., 2021; Feng et al., 2021; Li et al., 2021; Wang et al., 2021; Yi, 2021).

The urgency for sensing innovations in education is the need of the hour. Education innovation is a hotly debated topic. When speaking with education ministers, it immediately becomes clear that educational systems, in general, are hesitant to innovate and that instructors are particularly resistant to change. Education has a reputation for being among the most orthodox welfare structures and policy sectors. However, speaking with teachers creates the impression that too many changes are being pushed on them without adequate consultation or the essential preconditions for successful implementation. Creative change has been undertaken in certain nations without the care and diligence required and the necessary preceding testing, experimentation, and assessment. The major issue in learning is one of production and efficiency. In this context, efficiency refers to the relationship between resources spent and student achievement and equality outcomes. Education has received an increasing amount of funding during the last few decades. Looking only at schooling, the mean funding per student in Organisation for Economic Co-operation and Development (OECD) nations grew by 17% in factor cost during 2005 and 2013. However, the Project for International Student Assessments (PISA) statistics from the 2003 to 2012 surveys reveal no substantial improvement in test results during the same time span. Instead, the share of elite performers has decreased in most nations. And, while the PISA statistics indicate some improvement in terms of equity, enormous inequalities in educational opportunity and outcomes between various socioeconomic groups still exist (Winston and Patterson, 2006; Yilmaz, 2013; HemaMalini and Washington, 2014; Feng et al., 2021; Li et al., 2021). Innovation has become a critical component of sustaining competitiveness in a globalized world in the last several decades. Creativity may revitalize stale markets and improve the ability of an organization to adapt to new circumstances (Tashakkori et al., 1998; Twenge, 2010; Uzair et al., 2017; Chen et al., 2021; Wang et al., 2021; Yi, 2021). To ensure their existence, education firms must innovate to stay ahead of the competition by offering new goods or services, improving their learning processes and organizational structures, or enhancing the marketing of their operations. In the context of education, how may innovation bring value? To begin with, education innovations have the potential to increase learning outcomes and educational quality. Changes in the educational system or teaching techniques might aid in customizing the educational experience. The use of ICT and innovative ways of managing schools are central to emerging trends in customized learning. Secondly, learning is viewed as a method of improving equity and equality in most countries. Innovations might assist increased services to and usage of education and also learning results equally. Lastly, education must stay relevant in the face of fast societal and economic changes (Pange et al., 2010). Institutions have to adjust to online education in recording speed, adopting and modifying the available technical resources, and integrating professors and scientists who lack intrinsic technological capabilities for online learning. The rapid advancement of computer and Internet technologies has aided the education transformation. Nowadays, an increasing number of medical institutions worldwide are using interactive learning websites to create courses as supplementary tools to aid students in their studies. In 2018, China's Ministry of Education launched the educational transformation Plan 2.0, which accelerated the educational transformation. Researchers from several nations performed surveys from diverse viewpoints in response to this major transition to online education. New discoveries, such as a considerable difference in opinion on the ideal quantity of online courses between students and faculty, were beneficial to the advancement of online learning (Schlenz et al., 2020). Online education has also been shown to increase critical thinking skills and organizational learning outside of the classroom (Lahti et al., 2014). Online education, on the other hand, has a number of flaws. Concerns of teachers about students' grasp of ideas and whether teachers evaluated students' understanding were two typical flaws in asynchronous online education, which is extensively used in China (Lahti et al., 2014). The explanation of practical ideas is widely regarded as one of the most important drawbacks of online instruction (Sankaranarayanan et al., 2020). Many researchers were concerned about limited contacts and

technological challenges. The lack of actual teacher-student contact and interactions among learners will have a detrimental impact on the grasp of practical ideas and perceptions of learning of students throughout the course (Fulton, 2020). As a result, the effectiveness of practical online courses might be critical. If the classes are not live-streamed, students are frequently alone when learning online at home. Is it possible for parents to take on the role of educators? The scientists are unaware of this. Scientists must evaluate the state of online education in China and discover online student learning problems to improve education in the future. Keeping in view all the transformation activities toward online learning from normal education, there was a dire need to design and conduct research that could lead to digital entrepreneurship. Digital entrepreneurship would be the ultimate goal through a transformation of normal education in China. Several factors, such as mentoring, can lead to ultimate digital entrepreneurship. In connection with achieving the goals, this research is designed.

The study has the following objective that needs to be investigated: the relationship between mentorship and digital entrepreneurship with the mediating role of innovation, reinforcement, and knowledge sharing. This bold objective has been further explored with hypothesis division in the next section of the literature review.

REVIEW OF LITERATURE

Mentorship and Innovation

Mentorship is a global phenomenon, yet it takes significantly more effort to provide high-quality mentorship than mentoring mentees in the traditional sense (Angervall, 2016). As a result, the body of literature has long acknowledged that the competencies required for mentorship of a pleased mentee are vast in scope and change depending on the needs of the mentee (Brown, 2018). A long-term approach to the mentorship of mentees is a must for a higher education industry of a country to remain active and thrive (Memon et al., 2015). According to Hernandez et al. (2017), a faculty member usually provides social, technical, and coauthoring help to students during the mentoring process. Psychosocial support is associated with counseling, encouragement, and role modeling, whereas instrumental support assists with difficult tasks, coaching tasks, and offering opportunities for growth (Seraji et al., 2017). In addition to these factors, the emotional wellbeing of the mentee contributes to a high-quality mentoring relationship (Memon et al., 2014). Entrepreneurial mentorship is largely considered a successful method of training new entrepreneurs worldwide (Hussain et al., 2021). The entrepreneurial mentorship system was first implemented in Europe and the United States in the 1970s, and its success has piqued the interest of research organizations since the 1980s (St-Jean, 2013). However, it was first launched in China in 1987 by the Wuhan New Technology Entrepreneurs Service Center to promote large and micro high-tech businesses, and theoretical study on entrepreneurial mentorship in China has only recently begun (Thomas et al., 2015). Hence, based on the literature hypothesis could be developed about the role of mentorship in providing innovation.

H1: Mentorship has affected innovation in China.

Impact of Mentorship on Reinforcement

Reinforcement is one of the most important behavior control techniques for instructors. Reinforcement could be used to educate new abilities, replace an interfering behavior with a replacement behavior, improve suitable behaviors, or boost on-task behavior (Uzair et al., 2017). Reinforcement may appear to be a straightforward approach that many mentors employ, yet it is frequently underutilized. Positive reinforcement is when a reinforcer is given to encourage the right conduct, while negative reinforcement is when an uncomfortable event or condition is removed, encouraging appropriate behavior (Yilmaz, 2013). A mentor has different tools for reinforcing the tasks for the learners. Therefore, mentorship has a vast scope of providing innovation and new opportunities to the learners in normal education.

Students are asked to complete a reinforcer survey to identify their reinforcers, which includes questions and checklists. Reinforcement sampling may be a better method for children with poor communication abilities to determine their likes and dislikes (Powell-Smith et al., 2008). A mentor will watch the pupil initially, then speak with the parents of students and other coworkers to gather potential reinforcers. According to (Feng et al., 2021), there are two types of reinforcers i.e., primary reinforcers and secondary reinforcers. Primary reinforcers, such as consumables (small bites of food or drink) or sensory input, are intrinsically reinforcing (light-up toys, fans, and massagers). Physical things, activities, unique privileges, social acclaim, and attention are examples of secondary reinforcers. After gathering these objects, the mentor will offer the reinforcers to the students in pairs and see which one they prefer. The mentor should keep presenting two-choice sets of reinforcers until all of the options have been matched with one another. The mentor can begin delivering the reinforcement once the reinforcers have been selected and data on the frequency and duration of the desired behavior have been gathered. Initially, the mentor or other member of staff will want to offer reinforcement every time the learner performs the desired skill or behavior. The objective of continuous reinforcement is to convince pupils that they will be rewarded if they behave appropriately.

Reinforcers must be given soon after the target skill to establish this strong link. Some mentors may be hesitant to use reinforcement because of the risk of the student becoming reliant on the reinforcer to do the desired behavior or the requirement to offer high reinforcement rates. This is a valid worry, but it may be averted by devising a strategy for thinning the reinforcement. Reward thinning refers to reducing the overall rate or concentration of reinforcement given to a person when they do the desired behavior (Hagopian et al., 2011). Once the reinforcement system of pupils has been customized for them, everyone, such as the mentors who interact with them, should be conscious of it. The mentors who work with the learners should be aware of potential reinforcers and how to avoid them being satiated. The students will become more likely to generalize their proper conduct to certain other areas if the reinforcement method is used by a variety of educational employees and in

different locations throughout the school day. All this literature concludes that mentorship is vital, while reinforcement in normal education in China can be hypothesized as follows.

H2: Mentorship has an impact on reinforcement in normal education.

Mentorship and Knowledge Sharing

Mentorship takes on many forms in different organizations, but one constant is its importance for the capacity development of students. The job of a mentor includes providing information, stimulating growth, providing encouragement in difficult situations, and serving as a sounding board, among other things. These partnerships are beneficial, providing chances for both sides to grow and learn. Mentoring relationships are frequently split into informal and formal categories. Many schools, education departments, and organizations are interested in supporting mentoring because of its efficacy in producing more productive students. Traditional components of monitoring/mentoring must be connected with knowledge transfer since trust is vital for knowledge transfer and develops largely *via* face-to-face contacts (Eby and Allen, 2008). Highlighting information exchange procedures among individuals is one of the most efficient techniques of producing new knowledge. Many publications have looked at the elements that influence knowledge sharing. According to Babalhavaeji and Kermani (2011), faculty-related mentors that impact knowledge sharing have been influential for knowledge sharing among students (Wu et al., 2020).

According to the researchers, mentors who wanted to foster information sharing had a good attitude toward knowledge-sharing culture in higher education institutions. They also discovered a link between the experience of faculty members and their willingness to share their expertise. Nordin et al. (2012) conducted research on knowledge sharing among mentors. They have used a theory of planned behavior to describe how academic staff at a public higher education institution share information. The study determined the levels of information-sharing behavior among academic faculty and examined the factors that impact knowledge-sharing behavior. The findings indicated that while academic staff at a public higher education institution perceive and implement information-sharing behavior, the conduct may not be publicly or firmly exercised. Learning management requires assessment and assessment of teaching and learning, however, some digital education instructors lack these abilities (Karatsiori, 2016). Suwatthipong et al. (2015) have suggested a knowledge-sharing strategy for creating instructional computer standardized tests in higher education.

Five professional instructional designers assessed the knowledge-sharing approach, and data were examined using content analysis and descriptive statistics. People, knowledge, technology support system, activity, and evaluation are five components of knowledge sharing, according to the findings, and the model of knowledge sharing consists of seven steps, such as explaining and guiding, objective, facilitate, assign, share and learn, review, and evaluate, but this model of knowledge sharing has not yet been used. Furthermore, the findings indicated that there is a high level of congruence among specialists. Future research might look at all of the effects of leadership to see which is the most impactful on knowledge sharing among teaching staff and mentors (Al-husseini and Elbeltagi, 2016). Based on the findings of different researchers, it is evident that knowledge sharing among students can be improved by mentorship in normal education so the following hypothesis was drawn.

H3: Mentorship has increased the knowledge sharing among the students in normal education in China.

Reinforcement and Digital Entrepreneurship

By strengthening economic structures, stimulating innovation, developing innovation, and creating more jobs, entrepreneurship contributes to the growth of the economy. Entrepreneurship as a concept in education is riddled with inconsistencies (Mu et al., 2020). Throughout the world, digital skills are fast altering the structure, character, and dynamics of communication, employment, production, and learning (Chan et al., 2019). Individuals, families, businesses, government agencies, and organizations have been deeply integrated by the rapid expansion of ICT, which has elevated the physically connected biological process to a digital process to make an open, collaborative, and interactive network (Jain et al., 2015). By strengthening economic structures, stimulating innovation, advancing technology, and stimulating the economy, entrepreneurship makes a significant contribution to the economic growth of a country (Scholz et al., 2020). Entrepreneurship as a concept in education is riddled with inconsistencies. One of them has something to do with the course content. The learning organization has significant implications for the position of education as a fundamental driver of economic growth and enhanced ability to succeed in the international marketplace and respond to current and new difficulties (Harjanti and Noerchoidah, 2017). Institutions of higher learning are responsible for motivating and assisting students in acquiring relevant and up-to-date skills, such as entrepreneurial and digital skills, that are required to innovate in the workplace (Goyanes, 2015). A focus for EU countries is to improve entrepreneurial and technological skills in education in underdeveloped areas. The universal aim of providing effective and integrated education and lifelong teachable moments for all people reveals the importance of education in environmental sustainability (Nambisan, 2017). Based on the literature, the following hypothesis was formulated.

H4: Reinforcement in normal education has led to digital entrepreneurship.

Innovative Education and Digital Entrepreneurship

Within the innovation process, digital entrepreneurship is an important determinant (König et al., 2019). It influences the many levels and aspects of the innovation system by changing the structure, goals, and networking processes of the overall business system (Satalkina and Steiner, 2020). Digital technologies, by bringing major changes to the innovation

system, may not only present new economic opportunities, but they may also be disruptive and create new risks (Luz Martín-Peña et al., 2018). Economic outcomes and creative success of the countries have been increasingly dependent on digital technology improvements during the last century (Scholz, 2017). Changes in big data analytics, the acceptance of digital technology, and an increase in their use are all part of the digitalization process. According to research, the rate of digitization is increasing (Scholz et al., 2020). Digitalization poses new difficulties to socioeconomic systems' resilience; on the one hand, it offers new opportunities (Rayna et al., 2015), but it also introduces new risks and unforeseeable repercussions. Digital technologies are being used by entrepreneurs and inventors to create new types of entrepreneurial acts that extend beyond traditional industry borders to incorporate networks, environments, and communities, accelerating the evolution of new businesses (Chang, 2017). Because it allows for a break from conventional production methods and provides new routes and links to markets, customers, and other stakeholders, the current wave of digital technological advancements can be defined as an organizational design (Giones and Brem, 2017). It can be concluded that innovation in normal education may lead to digital entrepreneurship, so the following hypothesis was formulated.

H5: Innovation in normal educations has led to digital entrepreneurship.

Knowledge Sharing and Digital Entrepreneurship

The aim of this research was to investigate the effect of knowledge sharing in normal education that has led to digital entrepreneurship. Entrepreneurial performance is critical to the success of a small business. To avoid running a deficit for investment, they must divide their personal and company finances (Trivellas et al., 2015). Organizations must adopt a knowledge approach to management as a result of the growth of a knowledge-based business. Individual competency in organizations can be increased by disseminating, implementing, and developing explicit knowledge (Laily, 2020). General abilities of individuals, such as producing new ideas, expressing, interpersonal connections, prioritizing tasks, creativity, planning, problem-solving, and teamwork, may be enhanced by a knowledge-sharing culture (Wang et al., 2016). This method is designed to provide employees with the information and expertise required to perform their responsibilities adequately and demonstrate innovative behavior. Behavioral patterns are encouraged to create, introduce, and utilize new things at several levels of the business.

As a result, information sharing aims to improve individual performance with innovative behaviors such as problem-solving strategies (Chan et al., 2019). Knowledge sharing is an approach in which students share their combined knowledge, resulting in a new perspective. Individuals and organizations share knowledge to build a common aim for organizations to gain sustainable competitive advantage (Harjanti and Noerchoidah, 2017). Knowledge sharing may also be defined as a practice in which someone freely shares their experience and knowledge with others (Maulana et al., 2018). The primary goal of each person is to explain, interpret, and convey knowledge to other people, groups, and organizations. In an organization, they disseminated knowledge and information to coworkers (Mathis and Jackson, 2010). It provides chances to investigate, obtain, or generate new knowledge in addition to fully utilizing existing knowledge. In the future, innovation or exploratory knowledge sharing is predicted to be popular. Several other studies understand it as a set of ideas that can be repeatedly amended or rejected until a shared perspective emerges in both tacit and visible form.

Tacit knowledge is defined that has not been communicated with others, despite being acquired through perception and observation (Hsieh and Wu, 2019). Explicit knowledge, on the other hand, has been given, transmitted, and recognized by someone else. Self-confidence is affected by the growth in knowledge-sharing activities. A product or service generated by one or more persons is known as performance (Turner and Gianiodis, 2018). The two most important aspects of performance are efficiency and effectiveness. The efficiency with which an entrepreneur runs their firm to achieve their objectives is referred to as entrepreneur performance. Individuals with greater invention abilities are better able to solve difficulties at work and improve the quality and quantity of their output (Nguyen, 2018). The ability to innovate effectively leads to the formation of initiatives that result in a more effective and efficient working approach. The better the information exchange is implemented, the better the process innovation and product quality will be through new technology, which will boost the performance of the company (Nabi et al., 2017). Based on the literature, the following hypothesis was devised.

H6: Knowledge sharing in normal education has led to digital entrepreneurship.

Based on these hypotheses, this research was designed and the following conceptual framework was designed (see **Figure 1**).

RESEARCH METHODS

This section of the paper analyses the relationship of mentorship with digital entrepreneurship taking into account the mediating effects of knowledge sharing, reinforcement, and innovation. This study follows the quantitative approach where the relationship among different variables is tested using objective theories (Tashakkori and Creswell, 2007). This approach revolves around the emerging investigative questions using an instrument that quantifies the variables into a measurable form that is analyzed statistically. Following the post-positivist philosophy for study, this study measures the cause and effect of certain variables. This is a cross-sectional study where the data were collected all at once using a structured questionnaire containing 28 items for five variables, i.e., independent variables (mentorship), three mediating variables (knowledge sharing, innovation, and reinforcement), and one dependent

variable (digital entrepreneurship), and the data collection was self-administered. The population for this study was the teachers currently working in the education sector of China. The sampling design followed was convenient random sampling where the individuals of China related to the field of information technology were investigated randomly as per their availability. The total number of usable questionnaires was 305. The data were analyzed using Smart PLS 3.3.3 for structural equation modeling. The demographics of the respondents were analyzed using frequency and percentage. The demographic sheet was designed using gender (male and female), age using five age groups, education categorized in five categories, and three sectors that the respondents belonged. The detailed analysis of demography for the respondents is presented in **Table 1**.

TABLE 1 | Demographic summary.

Demographic summary	Frequency	%
Gender		
Male	150	49.18
Female	163	53.44
Age		
< 25	140	45.90
25–30	69	22.62
31–40	55	18.03
41–50	30	9.84
50 >	11	3.60
Education		
Higher secondary	40	13.11
Bachelor	145	47.54
Masters	80	26.23
Doctorate	10	3.27
Others	30	9.84
Sector type		
Information technology	39	12.70
Online services	85	27.86
Online education	181	59.34

N = 305.

Instrument Development

The questionnaire used for data collection was adapted from the previous studies adhering to these variables (references will be given from the literature review in accordance with the variables). The total numbers of items used in the scale were 28, excluding the demographic sheet. There were five variables, namely, mentorship, knowledge sharing, innovation, reinforcement, and digital entrepreneurship. The independent variable mentorship was measured with a four-item scale, and mediating variables; knowledge sharing with six items scale, reinforcement with six items scale, innovation with a four-item scale, and the dependent variable digital entrepreneurship with eight items. These all items were measured with five points Likert scale, i.e., five being strongly agree and one being strongly disagree. The consolidated questionnaire was checked for reliability and validity, respectively, using Cronbach's alpha and composite reliability, and confirmatory factor analysis and correlations to enhance data credibility and scale through China and all over.

DATA ANALYSIS

Partial least squares structural equation modeling (PLS-SEM) analyzed data in two stages, i.e., measurement and structural models are adopted. In the first stage, the data were analyzed for the measurement model using the PLS algorithm. The measurement model can be seen in **Figures 2**, **3**.

Through the measurement model, the variables and indicators were relied on using Cronbach's alpha and composite reliability. The cutoff value for these two statistics is 0.7 (Hair et al., 2017; Haq and Awan, 2020; Haq et al., 2020). All study variables meet this criterion as the alpha reliability statistic ranges from 0.85 to

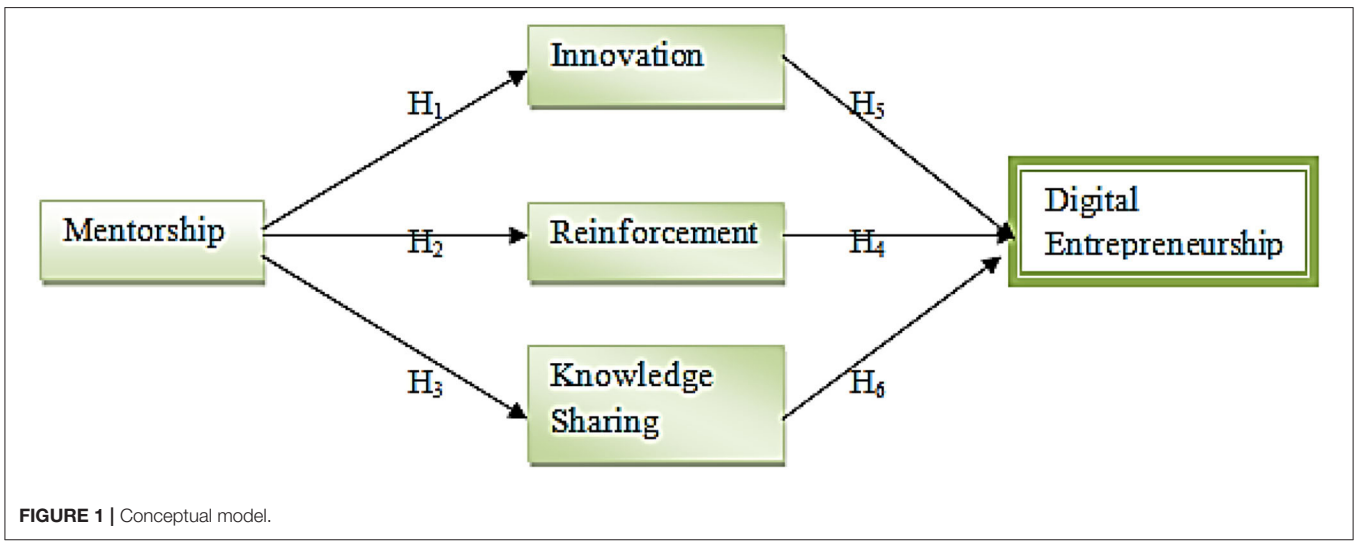

FIGURE 1 | Conceptual model.

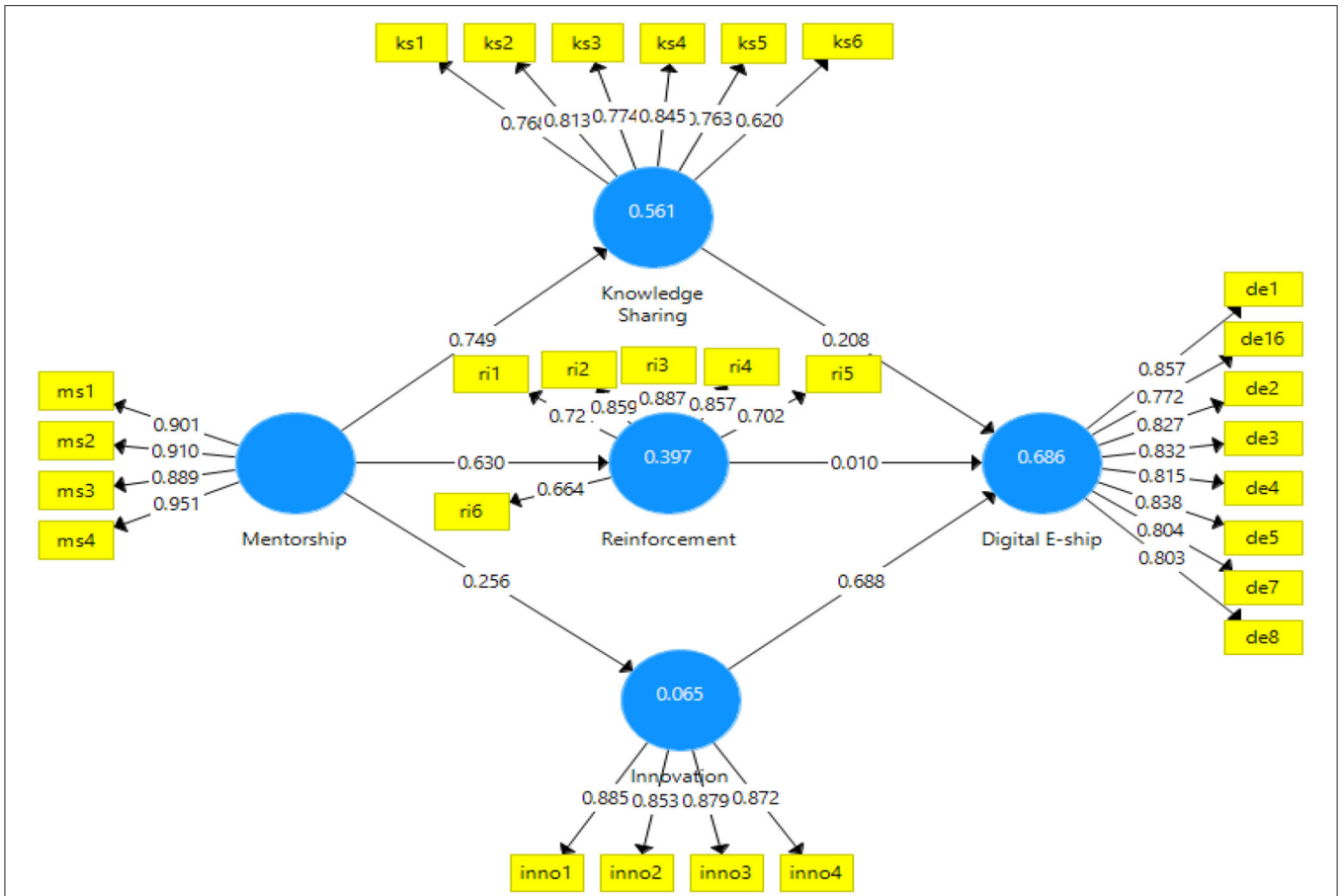

FIGURE 2 | PLS algorithm for measurement model. PLS, partial least squares.

0.93 and composite reliability statistic from 0.86 to 0.93; hence, meeting the criteria of reliable data. The convergent validity of the scale was measured with factor loading for all the items. The results of factor loadings fell between the acceptable ranges from 0.4 to 0.9 (Peterson and Kim, 2013; Hair et al., 2017; Haq and Awan, 2020; Haq et al., 2020). All the items showed convergent validity by showing their respective statistics ranging from 0.6 to 0.9, hence, validating the data for convergent validity. Also, the average variance extracted should be above 0.5 to validate convergent validity (Hair et al., 2017; Haq et al., 2020; Huo et al., 2020; Nawaz et al., 2020, 2021). The average variance extracted (AVE) for the variables used in this study was above the threshold prescribed, thus, confirming the convergent validity of data (see **Table 2**; **Figure 2**).

The data were further analyzed for discriminant validity using the tests Fornell and Larcker ratio and heterotrait-monotrait ratio of correlation (HTMT). The Fornell and Larcker criterion indicates the discriminant validity when the values in diagonal are higher than the rest of the values under that column (Hair et al., 2017; Haq and Awan, 2020; Haq et al., 2020). In this study, this requirement of discriminant validity is met. This can be seen in **Table 3**.

For the other criterion, i.e., HTMT ratio, the researchers agree that the value should not exceed 0.9, i.e., all values should be less (Hair et al., 2017). The values under the HTMT ratio, in this particular study, are below 0.9, thus validating the data discriminately as can be seen in **Table 4**.

In the third phase of data analysis, the data were analyzed for structural model or path analysis using bootstrapping with Smart PLS 3.3.3. This is usually the subsequent stage of the measurement model. The significance of the relationships is usually expressed in the form of path analysis, which either shows the direct effects or the indirect effects. The direct effects are the general linear regression; however, indirect effects indicate the mediating variables. The path analysis diagram obtained after consistent bootstrapping is as (**Figure 3**).

The significance of the hypotheses was checked with the *t*-statistics, *p*-values, and R^2. The results obtained are shown in the following table. For the first hypothesis, mentorship showed a significant effect on knowledge sharing in China (*t-statistic* = 19.350; $p = 0.000$), thus indicating a 56% change in knowledge sharing. As for H_2, mentorship also showed a 39.7% change in reinforcement with *t*-statistic = 13.1; $p = 0.000$, hence, approving the hypothesis. Moreover,

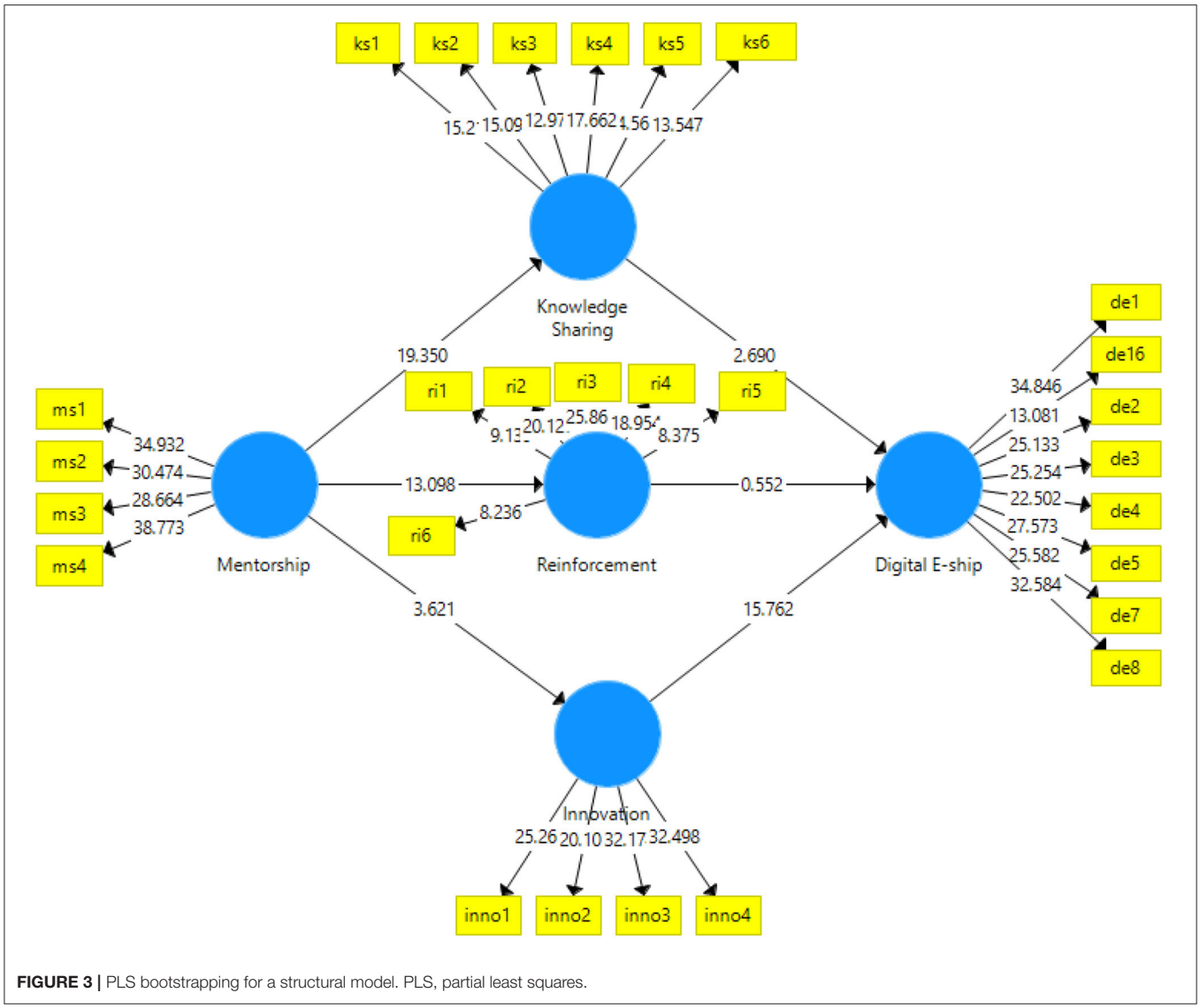

FIGURE 3 | PLS bootstrapping for a structural model. PLS, partial least squares.

innovation was 6.9% affected by mentorship indicating *t*-statistic = 3.621; $p = 0.000$, supporting H_3. As long as H_4 is concerned, it was also supported by showing an effect of knowledge sharing on digital entrepreneurship (*t*-statistic = 2.690; $p = 0.000$). In addition, innovation also showed a significant change in digital entrepreneurship with *t*-statistic = 15.762; $p = 0.000$, thus, supporting H_6. However, reinforcement could not show a significant role (*t*-statistic = 0.552; $p = 0.291$) in digital entrepreneurship thus rejecting H_5 (see **Table 5**).

DISCUSSION AND IMPLICATION

Keeping in view the scenario of digital entrepreneurship and transformation of normal education toward online learning and digital innovations, this study was designed and carried out. Several hypotheses were formulated to research in the wake of this new normal of current times. Covid-19 has erupted so instantly and unexpectedly that no one was aware of the consequences in any of the organizations. Due to severe fear among the nations, every country was destined to be put under lockdown. On the very first, school education was disturbed, and schools were also put under lockdown. There were extremely uncertain conditions for reopening the schools. There was a dire need to go for alternatives so that the education of school-going students and University students may not be affected or less harmed. For this purpose, after a short period and the closure of institutes, online learning on a massive scale came into being. This kind of learning was already in practice in some of the countries, such as China, for the distance learning students. This was not new but an alternative to normal education. Anyhow, by force, it was implemented worldwide so every student may have the opportunity to keep connected with his or her education in these challenging times. This happened without having prior knowledge of its consequences and pros.

TABLE 2 | A measurement model and descriptive statistics.

Constructs	Code	FD	α	CR	AVE	M	SD
Digital entrepreneurship			0.930	0.932	0.942	0.769	0.773
	DE1	0.857					
	DE2	0.772					
	DE3	0.827					
	DE4	0.832					
	DE5	0.815					
	DE6	0.838					
	DE7	0.804					
	DE8	0.803					
Mentorship			0.933	0.935	0.953		
	MS1	0.901					
	MS2	0.910					
	MS3	0.889					
	MS4	0.951					
Knowledge Sharing							
			0.858	0.861	0.895	0.835	0.835
	KS1	0.768					
	KS2	0.813					
	KS3	0.774					
	KS4	0.845					
	KS5	0.763					
	KS6	0.620					
Reinforcement			0.875	0.891	0.906	0.691	0.696
	RI1	0.721					
	RI2	0.859					
	RI3	0.887					
	RI4	0.857					
	RI5	0.702					
	RI6	0.664					
Innovation			0.895	0.896	0.927	0.279	0.276
	INNO1	0.885					
	INNO2	0.853					
	INNO3	0.879					
	INNO4	0.872					

CR, construct reliability; AVE, average variance extracted; α, Cronbach's alpha; M, mean; SD, standard deviation.

TABLE 3 | Fornell and Larcker criterion.

Variables	DE	INNO	KS	MS	RI
DE	**0.819**				
INNO	0.809	**0.872**			
KS	0.603	0.564	**0.767**		
MS	0.199	0.256	0.749	**0.913**	
RI	0.428	0.406	0.672	0.630	**0.787**

DE, digital entrepreneurship; MS, mentorship; KS, knowledge sharing; RI, reinforcement; INNO, innovation.

TABLE 4 | HTMT ratio.

Variables	DE	INNO	KS	MS	RI
DE					
INNO	0.881				
KS	0.653	0.627			
MS	0.215	0.280	0.844		
RI	0.522	0.498	0.766	0.657	

DE, digital entrepreneurship; MS, mentorship; KS, knowledge sharing; RI, reinforcement; INNO, innovation.

There was a need for time to find out the potential benefits and hazards of these digital systems. Students and even teachers were not ready for it, but luckily, this generation was well familiar with the information technology and devices. They utilized their own knowledge to get used to it. Along with it, institutes and software providers also came into action and provided training to the stakeholders in a limited time. It was so sudden that the system ran haphazardly. Now, there was the need to work on different aspects associated with this shift. Many researchers in the previous year gave their maximum output in devising and conducting the research and formulating their recommendations. Our research also focuses on the aspects associated with this kind of change. This research was designed and carried out in China among students and employees of different schools.

Certain hypotheses were developed to analyze the role of mentors in normal education, innovation, knowledge sharing, and digital entrepreneurship. A theoretical framework was designed, and questionnaires were sent to the participants. The results supported the hypotheses. The results were also in accordance with many researchers and some have a different opinion. The possible reasoning for the obtained results is also discussed here. A total of 49% male participants along with 51% female participants took part in this research. Their own education ranged from higher secondary to PhD level. All of them were associated with information technology, online services, and online education. The cutoff value was set at 0.7, which different researchers set in the past (Hair et al., 2017; Haq and Awan, 2020; Haq et al., 2020). The range fell in reliability values. The results of factor loadings fell between the acceptable ranges from 0.4 to 0.9 (Hair et al., 2017; Haq and Awan, 2020; Haq et al., 2020). All the items showed convergent validity by showing their respective statistics ranging from 0.6 to 0.9, hence, validating the data for convergent validity. Also, the average variance extracted should be above 0.5 to validate convergent validity (Hair et al., 2017; Haq et al., 2020).

The possible reason for getting these results was the authenticity and reliability of the data collected from the participants. Discriminant validity was also tested and found satisfactory for the research. This is also due to the authenticity of the data. For the other criterion, i.e., HTMT ratio, the researchers agree that the value should not exceed 0.9, i.e., all values should be less (Hair et al., 2017). The third phase of data analysis was analyzed for structural model or path analysis using bootstrapping with Smart PLS 3.3.3. This is usually the subsequent stage of the measurement model. The significance of the relationships is usually expressed in the form of path

TABLE 5 | Results for structural model.

Paths	H	O	M	SD	*T*-Stats	*P*-Value	R^2	Results
MS -> KS	H_1	0.835	0.835	0.042	19.350***	0.000	0.561	Supported
MS -> RI	H_2	0.691	0.696	0.055	13.098***	0.000	0.397	Supported
MS -> INNO	H_3	0.279	0.276	0.077	3.621***	0.000	0.065	Supported
KS -> DE	H_4	0.208	0.208	0.086	2.690***	0.008	0.686	Supported
RI -> DE	H_5	−0.039	−0.043	0.078	0.552	0.291		Not Supported
INNO -> DE	H_6	0.769	0.773	0.048	15.762***	0.000		Supported

*Significance level ***, 0.005%; H, hypothesis; O, original sample; M, sample mean; SD, standard deviation; DE, digital entrepreneurship; MS, mentorship; KS, knowledge sharing; RI, reinforcement; INNO, innovation.*

analysis, which either shows the direct effects or the indirect effects. The direct effects are the general linear regression, however, indirect effects indicate the mediating variables. For the first hypothesis, mentorship showed a significant effect on knowledge sharing in China, thus, indicating a 56% change in knowledge sharing. This is due to the fact that mentors are always well aware of their roles and provide the necessary knowledge sharing among their students (Alhusseini and Elbeltagi, 2016). As for H_2, mentorship also showed a 39.7% change in reinforcement hence, approving the hypothesis.

This is also supported by the fact that mentors provide the platform for reinforcements among their students (Powell-Smith et al., 2008). Moreover, innovation was 6.9% affected by mentorship supporting H_3. The possible reason for its significance was the role of mentors in providing guidance toward innovative skills among the students. As long as H_4 is concerned, it was also supported, showing an effect of knowledge sharing on digital entrepreneurship. After the transformation of normal education toward digitization, there was a gap for entrepreneurship regarding technology, devices, learning, and other factors involved. Therefore, it can be safely said that knowledge sharing showed an impact on digital entrepreneurship due to this. Innovation also showed a significant change in digital entrepreneurship thus supporting H_6, It is obvious that innovation in any field leads to new opportunities. So, the result for this hypothesis also supports the fact of new chances for entrepreneurship digitally. This research has several implications for future researchers and mentors who are interested in repeating this research with their available resources in different regions. These can be exploited well in finding new avenues for certain researches like this.

CONCLUSION

Normal education in China is transforming with the pace of technology, hence, it needs to be optimized. The conventional way of teaching has had a paradigm shift. Now, we see an online learning and education system that has intrigued the educationists and students toward online or digital entrepreneurship. Hence, this study has investigated the role of mentorship in digital entrepreneurship with mediating effects of organizational psychology and knowledge sharing. This study has used PLS-SEM to assess these relationships. It has been found that mentorship plays a vital role in knowledge sharing, reinforcement, and innovation, which subsequently affects digital entrepreneurship except for reinforcement. This study has contributed to the literature by exploring the emerging concept of digital entrepreneurship in this pandemic and its influence on normal education in China.

LIMITATION OF THE STUDY

The study has a limitation as its results are based on the only education sector, and data have been applied in china only. In the future, it can be explored in other states with different factors and dimensions. This research has several implications for future researchers and mentors who are interested in repeating this research with their available resources in different regions. These can be exploited well in finding new avenues for certain researches like this.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

Ethical approval for this study and written informed consent from the participants of the study were not required in accordance with local legislation and national guidelines.

AUTHOR CONTRIBUTIONS

YZ conceived and designed the concept, literature review, data collection, and wrote the paper and read and agreed to the published version of the manuscript.

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REFERENCES

Al-husseini, S., and Elbeltagi, I. (2016). Evaluating the effect of transformational leadership on knowledge sharing using structural equation modelling: the case of Iraqi higher education. *Int. J. Leadership Educ.* 11, 1–12. doi: 10.1080/13603124.2016.1142119

Angervall, P. (2016). The academic career: a study of subjectivity, gender and movement among women University lecturers. *Gender Educ.* 30, 1–14. doi: 10.1080/09540253.2016.1184234

Babalhavaeji, F., and Kermani, Z. (2011). Knowledge sharing behaviour influences: a case of library and information science faculties in Iran. *Malaysian J. Lib. Inform. Sci.* 16, 1–14. Available online at: http://jice.um.edu.my/index.php/MJLIS/article/view/6670

Brown, K. M. (2018). Gender, race, and mentorship: a perspective from California archaeology. *California Archaeol.* 10, 187–209. doi: 10.1080/1947461X.2018.1535814

Chan, Y. E., Denford, J. S., and Wang, J. J. (2019). The co-evolution of it, knowledge, and agility in micro and small enterprises. *J. Inform. Knowl. Manage.* 18:1950027. doi: 10.1142/S0219649219500278

Chang, S.-H. (2017). The technology networks and development trends of university-industry collaborative patents. *Technol. Forecast. Soc. Change* 118, 107–113. doi: 10.1016/j.techfore.2017.02.006

Chen, X., Huang, C., Wang, H., Wang, W., Ni, X., and Li, Y. (2021). Negative emotion arousal and altruism promoting of online public stigmatization on COVID-19 pandemic. *Front. Psychol.* 12:2140. doi: 10.3389/fpsyg.2021.652140

Eby, L. T., and Allen, T. D. (2008). Moving toward interdisciplinary dialogue in mentoring scholarship: an introduction to the special issue. *J. Vocat. Behav.* 72, 159–167. doi: 10.1016/j.jvb.2008.02.005

Feng, J., Liu, Z., and Feng, L. (2021). Identifying opportunities for sustainable business models in manufacturing: Application of patent analysis and generative topographic mapping. *Sustain. Product. Consum.* 27, 509–522. doi: 10.1016/j.spc.2021.01.021

Fulton, C. (2020). Collaborating in online teaching: inviting e-guests to facilitate learning in the digital environment. *Inform. Learn. Sci.* 121, 579–585. doi: 10.1108/ILS-04-2020-0116

Giones, F., and Brem, A. (2017). Digital technology entrepreneurship: a definition and research agenda. *Technol. Innov. Manage. Rev.* 7:1076. doi: 10.22215/timreview/1076

Goyanes, M. (2015). Factors affecting the entrepreneurial intention of students pursuing journalism and media studies: evidence from Spain. *Int. J. Media Manage.* 17, 109–126. doi: 10.1080/14241277.2015.1055748

Hagopian, L. P., Boelter, E. W., and Jarmolowicz, D. P. (2011). Reinforcement schedule thinning following functional communication training: review and recommendations. *Behav. Anal. Pract.* 4, 4–16. doi: 10.1007/BF03391770

Hair, J. F. J., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. (2017). *A Primer on Partial Least Squares Structural Equation Modeling*. PLS-SEM

Haq, I. U., and Awan, T. M. (2020). *Impact of e-Banking Service Quality on E-Loyalty in Pandemic Times Through Interplay of E-Satisfaction*. Vilakshan–XIMB Journal of Management.

Haq, I. U., Paracha, A., and Shakeel, W. (2020). A multiple parallel mediation between transformational leadership and project-based performance—a process model. *J. Financ. Eng.* 7:2050026. doi: 10.1142/S2424786320500267

Harjanti, D., and Noerchoidah, N. (2017). The effect of social capital and knowledge sharing on innovation capability. *Jurnal Manajemen Dan Kewirausahaan*. 19:78. doi: 10.9744/jmk.19.2.72-78

HemaMalini, P. H., and Washington, A. (2014). Employees' motivation and valued rewards as a key to effective QWL-from the perspective of expectancy theory. *TSM Bus. Rev.* 2:45. Available online at: https://www.researchgate.net/profile/Ajay-Massand-2/publication/272162587_Foreign_Direct_Investment_in_Indian_Banking_Sector_Trends_Opportunities_and_Impact/links/5c11e3c0299bf139c754970a/Foreign-Direct-Investment-in-Indian-Banking-Sector-Trends-Opportunities-and-Impact.pdf

Hernandez, P. R., Estrada, M., Woodcock, A., and Schultz, P. W. (2017). Protégé perceptions of high mentorship quality depend on shared values more than on demographic match. *J. Experim. Educ.* 85, 450–468. doi: 10.1080/00220973.2016.1246405

Hsieh, Y.-J., and Wu, Y. J. (2019). Entrepreneurship through the platform strategy in the digital era: insights and research opportunities. *Comput. Hum. Behav.* 95, 315–323. doi: 10.1016/j.chb.2018.03.033

Hull, C. E., Hung, Y.-T. C., Hair, N., and Perotti, V. (2007). Taking advantage of digital opportunities: a typology of digital entrepreneurship. *Int. J. Network. Virt. Organisat.* 4, 290–303. doi: 10.1504/IJNVO.2007.015166

Huo, C., Ahmed Dar, A., Nawaz, A., Hameed, J., albashar, G., Pan, B., et al. (2020). Groundwater contamination with the threat of COVID-19: Insights into CSR theory of Carroll's pyramid. *J. King Saud Univ. Sci.* 10:1295. doi: 10.1016/j.jksus.2020.101295

Hussain, S., Tirmizi, D. S. M., Shahid, D., and Hussain, M. (2021). An innovative mentorship behavior model imperative for sustainable higher. *Education*. 15:2021. Available online at: https://www.researchgate.net/profile/Dr-Syed-Muhammad-Tirmizi/publication/351868630_An_Innovative_Mentorship_Behavior_Model_Imperative_for_Sustainable_Higher_Education/links/60adf79a458515bfb0a355ca/An-Innovative-Mentorship-Behavior-Model-Imperative-for-Sustainable-Higher-Education.pdf

Jain, S., Nair, A., and Ahlstrom, D. (2015). Introduction to the special issue: towards a theoretical understanding of innovation and entrepreneurship in India. *Asia Pacific J. Manage.* 32, 835–841. doi: 10.1007/s10490-015-9444-x

Karatsiori, M. (2016). European profile for language teacher education: Meeting the challenge for sharing common competences, knowledge, strategies and values. *Cogent Educ.* 3:1199125. doi: 10.1080/2331186X.2016.1199125

König, M., Ungerer, C., Baltes, G., and Terzidis, O. (2019). Different patterns in the evolution of digital and non-digital ventures' business models. *Technol. Forecast. Soc. Change* 146, 844–852. doi: 10.1016/j.techfore.2018.05.006

Kraus, S., Palmer, C., Kailer, N., Kallinger, F. L., and Spitzer, J. (2019). Digital entrepreneurship. *Int. J. Entrepr. Behav. Res.* 25, 353–375. doi: 10.1108/IJEBR-06-2018-0425

Lahti, M., Kontio, R., Pitkänen, A., and Välimäki, M. (2014). Knowledge transfer from an e-learning course to clinical practice. *Nurse Educ. Today* 34, 842–847. doi: 10.1016/j.nedt.2013.09.003

Laily, N. (2020). The effect of knowledge sharing and innovation behavior on the performance of batik entrepreneurs. *Jurnal Manajemen* 24:194. doi: 10.24912/jm.v24i2.643

Li, X., Li, Z., Jia, T., Yan, P., Wang, D., and Liu, G. (2021). The sense of community revisited in Hankow, China: Combining the impacts of perceptual factors and built environment attributes. *Cities* 111:103108. doi: 10.1016/j.cities.2021.103108

Luz Martín-Peña, M., Díaz-Garrido, E., and Sánchez-López, J. M. (2018). The digitalization and servitization of manufacturing: a review on digital business models. *Strategic Change* 27, 91–99. doi: 10.1002/jsc.2184

Mathis, R. L., and Jackson, J. H. (2010). *Human Resource Management*. Cengage Learning.

Maulana, F., Sularso, R., and Titisari, P. (2018). Analisis Pengaruh Knowledge Sharing Dalam Penerapan Sistem Manajemen Mutu Iso 9001:2008 Terhadap Kinerja Inovasi Dan Kinerja Karyawan. *JURNAL MANAJEMEN DAN KEWIRAUSAHAAN* 6:2045. doi: 10.26905/jmdk.v6i1.2045

Memon, J., Abd Rozan, M. Z., Ismail, K., Uddin, M., Balaid, A., and Daud, D. (2014). A theoretical framework for mentor-protégé matchmaking: The role of mentoring in entrepreneurship. *Int. J. Green Econ.* 8, 252–272. doi: 10.1504/IJGE.2014.067728

Memon, J., Rozan, M. Z. A., Ismail, K., Uddin, M., and Daud, D. (2015). Mentoring an entrepreneur: guide for a mentor. *SAGE Open* 5:2158244015569666. doi: 10.1177/2158244015569666

Mu, K., Shi, Q., Ma, Y., and Tan, J. (2020). Exploration of entrepreneurship education by linear regression and psychological factor analysis. *Front. Psychol.* 11:2045. doi: 10.3389/fpsyg.2020.02045

Nabi, G., Liñán, F., Fayolle, A., Krueger, N., and Walmsley, A. (2017). The impact of entrepreneurship education in higher education: a systematic review and research Agenda. *Acad. Manage. Learn. Educ.* 16, 277–299. doi: 10.5465/amle.2015.0026

Nambisan, S. (2017). Digital Entrepreneurship: toward a digital technology perspective of entrepreneurship. *Entrepreneur. Theory Pract.* 41, 1029–1055. doi: 10.1111/etap.12254

Nambisan, S., Wright, M., and Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: progress, challenges and key themes. *Res. Policy* 48:103773. doi: 10.1016/j.respol.2019.03.018

Nawaz, A., Su, X., Barkat, M. Q., Asghar, S., Asad, A., Basit, F., et al. (2020). epidemic spread and its management through governance and leadership response influencing the arising challenges around COVID-19 in pakistan—a lesson learnt for low income countries with limited resource. *Front. Public Health* 8:817. doi: 10.3389/fpubh.2020.573431

Nawaz, A., Su, X., and Nasir, I. M. (2021). BIM adoption and its impact on planning and scheduling influencing mega plan projects-(CPEC-) quantitative *Approach* 18:296. doi: 10.1155/2021/8818296

Nguyen, D. (2018). The University in a world of digital technologies: tensions and challenges. *Austr. Market. J.* 26, 79–82. doi: 10.1016/j.ausmj.2018.05.012

Nordin, N., Daud, N., and Osman, W. (2012). Knowledge sharing behaviour among academic staff at a public higher education institution in Malaysia. world academy of science, engineering and technology. *Int. J. Soc. Behav. Educ. Econ. Bus. Industr. Eng.* 6, 3415–3420. doi: 10.5281/zenodo.1060072

Pange, J., Lekka, A., and Toki, E. I. (2010). Different learning theories applied to diverse learning subjects a pilot study. *Procedia Soc. Behav. Sci.* 9, 800–804. doi: 10.1016/j.sbspro.2010.12.237

Peterson, R. A., and Kim, Y. (2013). On the relationship between coefficient alpha and composite reliability. *J. Appl. Psychol.*, 98:194.

Powell-Smith, K., Stoner, G., Bilter, K., and Sansosti, F. (2008). "Best practices in supporting the education of students with severe and low-incidence disabilities," in *Best Practices in School Psychology,"* 1233–1248.

Qin, Z., Ji, C., Su, X., and Nawaz, A. (2021). Probability analysis of construction risk based on noisy-or gate bayesian networks. *Reliabil. Eng. Syst. Safety* 10:7974. doi: 10.1016/j.ress.2021.107974

Rayna, T., Striukova, L., and Darlington, J. (2015). Co-creation and user innovation: the role of online 3D printing platforms. *J. Eng. Technol. Manage.* 37, 90–102. doi: 10.1016/j.jengtecman.2015.07.002

Sankaranarayanan, S., Kandimalla, S., Cao, M., Maronna, I., An, H., Bogart, C., et al. (2020). Designing for learning during collaborative projects online: tools and takeaways. *Inform. Learn. Sci*. 20:95. doi: 10.1108/ILS-04-2020-0095

Satalkina, L., and Steiner, G. (2020). Digital entrepreneurship and its role in innovation systems: a systematic literature review as a basis for future research avenues for sustainable transitions. *Sustainability* 12:2764. doi: 10.3390/su12072764

Schlenz, M. A., Schmidt, A., Wöstmann, B., Krämer, N., and Schulz-Weidner, N. (2020). Students' and lecturers' perspective on the implementation of online learning in dental education due to SARS-CoV-2 (COVID-19): a cross-sectional study. *BMC Med. Educ.* 20:354. doi: 10.1186/s12909-020-02266-3

Scholz, R. W. (2017). Digital threat and vulnerability management: The SVIDT method. *Sustainability* 9:554. doi: 10.3390/su9040554

Scholz, R. W., Czichos, R., Parycek, P., and Lampoltshammer, T. J. (2020). Organizational vulnerability of digital threats: a first validation of an assessment method. *Euro. J. Operat. Res.* 282, 627–643. doi: 10.1016/j.ejor.2019.09.020

Seraji, F., Tavakkoli, R., and Hosseini, M. (2017). The relationship between technological research skills and research self-efficacy of higher education students. *Interdisciplin. J. Virt. Learn. Med. Sci.* 11:893. doi: 10.5812/ijvlms.11893

St-Jean, E. (2013). The effect of mentor intervention style in novice entrepreneur mentoring relationships. *Mentor. Tutor.* 21:784061. doi: 10.1080/13611267.2013.784061

Suwatthipong, C., Thangkabutra, T., and Lawthong, N. (2015). A proposed model of knowledge sharing to develop educational computer standardized test in higher education. *Procedia Soc. Behav. Sci.* 191, 93–97. doi: 10.1016/j.sbspro.2015.04.253

Tashakkori, A., and Creswell, J. W. (2007). *The New Era of Mixed Methods*. Available online at: https://journals.sagepub.com/doi/pdf/10.1177/2345678906293042

Tashakkori, A., Teddlie, C., and Teddlie, C. B. (1998). *Mixed Methodology: Combining Qualitative and Quantitative Approaches*. New York, NY: Sage.

Thomas, J., Lunsford, L., and Rodrigues, H. (2015). Early career academic staff support: evaluating mentoring networks. *J. High. Educ. Policy Manage.* 37:4426. doi: 10.1080/1360080X.2015.1034426

Trivellas, P., Akrivouli, Z., Tsifora, E., and Tsoutsa, P. (2015). The impact of knowledge sharing culture on job satisfaction in accounting firms. the mediating effect of general competencies. *Procedia Econ. Finance* 19, 238–247. doi: 10.1016/S2212-5671(15)00025-8

Turner, T., and Gianiodis, P. (2018). Entrepreneurship unleashed: understanding entrepreneurial education outside of the business school. *J. Small Bus. Manage.* 56, 131–149. doi: 10.1111/jsbm.12365

Twenge, J. M. (2010). A review of the empirical evidence on generational differences in work attitudes. *J. Bus. Psychol.* 25, 201–210. doi: 10.1007/s10869-010-9165-6

Uzair, M., Razzaq, W., Sarfraz, M., and Nisar, Q. A. (2017). Impact of HR practices on employee loyalty and commitment: mediating role of job satisfaction. *Int. J. Manage. Excell.* 9, 1067–1073. doi: 10.17722/ijme.v9i2.917

Wang, H., Han, Y., Fidrmuc, J., and Wei, D. (2021). Confucius institute, belt and road initiative, and internationalization. *Int. Rev. Econ. Finance* 71, 237–256. doi: 10.1016/j.iref.2020.09.011

Wang, Z., Sharma, P. N., and Cao, J. (2016). From knowledge sharing to firm performance: a predictive model comparison. *J. Bus. Res.* 69, 4650–4658. doi: 10.1016/j.jbusres.2016.03.055

Winston, B. E., and Patterson, K. (2006). An integrative definition of leadership. *Int. J. Leadership Stud.* 1, 6–66. Available online at: http://www.rodrigoselback.com.br/wp-content/uploads/2020/08/An-Integrative-Definition-of-Leadership.pdf

Wu, H., Shah, S. M. A., Nawaz, A., Mahmood, A., Albashar, G., Shah, S. A. R., et al. (2020). Disaster management policy development and engineering economics: an analysis of game-changing impact of COVID 19. *Revista Argentina de Clínica Psicológica* 29:550.

Yi, H. (2021). Secure Social Internet of Things Based on Post-Quantum Blockchain. *IEEE Trans. Netw. Sci. Eng.* 95:192. doi: 10.1109/TNSE.2021.3095192

Yilmaz, K. (2013). Comparison of quantitative and qualitative research traditions: Epistemological, theoretical, and methodological differences. *Euro. J. Educ.* 48, 311–325. doi: 10.1111/ejed.12014

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The Behavioral Role of Digital Economy Adaptation in Sustainable Financial Literacy and Financial Inclusion

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The basic aim of this research was to investigate the impact of the behavioral biases on financial inclusion in Pakistan while considering the moderating effect of financial literacy in this relation, in the context of behavioral perspective. This study focused on the significant behavioral phenomenon, including self-control, optimism, herding, and loss aversion with a perspective of the digital economy. To test the proposed hypothesis, the primary data collection method was used. A structured questionnaire was designed to collect data from 102 individual households through the convenience sampling technique. SmartPLS was used to analyze collected data. This study found the negative impact of self-control, optimism, and herding on financial inclusion. In contrast, loss aversion contributes to the uplift of financial inclusion in Pakistan. Similarly, financial literacy proved to have a decreasing effect on financial inclusion because of religious concerns. The moderation effect of financial literacy was also significantly positive except for loss aversion. The behavioral phenomenon proved to have a significant impact on financial inclusion. This research shows that individual households who do not use developed technological services and products from formal financial inclusion can overcome the behavioral biases that hinder them from making informed financial decisions. This research work will significantly help households use financial services to improve their standard of living and overall long-term financial well-being. This research is essential because many households are not using bank services and have low financial knowledge in Pakistan. The key contribution of this research study is that it found the relation between behavioral factors and financial inclusion. Financial literacy also has a moderating effect on their relations.

Keywords: behavioral factors, financial literacy, financial inclusion, individual households, digital economy

INTRODUCTION

The origin of financial inclusion is microcredit and microfinance with the emerging context of global financial exclusion. The thematic concept of financial inclusion brings access to individuals and businesses for consummating financial services and products. Financial inclusion refers to providing financial services including credit, insurance, deposits, payment, and loan services to people equally and according to their ease. It also aims to include the people in the financial circle who are either not using these services or not accessing the financial products. Although credit unions and financial intermediaries have played a significant role in providing financial assistance, almost 2.5 billion people still do not have their saving account or are not using financial services. Financial inclusion is the concept to bring all these people who are not using the financial product into the financial circle. According to major agencies that have an active role in the development of countries around the world, including the United Nations Development Programme, World Bank, G20, and Bill and Melinda Gates Foundation, there is an immense need for financial inclusion from all the sectors of the population to achieve sustainable economic growth and eliminate poverty, significantly in developing countries (Bongomin et al., 2018; Valencia et al., 2021).

According to the statistics of the State Bank of Pakistan, more than 17% (27 million) of the population of Pakistan are earning <$1 a day. Similarly, <$2 is earned by 73% or 116 million of the total population of Pakistan per day. But banks and other microfinance institutions are availed by only 2% of the poor individual. People living in rural areas are not using financial services, including account opening, bank deposits, insurance, and, most importantly, bank credit. Thus, the financial inclusion rate in Pakistan is very low. Technically, the reason behind this situation is the financial illiteracy of people about the financial concepts, so they may not access these services. Behavioral finance is comparatively a new approach in the financial area that emerged due to the problems faced by individuals in traditional finance. Behavioral finance describes the irrational behavioral phenomenon by developing the critical behavioral model. While making financial decisions, whether they are household individuals and the decision making for business, people faced different types of cognitive and emotional errors named biases that mislead them into making false decisions. Behavioral finance provides an understanding of such emotional errors and tells how people could escape from these misleading factors while making decisions among different choices. Behavioral finance emerged as a new field discussed in different newspapers, publications, and journals in the 1990s. But different authors considered that behavioral finance originated in 1800 or 1900, as was discussed in different books at that time. It is also linked with sociology, psychology, and finance (Ricciardi and Simon, 2000; Mohsin et al., 2020a).

Different types of errors connected with the cognitive and emotional abilities of an individual can affect the financial decisions due to religious, emotional, ideological, and cognitive factors; people do not behave rationally while making financial decisions among different choices (Roll, 1986; Lin et al., 2008; Sadi et al., 2011; Sarfraz et al., 2020a). These biases also affect the decisions related to financial products and services. This study considers the effects of these behavioral factors on financial inclusion. Research shows that financial inclusion helps in poverty reduction and in achieving millennium development goals. It is also found that it leads to eliminating inequality in society (Chibba, 2009; Polloni-Silva et al., 2021). Female empowerment increases as they have access to saving accounts to decide about the proper utilization of their savings. Access to credit also improves the job situation and mental health of individuals. The State bank of Pakistan has also taken the initiative to improve the statistics of financial inclusion in Pakistan, but this program is still in progress. Earnings management plays a moderating role in the Small and Medium-sized Enterprises (SMEs) cash holdings (Sarfraz et al., 2020b).

According to the Organization for Economic Co-operation and Development (OECD) working paper on finance, low financial literacy contributed to the low financial inclusion rate (Gambetta et al., 2021). Financial literacy refers to understanding the financial concepts as the individual needs to choose among different financial services. It facilitates the individuals to effectively use the financial products as it directly impacts financial inclusion (Cohen and Nelson, 2011; Naseem et al., 2020; Menyelim et al., 2021). Individuals with an understanding of the financial rules would manage their expenses efficiently, saving money leading to certain investments properly. Ignorance of financial knowledge may bring consequences to the life of an individual. By considering all this valuable information, this paper is aimed to determine the role of these behavioral biases on financial inclusion in Pakistan, considering the role of financial literacy as the moderator. Several research pieces have been conducted to evaluate the role of behavioral biases on investor behavior or the behavior of individual households while making choices among alternate financial products and services. This also helps the individual find ways to escape these mental errors and make good financial decisions. Studies have also been conducted to determine the impact of these biases on the financial behavior of an individual, how they manage their expenses and save for the future and their impact on their long-term financial well-being. But this research work is not enough in behavioral finance, and there is still scope for more contributions.

This study has the following research questions:

RQ1. What are the significant roles of behavioral errors related to the emotions and cognition of an individual while making financial decisions to use financial products or services?

RQ2. How does financial literacy affect the relationship between behavioral biases and financial inclusion?

The main objectives of this research are to determine the impact of significant behavioral biases, including self-control, optimism, herding, and loss aversion bias, on the level of financial inclusion among households in Pakistan. In addition, the role of financial literacy in relationships between behavioral biases and financial inclusion is also measured in this research masterpiece. Purposely, this study creates awareness among households to overcome their preferences in using products and services from formal financial institutions. To achieve all these objectives, we have considered behavioral biases as the independent variables,

financial inclusion as the dependent variable, and the moderating role of financial literacy.

The intangibility concept of low financial inclusion with a behavioral approach is the core phenomenon of intellectual capital. First, this thematic research is argued for current financial sector services and competitive advantages in this digital era. Second, the focused country of this research is Pakistan which is not even discussed in the existing literature. The focused country is essential in the broad sense that Pakistan has a mixture of banking and financial inclusion services (Islamic and Conventional) and a developing economy. These two elements, i.e., Islamic state and developing economy, declare Pakistan an overheated economy that enhances the exciting aspect of being a focused research country. Third, the Smart-PLS is used to empirically examine the impact of behavioral causes of low financial inclusion in an Islamic and developing country. Lastly, this research is made some recommendations for enhancing the competitive advantages for Pakistan in the sustainable development of financial inclusion.

LITERATURE REVIEW

Financial Inclusion

Financial inclusion refers to "providing the financial services and products to the poor and disadvantaged people on affordable cost and equivalent basis" (Dev, 2006). Financial inclusion aims to involve all those individuals into the monetary circle who are either unbanked or underbanked. Thus, the individuals who do not have a bank account or do not have access to financial services are all financially excluded. There is a figure of the world population which has omitted financially. According to the United Nations survey, nearly three billion people worldwide have not accessed the financial services and products offered by banks or other financial institutions such as a safe place to save money, credit, loan, and insurance. Mostly the financially excluded people in developing countries are the average class people. Providing financial services to individuals to handle money in formal ways will help them reduce poverty and help achieve millennium development goals (Chibba, 2009; Mohsin et al., 2020b). Countries like Pakistan are resource-constrained and face additional challenges for financial inclusion than a developed country. Globally, there are gender differences that are more severe in developing countries in handling financial recourses, security, and empowerment (Ibtasam et al., 2018).

Advancement and expansion of the banking system in Pakistan due to privatization and solid financial policies have shown a significant deepening of the inclusive financial system. But the financial system is not fully expanded to all the sectors of society, especially in rural areas. In Pakistan, financial exclusion is caused by many reasons, including geographical locations as 67% of people live in rural areas, cultural or language barriers, banking services, behavior, lack of support at provincial levels, regulatory restraints including money laundering, and suitability of financial products (Menyelim et al., 2021). The efficient policies of state banks and initiatives by the government have not yet achieved the goals of including people into the financial circle completely. According to Husain (2011), one of the fundamental problems in expanding final inclusion in Pakistan is mismatching the long-term loans and short-term deposits of bank customers. But this problem is resolved, and the gap is filled to some extent by the long-term Islamic Sukuk bonds, insurance by different institutions, pension funds, municipal bonds, and endowment funds. But the progress in financial inclusion is plodding than the developed nations.

Financial inclusion has become a research and policy concern in many countries around the world. State banks worldwide, along with World Bank, have taken the initiative to improve financial inclusion statistics. Still, there are a variety of factors to be investigated that cause low inclusion in financial systems. The innovativeness of this research idea lies in its concept, as no such research study has been conducted. The behavioral causes of low financial inclusion in Pakistan are still unknown in research fields. So, this could be assumed that current research will not only contribute to making people aware of taking control of their business to include into the financial system but also help to achieve the financial inclusion goals of the state bank of Pakistan. It will also contribute to strengthening the banking system in Pakistan.

Behavioral Bias

The word bias refers to the tendency of an individual toward a conclusion or disposition. Biasness is a particular type of tool or specific design used by the human mind to handle the overloaded information and conclude decision-making. As these biases impact behavior or choices in the decision-making process, they need to be further researched to gain more insight into these concepts (Sahi and Arora, 2012). Behavioral finance literature considers biases as deviations from certain norms: cognitive limitations, heuristic, or information processing strategies (Tversky and Kahneman, 1974). Researchers in the psychological area observed that people sometimes show abnormal behavior while making decisions. The main reason behind poor decision-making may be cognitive errors or emotional imbalances (Sarfraz et al., 2018; Baig et al., 2019).

Self-Control Bias

Self-control bias is defined by Pompian (2011) as the tendency of the individuals that causes them to consume today at the expense of tomorrow. Self-control is considered the conflict between the overarching desires of individuals and their inability to act according to these desires due to the lack of self-discipline. Self-control is interchangeable with self-discipline as it is the ability to put down some solid responses for achieving some higher goals. Still, these restrictions are not automatic and require conscious efforts (Duckworth and Seligman, 2006). Individuals with low self-control tend to be more self-centered and impulsive, enjoy ease, and become riskier. In addition, people with low self-control have less ability to calculate the consequences of their bad financial decisions (Wolfe and Higgins, 2009).

Self-Control Bias and Financial Inclusion

Research findings proved the positive impact of self-control on the financial behavior and financial well-being of individuals. People with better self-control are more likely to save money

from every paycheck, have satisfaction through their financial behavior, and are less likely to be anxious and feel secure in their current and future financial matters (Strömbäck et al., 2017).

Behavioral Life-Cycle Hypothesis

According to Pompian (2011), the behavioral life-cycle hypothesis provides the best technical description of self-control in saving and consumption. The individual saving decisions represent their preference for present over future consumption. Previous literature shows that propensity of individuals to save, budget, and make better financial decisions largely depends on their financial behavior control. Similarly, the individuals who are future-oriented and have financial knowledge about the financial terms and rules are more likely to save for their future and participate in different retirement plans, and this will result in controlling their consumptions today (Perry and Morris, 2005; Howlett et al., 2008).

Studies have also investigated the link between self-control and financial behavior while making choices among financial products and services, for example, bank credit and retirement plans. Households lacking commitment, monitoring, and financial planning also have accumulated less wealth (Strömbäck et al., 2017). Thus, the individual with self-discipline is more likely to save for the future and get the financial services to accumulate the money or get a place to save the money. This study aims to explore the relation between self-control and financial inclusion. It argues that people with high self-discipline in their monetary and saving behavior are more likely to use banks and financial services and products of different financial institutions. On the contrary, individuals with accumulated wealth are more likely to use bank accounts to deposit money, bank credit, insurance, retirement plans, and investment in different funds. Furthermore, self-control contributes to increasing financial inclusion and accumulating people in the financial circle.

H_1: There is a significant relationship between self-control and financial inclusion.

Optimism Bias

A valuable definition of optimism was given by Peterson (2000): "an attitude or mood about the material or future social expectations, on which the person having the expectations are socially desirable, either because of his pleasure or his advantage." There is not a single optimism; it depends upon the contents because what is desirable for a person will be his optimism. Individuals are more optimistic when they can control the outcomes or have a high commitment (Heaton, 2002).

Optimism Bias and Financial Inclusion

When predicting what will happen with us in the future, next year or 50 years from now, we underestimate the probability of adverse events and overestimate the probability of positive events. We expect to live long, overestimate our professional success, and believe that our children will be talented. This phenomenon is known as optimism bias and is one of the most prevalent behavioral finance concepts and economics (Sharot et al., 2012; Naseem et al., 2021). One of the main objectives of this study is to investigate the relationship between optimism and financial inclusion. As optimistic persons see their future with "rose-colored glasses," they only expect good things to happen in the future. Thus, people with an upbeat nature are more likely to think that their future will be risk-free. Such people say they will remain financially strong in the future and do not need to save for rainy days, which results in not using the services of financial institutions. As a result, they may be less willing to invest their savings into different financial products, including insurance, fund investment.

H_2: There is a significant relationship between optimism and financial inclusion.

Herding Bias

Herding is the behavioral phenomenon that primarily originated from the animals moving in groups and following one another has been widely studied in financial markets, especially in stock markets. Zhang and Chen (2017) define herding by considering it as: "individuals doing what other individuals are doing, even when their information suggests them to do something different from the others." Literature has classified herding behavior into two major types, whether herding is rational or irrational. Irrational herding could be observed when individuals follow the choices of others because they consider it part of social norms. Irrational herding occurs due to learning through the observations of an individual (Zhang and Liu, 2012).

Herding Bias and Financial Inclusion

Herding is often observed when people follow the same choices, and most of them do this to mimic the actions of others. Herding behavior based on experiments conducted includes different economic activities, such as earnings forecasts, investment recommendation, corporate conservatism, and initial public offerings (Graham, 1999). People mostly get influenced by the choices of others in their purchase decisions. Although herding has often received negative comments, the literature reports the positive impact of the recommendations of online consumers on other consumer choices (Huang and Chen, 2006). In the light of these entire viewpoints, it is argued that household individuals exhibit herding behavior when choosing among alternatives in their financial decisions. Pakistani people, mostly, the rural areas and the poor who do not have financial knowledge, do not consider bank credit as the source when they need money. They mostly get loans from their relatives and friends instead of considering banks as an opportunity. Thus, this study aimed to investigate the relation between the herding behavior of individual households and the probability of their financial inclusion by considering all these literature viewpoints.

H_3: There is a significant relationship between herding and financial inclusion.

Loss Aversion Bias

Loss aversion has been described as a similar loss or gain with different mental penalty levels for an individual. The research evidence shows that people exhibit more distress when they face a loss than pleasure from equal gain. Similarly, the loss coming

after the prior loss is more painful in a usual situation than the loss after the earning. Thus, avoiding the risk is common in households that can affect their household financial decisions (Ngoc, 2014). Simultaneously, making forecasting about how outcomes of decisions feel, people believe that the hedonic impact of loss will be superior to the hedonic impression of equal sizes gain. If the prediction asymmetry is identical to the actual results, people will be wise in their decisions (Kermer et al., 2006).

Loss aversion is based on the researches of two psychologists Daniel Kahneman and Amos Tversky in 1979. Khan (2017) found that people are satisfied from gain but double ache when they have losses. They refer to several studies based on cultural effects on the loss aversion nature of the individual. According to them in Pakistan, women are more loss averse than men in financial decision-making. Similarly, unemployed and older adults near retirement are more loss averse than young and employed individuals.

Loss Aversion Bias and Financial Inclusion

Originally, loss aversion bias was studied in gamblers for their two-outcome monetary choices. But within a short time, researchers have made significant studies in different fields like marketing, consumer choice, and psychology.

Prospect Theory

Formally, the loss aversion could be described based on prospect theory developed by Daniel Kahneman and Amos Tversky in 1979 and 1992, the widely used and known theory for deciding risk. According to the prospect theory, people judge the outcomes of their decisions in terms of gain or losses, concerning some reference point, and they have more sensitivity for losses than the gains. The drawback of loss aversion is people have more probability weightage for the losses than the probability estimation for gains (Abdellaoui et al., 2007). Prospect theory defines human behavior when they are under the situation of risk and uncertainty. It is also linked with status quo bias. The reference point of the outcomes is also considered the status quo, against which any loss is not bearable for the people (Köbberling and Wakker, 2005).

Prospect theory relates the loss aversion to the consumption/saving behavior of the individuals. Fisher and Montalto (2011) conducted a research study using the U.S. survey of consumer financial data to determine the saving behavior of households. The research findings confirmed the asymmetric impact of good or bad news related to the income of an individual on his/her saving behavior. Households are loss averse, as the increase in the income above the reference level does not significantly relate to savings chances. In light of all these research contributions, this study aimed to investigate the role of loss aversion on the financial inclusion of an individual household. Loss-averse people have fewer intentions toward saving even when their income is above the reference level. Similarly, the loss-averse behavior of individuals could also affect the choices of financial services provided by banks and other financial institutions.

H_4: There is a significant relationship between loss aversion and financial inclusion.

Financial Literacy

Different researchers and organizations have defined financial literacy. The President's Advisory Council on Financial Literacy (PACFL) provided the most common definition in 2008: "the management of financial resources for people's lifetime well-being by using knowledge and skills." In literature, financial literacy is defined in many ways as good financial behavior, financial knowledge, perceived knowledge, skills, and abilities to apply financial knowledge and financial experiences. According to Lusardi and Mitchell (2008), financial literacy is "understanding about the basic concepts of finance, such as the real and nominal values differences, diversification of basic risks and the phenomenon of interest compounding."

Financial Literacy and Financial Inclusion

There are different views regarding the impact of financial literacy of individuals on financial behavior. Literature provides evidence that the impact of financial literacy on the overall financial behavior is not too certain, although it is observed that financial behavior is positively influenced by financial literacy. Bernheim et al. (2001) investigated the relation of financial literacy with saving behavior. Those who studied the finance course in their high school were observed to have more savings in their middle age than those who did not study the finance subjects.

The long-term saving behavior of households is also linked to financial literacy. Research studies have investigated the role of financial literacy in planning financial decisions among older women. Evidence proved the interrelation between financial literacy and planning; women with financial knowledge are expected to make better financial decisions and long-term planning to save for retirement (Lusardi and Mitchell, 2008; Naiwen et al., 2021). Financial literacy has been studied about various behavioral aspects, including long-term well-being, investment decision-making behavior, and financial decision-making of individuals. Research evidence also provided information about the positive role of financial literacy in enhancing financial inclusion in different countries. The more people know about financial terms, the more they can make financial decisions and escape behavioral biases. The present research considers the moderating role of financial literacy in the relation between behavioral biases and financial inclusion.

H_5: Financial literacy moderates the relationship between self-control and financial inclusion.
H_6: Financial literacy moderates the relationship between optimism and financial inclusion.
H_7: Financial literacy moderates the relationship between herding and financial inclusion.
H_8: Financial literacy moderates the relationship between loss aversion and financial inclusion.

Theoretical Framework

In light of the detailed information provided in previous literature, I have developed the theoretical model. This research

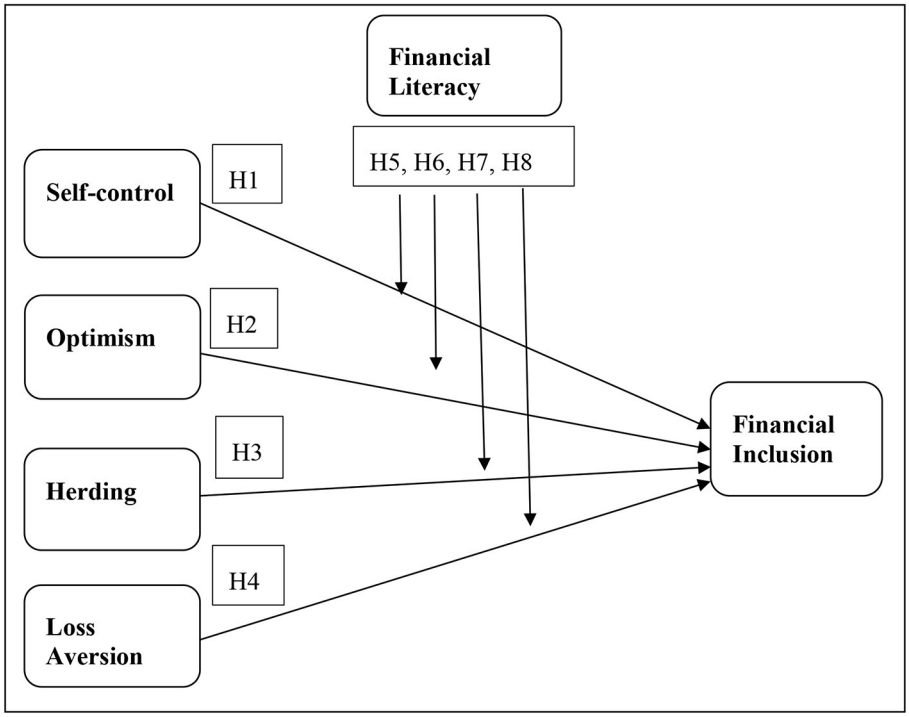

FIGURE 1 | Theoretical model.

work aims to investigate the impact of behavioral biases on the financial inclusion of a household individual. This research study considered self-control, optimism, herding, and loss aversion as behavioral biases. Although there are more than 100 biases in the behavioral finance literature, I have worked on only four. Financial inclusion is considered as a dependent variable, while financial literacy is the moderating variable. The detailed review of the previous literature provided the basis for the arguments that behavioral biases are linked to the long-term financial decision-making of an individual. The overall financial well-being depends on the information a person has about financial products and services (**Figure 1**).

DATA DESCRIPTION AND METHODOLOGY

Data Description

This research study aims to determine whether behavioral biases have a role in the financial inclusion of a household individual when choosing the products and services in financial markets. Thus, all the household individuals of Pakistan are considered as the population for the study. The individuals included in the study belong to various professions, including banking, textile, teaching, shopkeepers, etc. This research also consists of people from both the private and public sectors. The population for this research study is a huge number, so the sample is derived, which is considered the subset of the representative of the whole population. As the number of household individuals using the financial products and services is too large, we could not collect data from each one of them, so it took 102 respondents as a sample.

This research study is based on common household individuals. It does not require any specific professional knowledge or skills, which allowed us to use the convenience sampling technique to collect data from the respondents. Data are collected from every possible individual willing to respond, but the respondent must have some post qualification job experience. This condition was applied with the thought that individuals working must have some savings, which will genuinely measure their self-control nature. It will also help understand the behavioral errors that restrict their decision-making ability to use financial market services, especially banks. Research data are analyzed with the use of software including SPSS and smartPLS.

Questionnaire

The questionnaire for this research consisted of two main parts: demographics and variables. The demographic portion of the questionnaire consists of variables including gender, age, community, income, occupation, and marital status. The second part of the questionnaire consists of the items of different variables. The independent variable self-control consists of 4 items, optimism 5 items, herding 4 items, and loss aversion 3 items. The dependent variable is financial inclusion having 7 items measure it. Financial literacy has been considered as the moderator, which includes 5 items.

Measures

This quantitative study has adopted measures for the collection of data. Self-control consists of 4 items adopted from Antonides et al. (2011); 5 items for optimism have been derived from Scheier and Carver (1985); 4 items for variable herding have been adopted from Metawa et al. (2018); 3 items for the loss aversion have been derived from two different sources (Ngoc, 2014; Baker, 2018). Financial inclusion is measured by 7 items that have been derived from Demirgüç-Kunt et al. (2015). All these variables have been measured on five-point agreement Likert scale. The values ranged from disagreement to agreement where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

TABLE 1 | Previous research glimpses.

Sr. No.	Variables	Questions adopted from	No. of items
1	Self-control	Antonides et al., 2011; Strömbäck et al., 2017	4
2	Optimism	Scheier and Carver, 1985; Strömbäck et al., 2017	5
3	Herding	Metawa et al., 2018	4
4	Loss aversion	Ngoc, 2014; Baker, 2018	3
5	Financial inclusion	Demirgüç-Kunt et al., 2015	7
6	Financial literacy	Rooij et al. (2011)	5

TABLE 2 | Construct reliability and validity.

	Cronbach's alpha	CR	AVE
Financial inclusion	0.743	0.822	0.540
Financial literacy	0.693	0.785	0.582
Herding	0.716	0.667	0.504
Herding × financial literacy	0.650	0.636	0.519
Loss aversion	0.711	0.783	0.580
Loss aversion × financial literacy	0.655	0.660	0.565
Optimism	0.888	0.796	0.661
Optimism × financial literacy	0.726	0.655	0.574
Self-control	0.624	0.730	0.605
Self-control × financial literacy	0.779	0.624	0.584

CR, composite reliability; AVE, average variance extracted.

Financial literacy consisted of 5 items to measure the financial knowledge of the individual. All these items are adopted from Rooij et al. (2011) and Menyelim et al. (2021). The nominal scale measures these items (**Table 1**).

RESULTS AND DISCUSSION

Model Characteristics

The research study aimed to determine the relationship between behavioral biases and financial inclusion in Pakistan while considering financial literacy as a moderator. Thus, the questionnaire was distributed among the individual to collect data. Data analysis software, including SPSS and Smart PLS, was used for data analysis.

Evaluation of Measurement Model

The measurement model for this research study is evaluated based on reliability and validity. The most important measures of reliability are composite reliability and factor loadings. The reliability at the item and construct level is satisfied if it exceeds the threshold level of 0.50 and 0.70 (Zia-ur-rehman et al., 2017; Gambetta et al., 2021). The composite reliability and the factor loading of the constructs are shown in **Table 2**.

Discriminant Validity

Discriminant validity is measured using the Fornell and Larcker (1981) test, which describes that the square root should be greater than the correlation between other constructs in the rows and columns. Thus, discriminant validity is the criteria that measure the difference of a variable from the others (Zia-ur-rehman et al., 2017; Gambetta et al., 2021). **Table 3** represents the validity of the variables in the research study.

Assessment of Structural Model

The predictive capacity of the model has been determined by the significance of path coefficients and the determination coefficients. To obtain the significance level and the path coefficient values, bootstrapping was run at 300 points. The resulting values obtained have been presented **Table 3**.

Coefficient of Determination

The coefficient of determination criteria is that the acceptable R square having values 0.75, 0.50, and 0.25 describes the relatively substantial, moderate, and weak coefficient of determination (Hair et al., 2012; Gálvez-Sánchez et al., 2021). As the R square

TABLE 3 | Discriminant validity.

	Financial inclusion	Financial literacy	Herding	Loss aversion	Optimism	Self-control
Financial inclusion	0.663					
Financial literacy	−0.295	0.697				
Herding	−0.230	0.137	0.710			
Loss aversion	0.238	−0.171	0.182	0.808		
Optimism	−0.128	0.037	0.312	0.098	0.813	
Self-control	−0.244	0.006	0.373	0.101	0.309	0.777

value of the financial inclusion presented in **Table 4** is 0.418, it represents moderate predictive power.

Another important criterion to access the structural model is the measurement of square value. According to the effect size of the constructs omitted on the endogenous constructs, it is determined as small, medium, and large based on relative values 0.02, 0.15, and 0.35, respectively. **Table 5** represents the f square value of the variables in different relations (Gambetta et al., 2021).

The last part of the analysis consists of the determination of the path coefficient. The path coefficient determines whether the collected data support the hypothesis or not. The +1 value of the coefficient shows strong positive relation while the −1 shows strong negative relations. **Table 6** represents the value of the path coefficient for each relation, along with the p-value. A $p < 0.10$ is significant to support the hypothesis (**Figure 2**).

DISCUSSION

The study aimed to explore all the behavior factors that caused low financial inclusion in Pakistan. A small proportion of the total population in Pakistan uses financial products and services. To analyze the results, we use SPSS and smartPLS. The results identified whether the findings had supported the hypothesis we developed or not. The H_1 hypothesis argues that there is a significant relationship between self-control and financial inclusion. Still, results suggest an insignificant negative relationship between self-control and financial inclusion with values ($\beta = -0.161$, $\rho = 0.146$). However, the researchers argue the financial satisfaction and habitual saving of money among the individuals having self-control in their financial matters (Strömbäck et al., 2017). That will be expected to increase their usage of financial services to deposit money. The negative relation between self-control and financial inclusion indicates that people may have savings but not use banking services because of cultural barriers and religious beliefs. Especially in rural areas, Pakistani people prefer to deposit money with their relatives because they lack knowledge or access to financial services. The second hypothesis elaborates as the relation between optimism and financial inclusion is insignificantly negative ($\beta = -0.019$, $\rho = 0.862$), as the highly optimistic people do not consider saving for the future or investing in opportunities. As Peterson (2000) described, bright people judge their future on their expectations based on pleasure or desirable outcomes; they overestimate the likelihood of positive events and underestimate the likelihood of negative events (Sharot et al., 2012). The findings of the current research study are also aligned with previous literature as the people with "rose eyed glasses" may think their future is financially safe, so they do not need to plan for future financial events. This will reduce their savings and also the usage of financial products and services. The third hypothesis is justified by analytical process which confirmed that there is also a negative relationship between herding and financial inclusion ($\beta = -0.156$, $\rho = 0.158$) because herding involves irrational decision-making without the informed knowledge.

Zhang and Chen (2017) argue that people show herding behavior when following choices of others without rational decisions. For example, most people in Pakistan make their financial decisions by observing the behavior of others because of a lack of financial knowledge. There is also the possibility that they will not consider banking and other financial institutions as opportunities to avail of financial services due to their herding behavior, so these findings align with the arguments of previous researchers. The loss of aversion and financial inclusion are significantly positively related ($\beta = 221$, $\rho = 0.010$). People are

TABLE 4 | *R* square.

	***R* square**	**Predictive accuracy**
Financial inclusion	0.418	Moderate

TABLE 5 | *f* square.

	***f* square**	**Effect size**
Financial inclusion		
Financial literacy	0.083	Medium
Herding	0.031	Medium
Herding × financial literacy	0.156	Medium
Loss aversion	0.076	Medium
Loss aversion × financial literacy	0.036	Medium
Optimism	0.000	Small
Optimism × financial literacy	0.000	Small
Self-control	0.036	Medium
Self-control × financial literacy	0.025	Medium

TABLE 6 | Path coefficients.

Hypothesis	**Relationship**	**Path coefficients**	***p*-value**	**Decision**
H1	Financial literacy -> Financial inclusion	−0.228	0.027	Supported
H2	Herding -> Financial inclusion	−0.156	0.158	Not supported
H3	Herding x Financial literacy -> Financial inclusion	0.400	0.047	Supported
H4	Loss aversion -> Financial inclusion	0.221	0.010	Supported
H5	Loss aversion x Financial literacy -> Financial inclusion	−0.174	0.471	Not supported
H6	Optimism -> Financial inclusion	−0.019	0.862	Not supported
H7	Optimism x Financial literacy -> Financial inclusion	0.010	0.950	Not supported
H8	Self-control -> Financial inclusion	−0.161	0.146	Not supported
H9	Self-control x Financial literacy -> Financial inclusion	0.133	0.306	Not supported

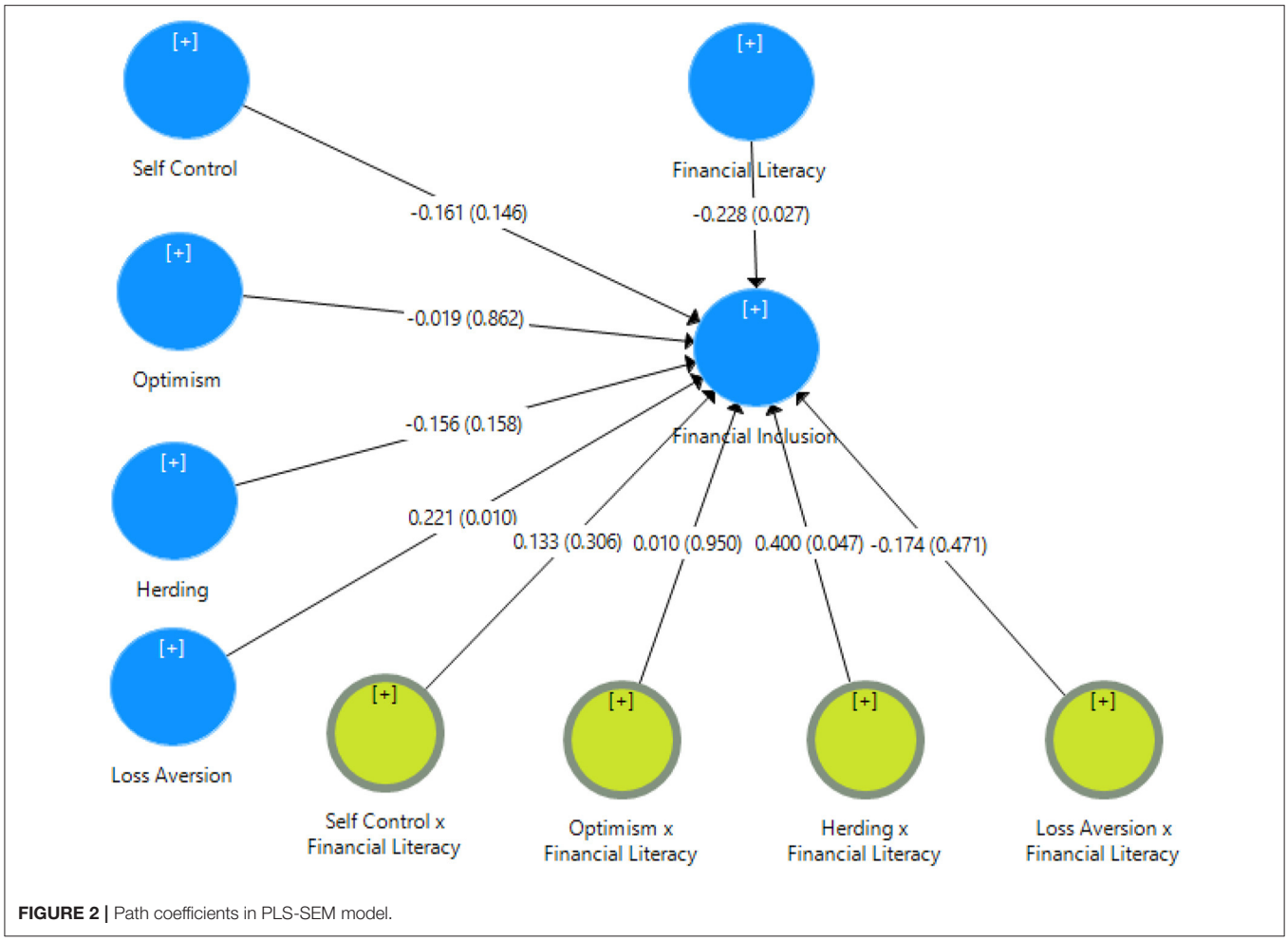

FIGURE 2 | Path coefficients in PLS-SEM model.

most sensitive to losses, as they feel more distress from a loss than pleasure from an equal amount of gain (Ngoc, 2014; Gálvez-Sánchez et al., 2021). This loss aversion behavior is expected in individuals to place their money with secure investments. Banks and other financial institutions are safe and secure options for depositing money and investing; it is expected to increase financial inclusion due to the loss aversion nature of individuals. There is a significantly negative relationship between financial inclusion and financial literacy ($\beta = -0.228$, $\rho = 0.027$), although previous research found a positive impact of financial literacy on financial inclusion.

For example, Bernheim et al. (2001) argued that individuals who studied finance courses are more likely to save in the future and use financial services. In Pakistan, this negative relation exhibits low participation of people in banking services because of their religious beliefs. The majority of the population of Pakistan is Muslim; people avoid the conventional banking system because of the interest element prohibited in Islam. Thus, they may have the literacy of financial matters, but their religious and cultural factors forced them to avoid banking services. Similarly, the research findings demonstrate the positive impact of moderating variable financial literacy on the relationship between independent variables self-control, optimism, and herding with dependent variable financial literacy by values ($\beta = 0.133$, $\rho = 0.306$), ($\beta = 0.010$, $\rho = 0.950$), and ($\beta = 0.400$, $\rho = 0.047$), respectively. Thus, the moderator contributes to the lowering strength of the relationship between loss aversion and financial inclusion.

CONCLUSION

Without knowing the emotional and cognitive domains of behavior, it will be difficult for an individual to make the right decision among the prevailing financial choices. This research indicates that individual behavior is biased when they decide to take financial services. Individual decision-making behavioral biases strongly cause the low rate of financial inclusion in Pakistan. The fundamental aim of this research was to investigate the moderating role of financial literacy and how the literacy level of an individual could play a role in overcoming these biases and increasing financial inclusion. The analysis of the data collected by 102 respondents proved the negative impact of self-control, optimism, and herding biases on financial inclusion. Individuals may have savings, but they do not consider the

potential investment opportunities of banks and other financial institutions. Their religious beliefs are a major cause of this issue with the banking system.

The optimistic nature of individuals also contributes to the low inclusion in Pakistan. People who are highly encouraging see their future positively and do not invest in potential financial products. Optimism is also proved to have a negative relation with financial inclusion. Furthermore, herding behavior results in low inclusion in Pakistan. An individual may herd the irrational choices of other people that are also a leading factor of low inclusion. Only loss aversion positively impacts financial inclusion because the individuals who know the banking system and its terms do not consider it a loss and avail of financial services. Research findings suggest that financial literacy as a moderator positively impacts the relationship between biases and financial inclusion, except for the relationship between loss aversion and financial inclusion. Therefore, the increasing rate of literacy could improve the inclusion level in Pakistan. The negative relation between financial literacy and financial inclusion indicates the low participation of the individual in banking services because of their religious beliefs. In Pakistan, Muslims have strict behavior toward interest, as interest is prohibited in Islam. So, the religious beliefs of the individual restrict them from using banking services. Based on the findings of this research work, a framework could be designed to create awareness and enhance the financial literacy level of households, which will help them recognize financial opportunities by banks and other institutions. Banks also have the advantage of this study as it will help increase their customer base by overcoming the biases of household individuals toward financial decisions. This will also contribute to the financial inclusion program of the State Bank of Pakistan, as increasing individuals into the financial circle will contribute to achieving its financial inclusion goals.

Limitations and Future Directions

The sample size for the study was significantly less because of the short time. Further researches can increase the number of respondents. Future researchers could also consider other biases (mental accounting, availability, conservatism) that may have also caused the low financial inclusion of Pakistan. The research studies could consider the cross-cultural aspects of the population and compare the financial inclusion in rural and urban areas.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

SL and LG: conceptualization. AD and MZ-U-R: methodology. SB and SL: formal analysis and investigation. AD: writing—original draft preparation. SL: writing—review and editing. LG: resources. KL and LG: supervision. All authors approved the current study.

REFERENCES

Abdellaoui, M., Bleichrodt, H., and Paraschiv, C. (2007). Loss aversion under prospect theory: a parameter-free measurement. *Manage. Sci.* 53, 1659–1674. doi: 10.1287/mnsc.1070.0711

Antonides, G., De Groot, I. M., and Van Raaij, W. F. (2011). Mental budgeting and the management of household finance. *J. Econ. Psychol.* 32, 546–555. doi: 10.1016/j.joep.2011.04.001

Baig, S. A., Zia-ur-Rehman, M., Jamil, K., Hashim, M., and Iqbal, N. (2019). Impact of Behavioural biases on firm performance: mediating role of entrepreneurial innovations. *J. Manage. Sci.* 13, 117–128. Available online at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3495406

Baker, H. K. (2018). How financial literacy and demographic variables relate to behavioural biases. *Manage. Finance* 45, 124–146. doi: 10.1108/MF-01-2018-0003

Bernheim, B. D., Garrett, D. M., and Maki, D. M. (2001). Education and saving: the long-term effects of high school financial curriculum mandates. *J. Public Econ.* 80, 435–465. doi: 10.1016/S0047-2727(00)00120-1

Bongomin, G. O. C., Munene, J. C., Ntayi, J. M., and Malinga, C. A. (2018). Exploring the mediating role of social capital in the relationship between financial intermediation and financial inclusion in rural Uganda. *Int. J. Soc. Econ.* 45, 829–847. doi: 10.1108/IJSE-08-2017-0357

Chibba, M. (2009). Financial inclusion, poverty reduction and the Millennium Development Goals. *Euro. J. Dev. Res.* 21, 213–230. doi: 10.1057/ejdr.2008.17

Cohen, M., and Nelson, C. (2011). Financial literacy: a step for clients towards financial inclusion. *Global Microcredit Summit* 14–17. Available online at: https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.466.2029&rep=rep1&type=pdf

Demirgüç-Kunt, A., Klapper, L. F., Singer, D., and Van Oudheusden, P. (2015). "The global findex database 2014: measuring financial inclusion around the world," in *World Bank Policy Research Working Paper* (Washington, DC).

Dev, S. M. (2006). Financial inclusion: issues and challenges. *Econ. Political Weekly* 41, 4310–4313. Available online at: https://www.jstor.org/stable/4418799

Duckworth, A. L., and Seligman, M. E. P. (2006). Self-discipline gives girls the edge: gender in self-discipline, grades, and achievement test scores. *J. Educ. Psychol.* 98, 198–208. doi: 10.1037/0022-0663.98.1.198

Fisher, P. J., and Montalto, C. P. (2011). Loss aversion and saving behaviour: evidence from the 2007 U.S. survey of consumer finances. *J. Fam. Econ. Issues* 32, 4–14. doi: 10.1007/s10834-010-9196-1

Fornell, C., and Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: algebra and statistics. *J. Market. Res.* 18, 382–388. doi: 10.1177/002224378101800313

Gálvez-Sánchez, F. J., Lara-Rubio, J., Verdú-Jóver, A. J., and Meseguer-Sánchez, V. (2021). Research advances on financial inclusion: a bibliometric analysis. *Sustainability* 13:3156. doi: 10.3390/su13063156

Gambetta, N., Azcárate-Llanes, F., Sierra-García, L., and García-Benau, M. A. (2021). Financial institutions' risk profile and contribution to the sustainable development goals. *Sustainability* 13, 7738. doi: 10.3390/su13147738

Graham, J. R. (1999). Herding among investment newsletters: theory and evidence. *J. Finance* 54, 237–268. doi: 10.1111/0022-1082.00103

Hair, J. F., Sarstedt, M., Ringle, C. M., and Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *J. Acad. Market. Sci.* 40, 414–433. doi: 10.1007/s11747-011-0261-6

Heaton, J. B. (2002). Managerial optimism and corporate finance. *Financial Manage.* 31, 33–45. doi: 10.2307/3666221

Howlett, E., Kees, J., and Kemp, E. (2008). The role of self-regulation, future orientation, and financial knowledge in long-term financial decisions. *J. Consum. Aff.* 42, 223–242. doi: 10.1111/j.1745-6606.2008.00106.x

Huang, J., and Chen, Y. (2006). Herding in online product choice. *Psychol. Market.* 23, 413–428. doi: 10.1002/mar.20119

Husain, I. (2011). Financial sector regulation in Pakistan: the way forward. *SBP Res. Bull.* 7, 31–44. Available online at: https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.732.1974&rep=rep1&type=pdf

Ibtasam, S., Razaq, L., Anwar, H. W., Mehmood, H., Shah, K., Webster, J., et al. (2018). "Knowledge, access, and decision-making: women's financial inclusion in Pakistan," in *Proceedings of the 1st ACM SIGCAS Conference on Computing and Sustainable Societies (COMPASS'18)* (New York, NY: ACM), 1–12.

Kermer, D. A., Driver-linn, E., Wilson, T. D., and Gilbert, D. T. (2006). Loss aversion is an affective forecasting error. *Psychol. Sci.* 17, 649–653. doi: 10.1111/j.1467-9280.2006.01760.x

Khan, M. Z. U. (2017). Impact of availability bias and loss aversion bias on investment decision making, moderating role of risk perception. *IMPACT J. Modern Dev. General Manage. Administr.* 1, 17–28. Available online at: http://www.impactjournals.us/download/archives/1-82-1502108083-3.man-%20Impact%20of%20Availability%20Bias%20and%20Loss%20Aversion%20Bias%20on%20Investment%20Decision%20Making.pdf

Köbberling, V., and Wakker, P. P. (2005). An index of loss aversion. *J. Econ. Theory* 122, 119–131. doi: 10.1016/j.jet.2004.03.009

Lin, Y., Hu, S., and Chen, M. (2008). Testing pecking order prediction from the viewpoint of managerial optimism: some empirical evidence from Taiwan. *Pacific Basin Finance J.* 16, 160–181. doi: 10.1016/j.pacfin.2007.04.007

Lusardi, A., and Mitchell, O. S. (2008). Planning and financial literacy: how do women fare? *Am. Econ. Rev. Papers Proc.* 98, 413–417. doi: 10.1257/aer.98.2.413

Menyelim, C. M., Babajide, A. A., Omankhanlen, A. E., and Ehikioya, B. I. (2021). Financial inclusion, income inequality and sustainable economic growth in sub-Saharan African countries. *Sustainability* 13:1780. doi: 10.3390/su13041780

Metawa, N., Hassan, M. K., Metawa, S., and Safa, M. F. (2018). Impact of Behavioural factors on investors' financial decisions: case of the Egyptian stock market. *Int. J. Islamic Middle Eastern Finance Manage.* 12, 30–55. doi: 10.1108/IMEFM-12-2017-0333

Mohsin, M., Naiwen, L., Zia-UR-Rehman, M., Naseem, S., and Baig, S. A. (2020a). The volatility of bank stock prices and macroeconomic fundamentals in the Pakistani context: an application of GARCH and EGARCH models. *Oeconomia Copernicana* 11, 609–636. doi: 10.24136/oc.2020.025

Mohsin, M., Naseem, S., Zia-ur-Rehman, M., Baig, S. A., and Salamat, S. (2020b). The cryptotrade volume, GDP, energy use, and environmental degradation sustainability: an analysis of the top 20 crypto-trader countries. *Int. J. Finance Econ.* 1–17. doi: 10.1002/ijfe.2442

Naiwen, L., Wenju, Z., Mohsin, M., Rehman, M. Z. U., Naseem, S., and Afzal, A. (2021). The role of financial literacy and risk tolerance: an analysis of gender differences in the textile sector of Pakistan. *Industria Textila* 72, 300–308. doi: 10.35530/IT.072.03.202023

Naseem, S., Fu, G. L., Mohsin, M., Rehman, M. Z. U., and Baig, S. A. (2020). Semi-quantitative environmental impact assessment of khewra salt mine of Pakistan: an application of mathematical approach of environmental sustainability. *Mining Metallurgy Exploration* 37, 1185–1196. doi: 10.1007/s42461-020-00214-9

Naseem, S., Mohsin, M., Hui, W., Liyan, G., and Penglai, K. (2021). The investor psychology and stock market behavior during the initial era of COVID-19: a study of China, Japan, and the United States. *Front. Psychol.* 12:16. doi: 10.3389/fpsyg.2021.626934

Ngoc, L. T. B. (2014). Behaviour pattern of individual investors in stock market. *Int. J. Business Manage.* 9, 1–16. doi: 10.5539/ijbm.v9n1p1

Perry, V. G., and Morris, M. D. (2005). Who is in control? The role of self-perception, knowledge, and income in explaining consumer financial Behaviour. *J. Consumer Affairs* 39, 299–313. doi: 10.1111/j.1745-6606.2005.00016.x

Peterson, C. (2000). The future of optimism. *Am. Psychol.* 55, 44–55. doi: 10.1037/0003-066X.55.1.44

Polloni-Silva, E., da Costa, N., Moralles, H. F., and Neto, M. S. (2021). Does financial inclusion diminish poverty and inequality? A panel data analysis for Latin American countries. *Soc. Indicators Res.* 155, 1–37. doi: 10.1007/s11205-021-02730-7

Pompian, M. M. (2011). *Behavioral Finance and Wealth Management: How to Build Investment Strategies That Account for Investor Biases*, Vol. 667. John Wiley & Sons.

Ricciardi, V., and Simon, H. K. (2000). What is behavioural finance? *Business Educ. Technol. J.* 2, 1–9. Available online at: http://www.smallake.kr/wp-content/uploads/2016/07/SSRN-id256754.pdf

Roll, R. (1986). The hubris hypothesis of corporate takeovers. *J. Business* 59, 197–216. doi: 10.1086/296325

Rooij, M. van, Lusardi, A., and Alessie, R. (2011). Financial literacy and stock market participation. *J. financ. Econ.* 101, 449–472. doi: 10.1016/j.jfineco.2011.03.006

Sadi, R., Asl, H. G., Rostami, M. R., Gholipour, A., and Gholipour, F. (2011). Behavioural finance: the explanation of investors' personality and perceptual biases effects on financial decisions. *Int. J. Econ. Finance* 3, 234–241. doi: 10.5539/ijef.v3n5p234

Sahi, S. K., and Arora, A. P. (2012). Individual investor biases: a segmentation analysis. *Qualitative Res. Financial Markets* 4, 6–25. doi: 10.1108/17554171211213522

Sarfraz, M., He, B., and Shah, S. G. M. (2020a). Elucidating the effectiveness of cognitive CEO on corporate environmental performance: the mediating role of corporate innovation. *Environ. Sci. Pollution Res.* 27, 45938–45948. doi: 10.1007/s11356-020-10496-7

Sarfraz, M., Qun, W., Hui, L., and Abdullah, M. I. (2018). Environmental risk management strategies and the moderating role of corporate social responsibility in project financing decisions. *Sustainability* 10:2771. doi: 10.3390/su10082771

Sarfraz, M., Shah, S. G. M., Ivascu, L., and Qureshi, M. A. A. (2020b). Explicating the impact of hierarchical CEO succession on small-medium enterprises' performance and cash holdings. *Int. J. Finance Econ.* 1–15. doi: 10.1002/ijfe.2289

Scheier, M. F., and Carver, C. S. (1985). Optimism, coping, and health: assessment and implications of generalized outcome expectancies. *Health Psychol.* 4, 219–247. doi: 10.1037/0278-6133.4.3.219

Sharot, T., Guitart-masip, M., Korn, C. W., Chowdhury, R., and Dolan, R. J. (2012). How dopamine enhances an optimism bias in humans. *Curr. Biol.* 22, 1477–1481. doi: 10.1016/j.cub.2012.05.053

Strömbäck, C., Lind, T., Skagerlund, K., Västfjäll, D., and Tinghög, G. (2017). Does self-control predict financial behaviour and financial well-being? *J. Behav. Exp. Finance* 14, 30–38. doi: 10.1016/j.jbef.2017.04.002

Tversky, A., and Kahneman, D. (1974). Judgment under uncertainty: heuristics and biases. *Science* 185, 1124–1131. doi: 10.1126/science.185.4157.1124

Valencia, D. C., Calabuig, C., Villa, E., and Betancur, F. (2021). "Financial inclusion as a complementary strategy to address the SDGs for society," in *Sustainable Development Goals for Society*, Vol. 1 (Cham: Springer), 79–89.

Wolfe, S. E., and Higgins, G. E. (2009). Explaining deviant peer associations: an examination of low self-control, ethical predispositions, definitions, and digital piracy. *Western Criminol. Rev.* 10, 43–55.

Zhang, J., and Liu, P. (2012). Rational herding in microloan markets. *Manage. Sci.* 58, 892–912. doi: 10.1287/mnsc.1110.1459

Zhang, K., and Chen, X. (2017). Herding in a P2P lending market: rational inference OR irrational trust? *Electron. Commer. Res. Appl.* 23, 45–53. doi: 10.1016/j.elerap.2017.04.001

Zia-ur-rehman, M., Rizwan, M. F., and Abbas, Z. (2017). Impact of behavioural biases on long term financial decisions and corporate performance: an evidence from non-financial sector of Pakistan. *NICE Res. J.* 10, 1–28. doi: 10.51239/nrjss.v0i0.29

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Sustainable Digital Economy Through Good Governance: Mediating Roles of Social Reforms and Economic Policies

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The most powerful and crucial concept today is a sustainable digital economy. This research is aimed to investigate the predictors of a sustainable digital economy in China. In addition, the mediating roles of social reforms and economic policies were investigated between good governance and a sustainable digital economy. This cross-sectional research considered partial least square–structural equational modeling (PLS-SEM) as an analysis technique. The data were collected from 317 managerial staff of the e-commerce industry in China via a self-structured questionnaire. A random sampling technique was applied in the data collection process. Results showed that good governance positively impacts the sustainable digital economy, social reforms, and economic policies. Additionally, an increase in social reforms and economic policies led to a sustainable digital economy in China. Social reforms and economic policies partially mediated the relationship between good governance and a sustainable digital economy. This research contributes to the body of knowledge by identifying components of a sustainable digital economy and examining whether good governance may aid in attaining a sustainable digital economy. Nowadays, research on the sustainable digital economy has got attention from policymakers and researchers around the globe. These outcomes suggest several ways to improve the sustainable digital economy in China. This research is not without limitations, such as cross-sectional and based on responses of the respondents. Several research avenues were discussed and can be influenced by many factors for future perspectives.

Keywords: good governance, economic policies, social reforms, sustainable digital economy, e-commerce

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INTRODUCTION

The notion of a sustainable digital economy is the most powerful and significant concept today, as it may lead a country out of crisis and on to a path of sustainable development and establish plans and objectives that span large-scale digital economies (Yang and Zhao, 2018). Today, digital economies encompass the rapid growth of information and communication technologies (ICTs) with the expectation that they will accomplish substantial technical advances to attain digital sustainability. In addition, globalization and the digital economy have resulted in extraordinary expansion across all private and public sectors and the creation of a worldwide accessible market. One must

emphasize the importance of governments and private sectors collaborating to develop a new digital ecosystem because a connected nation may transform a digital economy with more effective and convenient private and public sectors (Ubaydullaev, 2021). Furthermore, both individually and collectively, the digital economy is reshaping conventional transactions and enabling new ones (Stojanović et al., 2016).

There is a global consensus that governance approaches are required to appropriately balance potential advantages and risks of digitalization and maintain a sustainable digital economy (Yuan et al., 2021). Different perspectives and ideas have been presented on the appropriate governance techniques required to develop digitalized economies, govern the processes, and digitalization effects (Smirnova and Rudenko, 2017; Simangunsong et al., 2019; Ubaydullaev, 2021; Yuan et al., 2021). Sustainable development is still one of the most important concerns confronting the modern world. The rapid advancement of digital systems and their growing scale and complexity, new challenges for government and industry in promoting long-term digital growth, particularly in terms of recent work, responsible consumption, reduced inequalities, etc. outlined in the United Nations Sustainable Development Goals (Mickoleit et al., 2009; Thurik et al., 2019). It also seems like a major trend in environmental policy and economic growth (Linkov et al., 2018).

Moreover, good governance describes the process of public administration that optimizes public interests. One of its key characteristics is a type of collaborative administration of public life conducted by both citizens and the state and a new connection between civil society and the political State (MacDonald and Hasmath, 2020). To summarize all viewpoints on good governance, we can consider its six fundamentals: transparency, rule of love, legitimacy, accountability, effectiveness, and responsiveness (Mickoleit et al., 2009). Good governance can only be accomplished in a free and democratic political system since it is impossible to attain without them. Previous research studies have shown that individuals are happier with their lives in nations with higher levels of governance quality. Because good governance is an effective and constructive collaboration between citizens and the State, the foundation to its sustainability lies in authorities engaging in political administration (Linkov et al., 2018). Good governance is also an important component of effective economic policy since it contributes to the maintenance of an environment that promotes robust and equitable growth (MacDonald and Hasmath, 2020).

A reform movement is a social movement that seeks to modify or enhance specific elements of society progressively, and it does not advocate for drastic or fundamental improvements. While contrast, revolutionary movements attempt to transform society as a whole (Kondratiuk-Nierodzińska, 2016; Keping, 2018). Currently, China is one of the world's largest economies, with the largest economic scale and worldwide influence. The Chinese government is emphasizing the development model and efficiency of internal governance. Because for major countries, particularly for China, effective internal governance is the cornerstone of any foreign strategy, and the ultimate determinant of the former is the ability of the country to reform (Mansell, 2010; Nannestad et al., 2014; Ivanova et al., 2019). This study contributes to the literature by identifying elements for a sustainable digital economy and determining whether good governance can play a key role in achieving a sustainable digital economy. This study evaluated the mediating function of China's social reforms in understanding this relationship since reforms allow nations to achieve historic and great accomplishments and quick development and continual improvements of international status. Moreover, this paper has studied the mediating role of economic policies between good governance and sustainable economic policy for deeper understanding. Previous researchers have documented the role of economic policies in a different context, but in this context have never been studied before. Therefore, in this study, researchers understand the relationship between good governance and sustainable digital economy through the mediating role of social reforms and economic policy.

The remaining sections of this study are as follows: The second section discusses "Literature Review" on considered variables and the development of a hypothesis. The next third section is related to research "Methodology," which is employed to test the hypothesis. Fourth section is concerned with the "Interpretation" of our empirical study. The last fifth section, "Conclusion," concludes our results by offering future recommendations and implications.

LITERATURE REVIEW

Good Governance

Governance is the collection of all methods through which individuals and institutions, both public and private, manage their shared concerns (Avotra et al., 2021a). It is a continual process of balancing competing or divergent interests and taking coordinated action. It encompasses both official organizations and regimes with authority to compel compliance and informal agreements that individuals and institutions have agreed to or believe are in their best interests (Ott, 2011). It has four characteristics: governance is a process rather than a collection of rules or activity; the process of governance which is based on cooperation rather than control; it incorporates both the private and public sectors; and is not a formal institution but ongoing interaction (Okot-Uma and London, 2000). Essentially, governance is exerting authority to preserve order and addresses the demands of the general population within a set of parameters (Roblek et al., 2020; Dahwan and Raju, 2021). The goal of governance is to maximize the public interest through guiding, steering, and regulating actions of people via the use of various institutions and relationships. Good governance is defined as a commitment to democratic ideals, norms and practices, trustworthiness services, just and honest business, and the procedures and institutions that drive political and socioeconomic connections (Piątkowski and Binczyk, 2002; Nandal et al., 2021). According to United Nations, good governance has four principles: transparency, participation, consensus-oriented, the rule of law, effectiveness and efficiency, equity and inclusiveness, responsiveness, and accountability (Miller and Wilsdon, 2001; Fukuyama, 2013). Governance has

several meanings and is used in several contexts. However, there is broad agreement that governance is related to the evaluation of governing methods in which the borders between private and public sectors become blurred (Helliwell and Huang, 2008). Government tasks are increasingly regarded as more general, generic, social concerns that political institutions and other players may handle. The notion of governance envisions a move away from well-established concepts of top-down government approach to resolving societal challenges. Thus, good governance may enhance evaluations of life directly because individuals are happier living in a setting of excellent government or indirectly since good governance allows people to attain greater levels of something relevant to their wellbeing.

Social Reforms

A reform movement is a social movement that seeks to progressively modify or enhance specific elements of society (Kolosov et al., 2017; Glass and Newig, 2019; Estache and Foucart, 2021). A reform movement does not advocate for dramatic or fundamental reforms (Helliwell, 2014). Revolutionary movements, on the other hand, attempt to alter the whole society. Good governance influences the quality of citizen-government interactions and the quality of citizen-to-citizen interactions (Helliwell et al., 2014). One such method is by increasing social trust in general. Evidence from the literature (Cohen, 2004; Heeks and Alemayehu, 2009; Balcerzak and Bernard, 2017; Kyriacou et al., 2019) indicates that individuals live better lives in places where they believe and trust others, such as police, neighbors, coworkers, and strangers. The quality of governments entities, in turn, can enhance those views of trustworthiness (Howell et al., 2018). Countries can accomplish historic and great triumphs via social reforms, quick development, and continual improvements in global prestige (Frey and Stutzer, 2005).

Economic Policies

Governance is one of the main reasons for the disparities in performance between countries. The digital economy offers a plethora of options for economies to achieve more equitable growth. To make the most of digital technology, a free flow of data must be encouraged, backed up by a set of rules that meet other public policy goals. There are two types of digital technologies: information technology (IT) and communication technology (CT). Artificial intelligence (AI), robots, and machine learning are examples of information technology that speed up data processing, minimize the number of tasks, and provide concentration pressure for economic activity (An et al., 2021). The use of CT will also have significant consequences for the inclusivity mandated by the sustainable development goals. While platform providers demand highly skilled personnel, and users are not required to have such skills. CT makes information, communication, and economic possibilities more accessible (Frey and Stutzer, 2005; Helliwell et al., 2018). The policy system for data governance, on the other hand, is still in its infancy; it is undeveloped and scattered among nations. one underlying issue is that the logic of economic justification for actions is not clearly defined. Policies governing data flows and data-related companies are regulated by numerous ministries and organizations, with little to no coordination (Androniceanu et al., 2020).

Sustainable Digital Economy

Every country in the world is looking for ways to revitalize its economy, yet they all face huge challenges. Apart from many other sectors, the ICT industries have shown to be relatively robust throughout recent tumultuous times, as more individuals, businesses, and government have shifted their emphasis to the digital economy because it provides several benefits, such as low costs, speed of transactions, and international coverage (Lee et al., 2016; Roblek et al., 2020). High-and medium-growth enterprises have exceeded other sectors of the economy in terms of new business formation, share appreciation, and survival rates. The digital economy that includes digital skills and capital currently accounts for roughly 22.5% of the global economy. It still has a lot of room to grow and intertwine with the traditional economy (Cohen, 2004; Balcerzak and Bernard, 2017; Fogel and Etcheverry, 2019). The digital economy is characterized by integrating technology and the capacity to bridge the gap across digital, physical, and biological systems. It is commonly referred to as a digital information-based economy (Avotra et al., 2021a,b).

To be more precise, a digital economy encourages commodity circulation and the growth of the service industry through the interchange of digital information and online transactions. In the digitalization era, ICT tools provide a worldwide platform for individuals and organizations worldwide, allowing intercommunication and collaboration between various players (Ivanova et al., 2019). As a result, digital economy sustainability may be defined as actions that employ digital technologies creatively to meet sustainable development goals. Sustainable businesses have both self-interest and collection aims in mind, focusing on economic, environmental, and social objectives. Consequently, the influence of sustainability goals with digital technology has become essential in both corporate and governmental sectors (Paster, 2013; Naughton, 2014; Rotberg, 2014; Howell et al., 2018).

Good Governance Theory

Good governance theory is referred to as allocation and management of resources to address collective challenges, and it occurs when a state efficiently delivers excellent public goods to its inhabitants (Stojanović et al., 2016). This necessitates evaluating states in terms of the quality and quantity of public goods they give to citizens. Three key elements of good governance are efficiency, openness, and accountability. The capacity of government to provide predictability in policy and institutional environments is known as efficiency (Smirnova and Rudenko, 2017; Ubaydullaev, 2021). Efficiency aids in the prioritization of government services to align them with the requirements of citizens. Accountability entails making each individual responsible for their actions. It refers to responsibilities and duties associated with a certain institution in public administration. Good governance fosters gender quality, protects the environment, allows residents to express personal freedom, offers instruments to alleviate poverty, fear, deprivation, and creates a safe atmosphere free of violence

(Rothstein et al., 2012; Vishnivetskaya and Ablyazov, 2020; Xu et al., 2021). These principles enhance democratic institutions by ensuring frequent, free and fair elections, and a representative legislature, independent judiciary, and media (Rothstein and Eek, 2009; Urbaniec, 2015; Watanabe et al., 2018).

Good Governance and Social Reforms

Good governance influences not just the quality of citizen-government interactions but also the quality of citizen-to-citizen interactions. Enhancing social trust, in general, is one such method (Fernando et al., 2019). According to the previous research, people enjoy better lives where they believe and can trust others, such as police, coworkers, neighbors, and strangers. Individuals are happier living in a setting of excellent government; thus, good governance may enhance life evolution directly or indirectly since good governance allows people to reach greater levels of something else (Helliwell et al., 2014). The quality of government entities, in turn, can impact those views of trustworthiness. Furthermore, natural migration experiments from countries with the lowest to highest quality institutions show that improvement in institutional quality boosts social trust and that institutional differences outweigh cultural differences in analyzing social trust levels (Glass and Newig, 2019). Based on this discussion, the study proposes its hypothesis as follows:

H1: *Good governance leads to social reforms.*

Good Governance and Economic Policies

Good governance is a major concern in public administration management. This is evident, among other things, in high demand of individuals on state organizers, both in government, legislation, and court, to organize effective governance (Helliwell, 2014). Good governance is critical to establishing and maintaining an environment that promotes roust and equitable growth and is a necessary component of effective economic policy (Cohen, 2004). Good governance is defined as a commitment to democratic ideals, norms, practices, trustworthy services, and honest business as procedures and institutions that drive political and socio-economic connections (Balcerzak and Bernard, 2017). To avoid envisioning the internet as an abstract change agent, the study agenda should incorporate political economy, particularly state-business relations, as a crucial level of analysis, taking into account historical place of a country in global digital capitalism. Currently, governments are facing with the challenge of developing a highly competitive knowledge-based economy that would reduce the development gap with technologically advanced economies (Geels and Smit, 2000; Balcerzak and Pietrzak, 2016; Fogel and Etcheverry, 2019). The experience of certain countries that have achieved the status of developed economies in recent decades confirms that a technological leap forward is not feasible without policies and institutional reforms that establish a successful digital economy (Frey and Stutzer, 2005; Helliwell et al., 2018). Based on the above discussion, the study proposed the hypothesis as follows:

H2: *Good governance leads to favorable economic policies.*

Good Governance and a Sustainable Digital Economy

Digitalization has become prevalent in every economic sector and significant aspect of society, altering our daily lives, business models, and how we act and think in policy and practice. Hence Sustainable development is the consequence of quality and quantity transformation in the economic, social, and environmental spheres under the assumptions of efficient and effective space management (Heeks and Alemayehu, 2009; Vlasov et al., 2019; Yuan et al., 2021). Digital advances had both good and bad consequences on three pillars of sustainable development society, economy, and environment at each stage of evolution. The digital economy expanded more slowly during the crisis, but its future expansion is regarded as one of the elements that can assist nations in dealing with a crisis (Cohen, 2004; Helliwell, 2014). As a result, good governance is the most important requirement for fulfilling ambitions of an individual in accomplishing goals and values of the nation and state. In this scenario, the creation and execution of a clear, suitable, and sound system of accountability are required so that the government may be implemented efficiently, responsibly, collusion, successfully, free of corruption, and nepotism (Geels and Smit, 2000; Urbaniec, 2015; Balcerzak and Pietrzak, 2016; Watanabe et al., 2018). Based on this discussion, the study proposes its hypothesis as follows:

H3: *Good governance leads to a sustainable digital economy.*

Social Reforms and a Sustainable Digital Economy

The worldwide digital transformation has affected many different elements of the economy, society, and private lives of individuals. The core concept of a digital economy is that contemporary technology supports transmissions and processing of products, lifelong learning, services, and innovation in the framework of market globalization and sustainable development (Helliwell et al., 2014; Glass and Newig, 2019). Aside from economic and social implications, the environmental effect of the digital economy requires special consideration since it is an essential component of long-term growth. Ott (2011) argues that the digital economy is present in every significant sector of society. The political agenda should be reconstructed to include concerns about the digital economy's environmental effect. Rothstein and Eek (2009) illustrate that simplification of environmental impact studies results in unsuccessful technological futures. According to Geels and Smit (2000); Balcerzak and Bernard (2017), and Glass and Newig (2019), the digital economy alters the human-environment relationship through altering business paradigms. They promote the notion of the sustainable digital economy as a solution to environmental concerns. They examine the prospect of harnessing the creativity and energy of the digital economy for the benefit of the economy, society, and the environment. In general, digital technology has had a significant impact on value chain of nearly every industry. Based on this discussion, the study proposes its hypothesis as follows:

H4: *Social reforms lead to a sustainable digital economy.*

Economic Policies and Sustainable Digital Economy

The digital economy of apps and services has emerged as one of the world's most significant drivers today because the internet serves as a foundation for such a digital economy (Howell et al., 2018). From AI to cloud computing, the internet of things, new Web-enabled ICT applications are set to penetrate and change the economy and social life. In digitalization, ICT facilities provide a worldwide platform for individuals and organizations all over the world, allowing intercommunication and collaboration among various actors (Heeks and Alemayehu, 2009). As a result, digital economy sustainability may be defined as actions that attempt to achieve sustainability objectives through the creative application of digital technologies. Because China is growing dominantly, the Chinese government is consciously incorporating network connection and networked technologies into the main national economic restructuring agenda of the country (Piątkowski and Binczyk, 2002; Mansell, 2010; Kolosov et al., 2017).

Economic restructuring is defined as a deliberate shift from consumption based to an innovation-driven economy because a key state goal for China at a level that had never been seen after 2008. Economies develop such economic strategies to nurture more sophisticated labor divisions, build domestic consumption capacity, and stimulate innovation and company growth (Keping, 2018; Song et al., 2021). Based on the above discussion, the study proposed the hypothesis as follows:

H5: *Favorable economic policies lead to a sustainable digital economy.*

The Mediating Role of Social Reforms

Good governance influences the quality of citizen-government interactions and the quality of citizen-to-citizen interactions (Chen et al., 2020). Enhancing social trust, in general, is one such method. According to researchers, people enjoy better lives where they believe and can trust others, such as police, coworkers, neighbors, and strangers (Vlasov et al., 2019). The quality of governmental institutions can impact these trustworthiness judgments in turn. The contemporary world would be unimaginable without the widespread use of information technology, which has vastly improved the commercial operations of businesses while also improving the management system (Helliwell and Huang, 2008). As a result, a study in the subject of the digital economy is highly relevant since it examines a new path of economic theory and practices. The digital economy seems to be an activity in which the significant components in production are data presented in digital form, their processing and use in large volumes improve efficiency, quality, and productivity in various types of technology, storage, production, delivery, equipment, sale, and consumption of goods and services (Rothstein and Eek, 2009; Urbaniec, 2015; Watanabe et al., 2018). Since the end of the 20th century, the diffusion of digital technologies in the economy and society has resulted in a situation in which experts have begun to discuss the digital revolution, leading to scale and radical transitions of many aspects of business, providing tremendous opportunity, and penetrating all fields of the global economy (Stojanović et al., 2016; Howell et al., 2018; Ubaydullaev, 2021). Furthermore, digital platforms are frequently utilized in international practices to monitor and evaluate efficacy and efficiency of state agencies, particularly, in terms of monitoring and analyzing the quality of public services (Gnan and Masciandaro, 2020; Nandal et al., 2021; Yuan et al., 2021). The above discussion reveals that social reforms significantly mediate the relationship between good governance and a sustainable digital economy.

H6: *Social reforms mediate the relationship of good governance and a sustainable digital economy.*

The Mediating Role of Economic Policies

The governance framework is critical for transforming growth and welfare into long-term processes. As a result, the governance structure is critical for the growth, long-term development, and equitable income distribution. Governance is critical to societal wellbeing (Srivastava, 2009; Gnan and Masciandaro, 2020). Better-governed countries are wealthier, happier, and have fewer social and environmental issues. One of the major explanations for performance variations of countries is governance (Yang and Liu, 2016; Dhir et al., 2021). The efficiency of the public sector determines the effectiveness of various policy instruments. The digital economy offers many options for economies to achieve more equitable growth (Rothstein et al., 2012). To use digital technologies, a free flow of data must be encouraged, backed up by a set of rules that meet other public policy goals. Policies governing data flow and data-related companies, on the other hand, are still undeveloped and scattered among nations (Howell et al., 2018).

The larger multidisciplinary subject of information society and ICT policy highlights the perspective of developed nations conceiving ICTs as drivers of productivity, efficiency, and promoting the western paradigm of market-led technology spread. The digital economy has grown into a multibillion-dollar industry. The connections between digitalization and industrialization are mediated by economic policy, political economics, and social dynamics (Kolosov et al., 2017). To avoid abstractly viewing the internet as a change agent, the study agenda should incorporate a critical degree of examination of political economy, particularly state-business relations, while evaluating historical place of a country in global digital capitalism (Vlasov et al., 2019). Currently, governments face the challenge of developing highly competitive expertise economies that will narrow the infrastructure gaps with economies at the technology frontier (Kyriacou et al., 2019). The experience of certain countries that have achieved the status of advanced economies in recent decades confirms that a leap in technology forward is not feasible without policies and institutional changes that result in the establishment of a successful digital economy. This shows that the economic policies significantly mediate the relationship of good governance and a sustainable digital economy because countries mostly reform their economic policies to stabilize their

economic growth. Based on this discussion, this study proposed the hypothesis as follows:

H7: *Favorable economic policies mediate the relationship between good governance and a sustainable digital economy.*

Based upon the literature review, this research was designed, and the following conceptual framework (**Figure 1**) was developed. The research revolves around this.

METHODOLOGY

This study investigates the predictors of a sustainable digital economy through good governance and mediating roles of social reforms and economic policies in China. This study is cross-sectional, and a structured questionnaire was used to evaluate quantitative data. A total of 21 items were employed to develop a questionnaire for variable analysis.

The study used primary data sources, and data were collected via convenience random sampling. Researchers can obtain data from individuals who are easily available and willing to engage using convenience random sampling. Data for the survey were gathered from executives in e-commerce business of China. The total number of items will determine the sample size; hence, 317 responses will be used for analysis. A few demographic questions will be added to understand better responses, such as age, gender, education, experience, and job role. In this study, the data analysis approach was utilized partial least square–sequential equation modeling (PLS-SEM) in Smart-PLS 3.3.3. As a result, previous research measurements were used in this study to assess all the constructs of the current model.

Instrument Development

In this research, we developed a measuring scale for all these constructs using previous indications. The responses were rated using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). We have investigated the reliability and validity of all constructs by using confirmatory factor analysis (CFA) and exploratory factor analysis (EFA) analysis (PLS-algorithm) in Smart-PLS. We measured good governance through indicators used in a prior study (Afonso and Fernandes, 2006; Srivastava, 2009) and consist of five items. All the measurement items of social reforms were adapted from and seven items were chosen to measure social reforms (Okot-Uma and London, 2000; Miller and Wilsdon, 2001; Linkov et al., 2018). While this research made five items scale for economic policy based on previous research (Tsoukas and Papoulias, 1996; Simangunsong et al., 2019). Likewise, a sustainable digital economy is measured through indicators used in the previous studies (Kolosov et al., 2017; MacDonald and Hasmath, 2020) with four items. In total, 21 items were sued to measure four constructs in the current research model.

TABLE 1 | Demographics of the respondents.

Specification	Number	Percentage (%)
Gender		
Male	160	50.5
Female	157	49.5
Education		
Bachelor and below	48	15.1
Masters	178	56.2
Doctorate	54	17.0
Professional Diploma	37	11.7
Experience		
5 years and less	43	13.6
6–10 years	167	52.7
11–15 years	61	19.2
15–20 years	37	11.7
21 years and above	9	2.8
Job role		
CEO	28	8.8
Functional Manager	150	47.3
General Manager	139	43.8

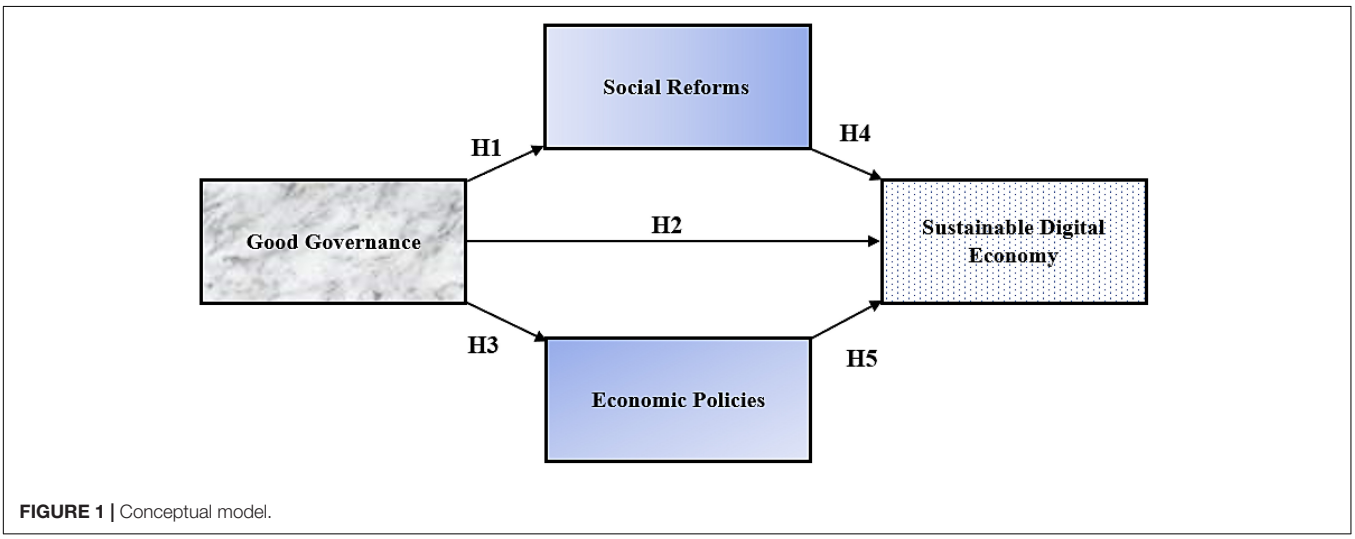

FIGURE 1 | Conceptual model.

DATA ANALYSIS

Table 1 shows a summary of respondents to whom data were gathered. After screening the data, a total of 317 samples have been used for the data analysis purposes; among them, 160 (50.5%) were male and 157 (49.5%) were female. Most of them held master's degree qualifications (56.2%) and the rest of them held bachelor's or below (15.1%), doctorate's (17.0%), and professional diplomas (11.7%), respectively. The sample-set covered managerial staff from diverse experience backgrounds of 5 years and less (13.6%), 6–10 years (52.7%), 11–15 years (19.2%), 15–20 years (11.7%), and 21 years and above (2.8%). Most of the respondents were functional and general managers of e-commerce companies, 47.3 and 43.8%, respectively; however, only 8.8% were CEO.

The descriptive statistics (mean and SD), reliability, and validity measures are illustrated in **Table 2**. Mean values for each construct fell between 3.920 and 3.748, and the SD fell between 1.020 and 1.091. This study used a five-point Likert scale; therefore, results fall within the range.

The measurement model was used to assess the reliability and validity and the data set of the constructs through convergent and discriminant validity. The outcomes of the measurement model are given in **Table 2** and **Figure 2**. The reliability of analysis access to what extent results are persistent and reliable over different scenarios. This study estimated the reliability of the constructs with Cronbach alpha and construct reliability (CR). Both Alpha and CR values fell above the minimum point of 0.70. Thus, the construct reliability is achieved. Factor loading above the minimum point 0.70 indicated the reliability of each measure in the construct; thus, no values below 0.70, and so measures reliability is also maintained. Talking about the convergent validity, all values of the average variance extracted should be not less than 0.50. As results indicated in **Table 2**, no value is below 0.50, confirming that convergent validity is attained.

TABLE 2 | Measurement model and descriptive statistics.

Constructs	Code	FD	Cronbach α	CR	AVE	M	SD
Good governance			0.91	0.933	0.735	3.843	1.020
	GG1	0.891					
	GG2	0.847					
	GG3	0.872					
	GG4	0.813					
	GG5	0.863					
Social reforms			0.912	0.93	0.657	3.748	1.050
	SR1	0.817					
	SR2	0.802					
	SR3	0.845					
	SR4	0.714					
	SR5	0.877					
	SR6	0.793					
	SR7	0.818					
Economic policies			0.891	0.92	0.699	3.92	1.084
	EP1	0.893					
	EP2	0.83					
	EP3	0.82					
	EP4	0.752					
	EP5	0.877					
Sustainable digital economy			0.899	0.93	0.768	3.8855	1.091
	SDE1	0.879					
	SDE2	0.879					
	SDE3	0.865					
	SDE4	0.882					

FD, factor loadings; CR, construct reliability; AVE, average variance extracted; α, Cronbach alpha.

The discernment validity is a source to measure the association or correlation between all variables. This study considered the criterion of Fornell and Larcker and the Heterotrait-Monotrait ratio. Fornell and Larcker ratio was accessed to find the discriminant validity where all diagonal values should be greater than the off-diagonal values. Values in bold illustrated in **Tables 3**, **4** show that the discriminant validity is achieved. Another measure is the heterotrait-monotrait (HTMT) ratio for discriminant validity. It measures the association between later variables with all other respective variables. The lower the value of HTMT describes, the higher the discriminant validity (**Table 4**).

The threshold for HTMT is 0.80 or 0.85, and values above 0.90 or near demonstrate the problem of discriminant validity. In the current research, all values are below 0.85. Therefore, the discriminant validity is maintained. All the measurements of discriminant validity confirmed the satisfactory discriminant validity in the data set.

The structural model assessment was followed to test the hypothesis or path analysis between constructs (**Figure 3**). To test the hypothesis's respective beta value (original sample), the *p*-value was considered. The analysis process took R^2 to assess how much the independent variable is changed due to independent constructs, and the Q^2 value accessed the predictive relevance of the model.

This study proposed seven hypotheses in total; among them five are direct and two are indirect. The first hypothesis confirmed a significant positive impact of good governance on a sustainable digital economy with $\beta = 0.146$; $p-$value $= 0.019$. Thus, *H1* meaningfully shows the sustainable digital economy. Good governance has positive impact on both the economic policies and social reforms under $\beta = 0.812$; $p-$value $= 0.000$ and $\beta = 0.830$; $p-$value $= 0.000$ respectively. Therefore, *H2* and *H3* were confirmed. Social reforms and economic policies have positive impact on sustainable digital economy under $\beta = 0.155$; $p-$value $= 0.009$ and $\beta = 0.618$; $p-$value $= 0.000$ respectively, thus *H4* and *H5* were accepted. In overview, all direct hypotheses were accepted. Results of the indirect hypothesis test confirmed that both mediating effects are accepted. Hypothesis six confirmed that social reforms partially mediate the relationship between good governance and sustainable digital economy with $\beta = 0.502$; $p-$value $= 0.000$. Likewise, economic policies partially mediate the relationship between good governance and a sustainable digital economy with $\beta = 0.129$; $p-$value $= 0.009$. Thus confirmed *H6* and *H7* (**Table 5**).

R^2 values range between 0.689, 0.766, and 0.659; these coefficients indicated that (68.9, 76.6, and 65.9%) changes

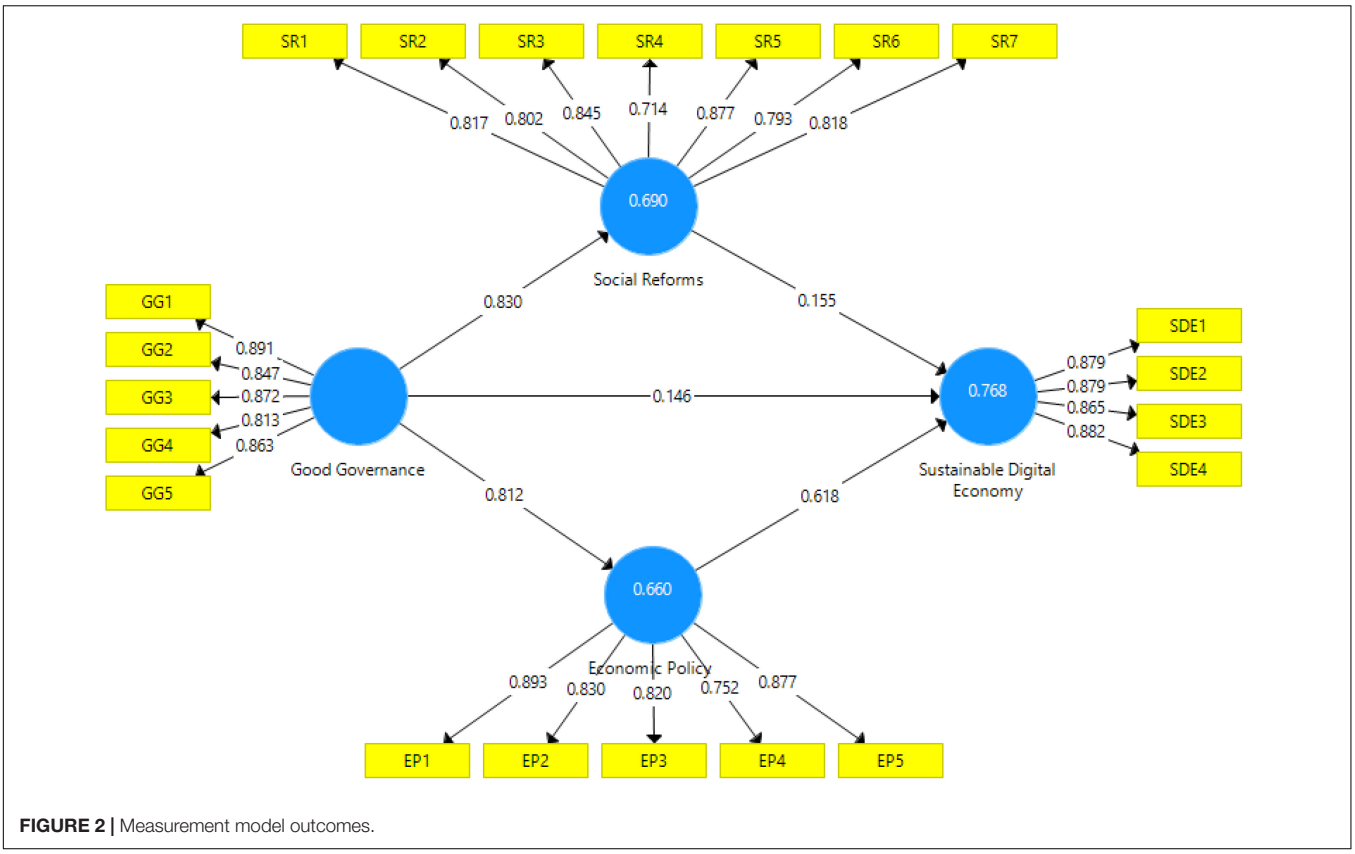

FIGURE 2 | Measurement model outcomes.

in independent variables (social reforms, sustainable digital economy, and economic policies) are due to independent constructs. Values for Q^2, such as 0.02, 0.15, and 0.35, are classified as the model's small, medium, and large predictive relevance. In short, the value for Q^2 should be positive and non-zero. The values of Q^2 (0.449, 0.584, and 0.457) confirmed a large predictive relevance of the model. Results for R^2 are represented in **Table 5** and for and Q^2 in **Table 5** and **Figure 4**.

DISCUSSION

Globalization and the digital economy have resulted in unprecedented growth in all corporate and public sectors and the emergence of a globally accessible market (Keping, 2018). Because a linked nation may change a digital economy with more effective and convenient private and public sectors, our study suggests that governments and private sectors must collaborate to develop a new digital ecosystem. The digital economy is altering traditional transactions and enabling new ones, both individually and collectively.

There is widespread agreement that governance mechanisms are required to correctly balance the potential benefits and hazards of digitalization while also ensuring the long-term viability of the digital economy (MacDonald and Hasmath, 2020). Therefore, this study offers several pathways for future improvements while focusing on economic policies and social norms. Various perspectives and ideas on the necessary governance strategies are required to establish digitalized

TABLE 3 | Fornell and Larcker criterion.

	Economic policy	Good governance	Social reforms	Sustainable digital economy
Economic policy	**0.836**			
Good governance	0.812	**0.857**		
Social reforms	0.813	0.830	**0.811**	
Sustainable digital economy	0.823	0.777	0.779	**0.876**

TABLE 4 | HTML ratio.

	Economic policy	Good governance	Social reforms	Sustainable digital economy
Economic policy	–			
Good governance	0.065	–		
Social reforms	0.840	0.711	–	
Sustainable digital economy	0.693	0.827	0.824	–

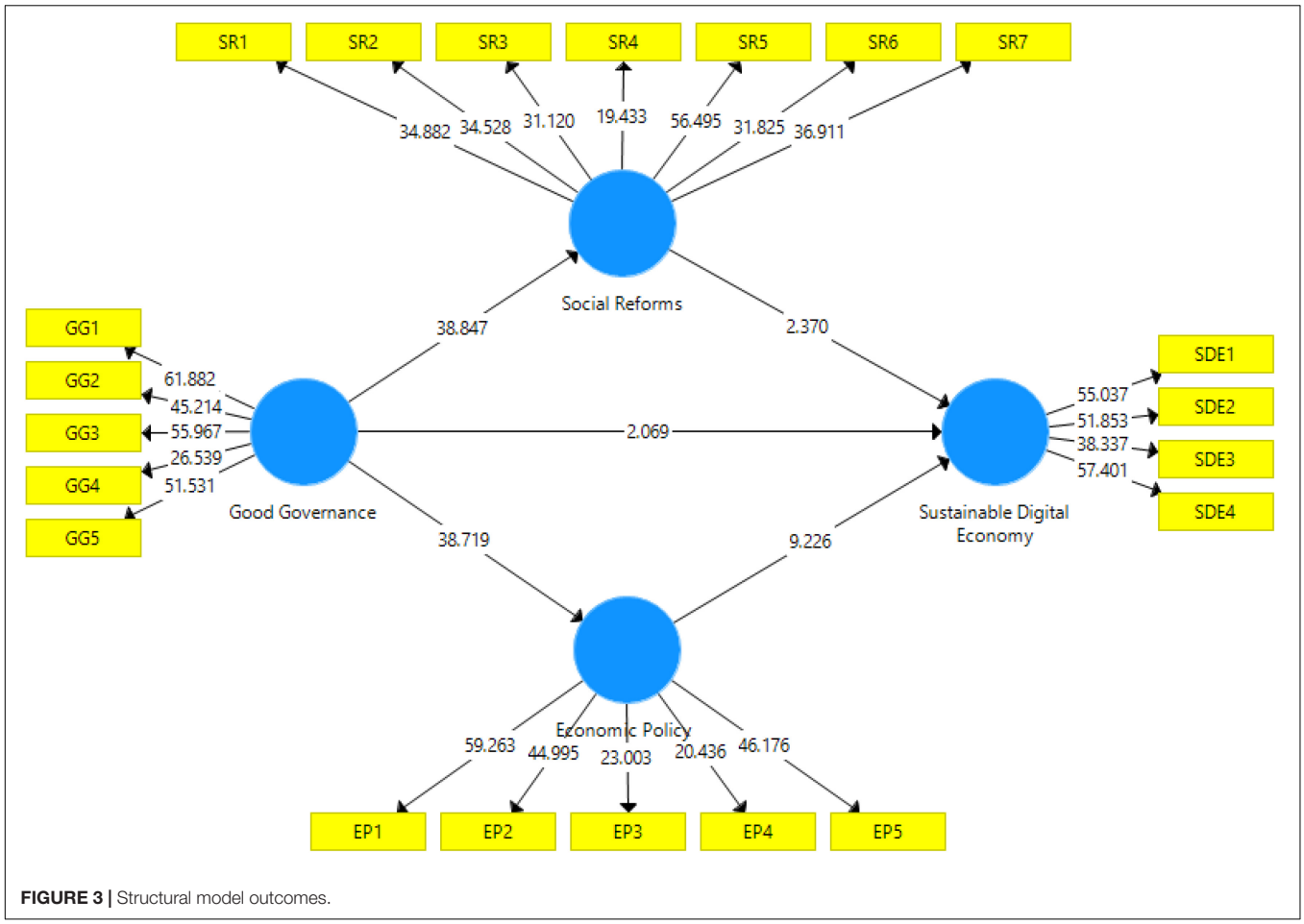

FIGURE 3 | Structural model outcomes.

TABLE 5 | Direct and indirect effects.

H.	Paths	O	M	STDEV	T Stats	*P* values	Results	Q2	R2
H1	GG → SR	0.830	0.831	0.021	38.847	0.000	Supported	0.449	0.689
H2	GG → SDE	0.146	0.145	0.071	2.069	0.019	Supported	0.584	0.766
H3	GG → EP	0.812	0.813	0.021	38.719	0.000	Supported	0.457	0.659
H4	SR → SDE	0.155	0.156	0.065	2.37	0.009	Supported		
H5	EP → SDE	0.618	0.619	0.067	9.226	0.000	Supported		
H6	GG →SR → SDE	0.502	0.503	0.059	8.577	0.000	Supported		
H7	GG → EP → SDE	0.129	0.13	0.055	2.362	0.009	Supported		

O, original sample or beta coefficient; M, sample mean; STDEV, standard deviation; H., hypothesis.

economies, manage the processes, and mitigate the repercussions of digitalization were suggested by the current model of research.

Current research outcomes are homogenous and heterogenous to the previous body of knowledge and add in previous research by identifying predictors of a sustainable digital economy and analyzing the role of good governance in achieving a sustainable digital economy in China. The findings of current research showed that good governance always positively enhances the emergence of a sustainable digital economy. These findings are novel because no such study has investigated the current mechanism in this research strand. Additionally, this study examined the mediating role of China's social reforms in comprehending this link and found that reforms enable states to make historic and significant achievements and rapid progress and continuous advances in the international stature of the economy. These research findings are well matched to the idea of Acheampong et al. (2018) and Chen et al. (2020). Additionally, this research investigated the mediating function of economic policies in the relationship between excellent governance and long-term economic policy. The outcomes of the current path are related to the previous body of knowledge. These studies have documented the role of economic policies in various contexts, but this is the first time it has been explored in this context. Social reforms and economic policies

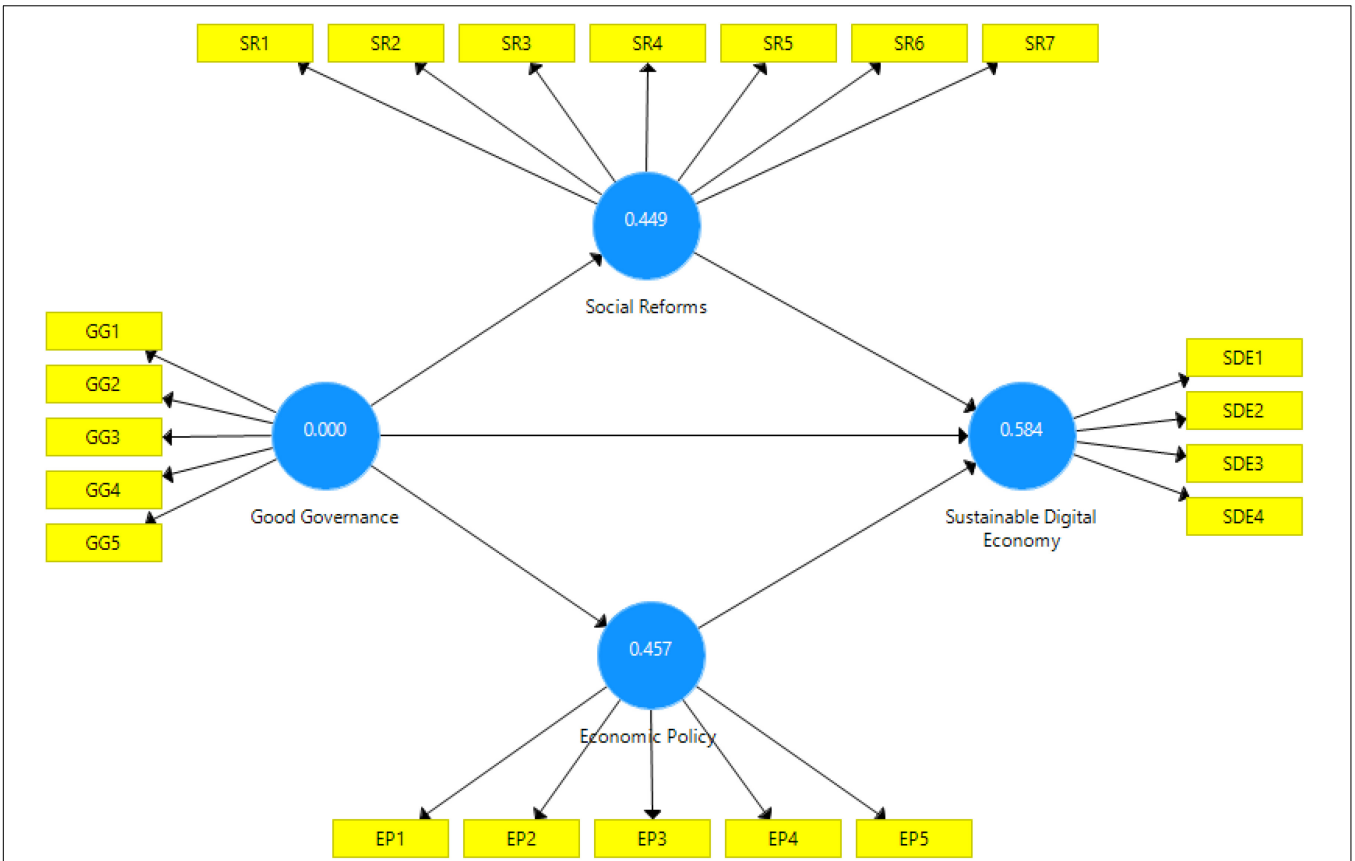

FIGURE 4 | Predictive relevance of the model.

partially mediate the direct linkage between good governance and a sustainable digital economy. In overview, findings suggest that policymakers and decision-makers should use the outcomes of this study, particularly, the mediating function of social reforms and economic policy, to understand better the relationship between good governance and a sustainable digital economy. Therefore, these forces can be a potential source to mediate the association between good governance and sustainable digital economy, hence important for policymakers to improve the sustainable digital economy considering the economic policies, such as monetary, fiscal, taxation, effective tax collections, development of manufacturing, privatization, and macroeconomic stability. The right fit of economic policies and social reforms and good governance can help China make the economy digitally sustainable.

CONCLUSION

There is widespread agreement that governance mechanisms are required to correctly balance the potential benefits and hazards of digitalization while also ensuring the long-term viability of the digital economy. Previous research is inclusive in concluding the predictors of a sustainable digital economy. Therefore, this study aims to look into the factors that influence the long-term viability of China's digital economy. In addition, the significance of social reforms and economic policies in mediating the relationship between good governance and a sustainable digital economy was studied. The analysis technique used in this cross-sectional study was PLS-SEM. The information was gathered from 317 e-commerce business executives in China. The outcome research found that good governance positively impacts long-term sustainability, social reforms, and economic policies of the digital economy. In addition, digital economy of China has become more sustainable due to increased social changes and economic policies. Social reforms and economic policies somewhat mediated the relationship between excellent governance and a sustainable digital economy. These findings point to several measures to boost China's digital economy's long-term sustainability. These dynamics can mediate the relationship between good governance and a sustainable digital economy, which policymakers must enhance.

This study has some limitations. Firstly, this study considered the mediating roles of social reforms and economic policies; however, a moderating effect is short in the model that may produce more insightful outcomes if added. Secondly, current research focuses on the e-commerce industry. Thus, data were collected from e-commerce. Therefore, current findings cannot be generalized for other sectors and industries. Another

contextual limitation is that the study is conducted in China. Therefore, country constraints are present in outcomes. Thirdly, the study is cross-sectional, and data were collected from a primary source (respondents). Individual responses are not as accurate as secondary data can be. Therefore, more research is called on using the secondary data in current research models. In addition, authors should segregate the individual mediating role of economic policies. A moderating role is missing in the current model. Thus, future research should add moderating role and investigate the current research model. Potential moderators can be economic conditions such as crisis periods or country inflation rates.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Xinjiang University, China.

AUTHOR CONTRIBUTIONS

TX conceived and designed the concept, wrote the manuscript. WQ collected the data and provided technical support. Both authors have read and agreed to the published version of the manuscript.

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REFERENCES

Acheampong, M., Yu, Q., Enomah, L. D., Anchang, J., and Eduful, M. (2018). Land use/cover change in Ghana's oil city: assessing the impact of neoliberal economic policies and implications for sustainable development goal number one–a remote sensing and GIS approach. *Land Policy* 73, 373–384.

Afonso, A., and Fernandes, S. (2006). Measuring local government spending efficiency: evidence for the Lisbon region. *Reg. Stud.* 40, 39–53. doi: 10.1080/00343400500449937

An, H., Razzaq, A., Nawaz, A., Noman, S. M., and Khan, S. A. R. (2021). Nexus between green logistic operations and triple bottom line: evidence from infrastructure-led Chinese outward foreign direct investment in belt and road host countries. *Environ. Sci. Pollut. Res* 28, 51022–51045. doi: 10.1007/s11356-021-12470-3

Androniceanu, A., Kinnunen, J., and Georgescu, I. (2020). E-government clusters in the EU based on the gaussian mixture models. *Administr. Manage. Public* 35, 6–20.

Avotra, A. A. R. N., Chengang, Y., Sandra Marcelline, T. R., Asad, A., and Yingfei, Y. (2021a). Examining the impact of E-government on corporate social responsibility performance: the mediating effect of mandatory corporate social responsibility policy, corruption, and information and communication technologies development during the COVID era. *Front. Psychol.* 12:4221. doi: 10.3389/fpsyg.2021.737100

Avotra, A. A. R. N., Chengang, Y., Wei, X., Ming, J., and Marcelline, T. R. S. (2021b). Struggling with business corporate cynical impression? Powerful methods of CSR to enhance corporate image and consumer purchase intention. *Front. Public Heal.* 9:1250. doi: 10.3389/fpubh.2021.726727

Balcerzak, A. P., and Pietrzak, M. B. (2016). Quality of institutions for knowledge-based economy within new institutional economics framework. Multiple criteria decision analysis for European countries in the years 2000-2013. *Econ. Sociol.* 9:66.

Balcerzak, P., and Bernard, M. P. (2017). Digital economy in visegrad countries. multiple-criteria decision analysis at regional level in the years 2012 and 2015. *J. Compet.* 9, 5–18.

Chen, B., Liu, T., Guo, L., and Xie, Z. (2020). The disembedded digital economy: social protection for new economy employment in China. *Soc. Policy Adm.* 54, 1246–1260. doi: 10.1111/spol.12603

Cohen, S. (2004). Social relationships and health. *Am. Psychol.* 59:676.

Dahwan, A. A. A., and Raju, V. (2021). The role of e-readiness rank on the implementation of E-government in military institutions in yemen. *Ann. Rom. Soc. Cell Biol.* 25, 1029–1043.

Dhir, S., Rajan, R., Ongsakul, V., Owusu, R. A., and Ahmed, Z. U. (2021). Critical success factors determining performance of cross-border acquisition: evidence from the African telecom market. *Thunderbird Int. Bus. Rev.* 63, 43–61.

Estache, A., and Foucart, R. (2021). On the political economy of industrial, labor and social reforms as complements. *Eur. Econ. Rev.* 137:103789.

Fernando, Y., Jabbour, C. J. C., and Wah, W.-X. (2019). Pursuing green growth in technology firms through the connections between environmental innovation and sustainable business performance: does service capability matter? *Resour. Conserv. Recycl.* 141, 8–20. doi: 10.1016/j.resconrec.2018.09.031

Fogel, D. S., and Etcheverry, S. (2019). "Economic and social reforms in the Czech and Slovak republics," in *Managing in Emerging Market Economies*, ed. Taylor & Francis Group (Routledge), 34–66. doi: 10.4324/9780429037580-2

Frey, B. S., and Stutzer, A. (2005). Happiness research: state and prospects. *Rev. Soc. Econ.* 63, 207–228.

Fukuyama, F. (2013). What is governance? *Governance* 26, 347–368. doi: 10.1111/gove.12035

Geels, F. W., and Smit, W. A. (2000). Failed technology futures: pitfalls and lessons from a historical survey. *Futures* 32, 867–885.

Glass, L.-M., and Newig, J. (2019). Governance for achieving the sustainable development goals: how important are participation, policy coherence, reflexivity, adaptation and democratic institutions? *Earth Syst. Gov.* 2:100031. doi: 10.1016/j.esg.2019.100031

Gnan, E., and Masciandaro, D. (2020). *Populism, Economic Policies and Central Banking: An Overview*. Vienna: SUERF Policy Note.

Heeks, R., and Alemayehu, M. (2009). Impact assessment of ICT-for-development projects: a compendium of approaches. *Dev. Informatics Work. Pap.* 36:162.

Helliwell, J. F. (2014). Social norms, happiness, and the environment: closing the circle. *Sustain. Sci. Pract. Policy* 10, 78–84. doi: 10.1080/15487733.2014.11908126

Helliwell, J. F., and Huang, H. (2008). How's your government? International evidence linking good government and well-being. *Br. J. Polit. Sci.* 38, 595–619. doi: 10.1017/s0007123408000306

Helliwell, J. F., Huang, H., Grover, S., and Wang, S. (2018). Empirical linkages between good governance and national well-being. *J. Comp. Econ.* 46, 1332–1346. doi: 10.1007/s11135-020-01015-4

Helliwell, J. F., Huang, H., and Wang, S. (2014). Social capital and well-being in times of crisis. *J. Happiness Stud.* 15, 145–162.

Howell, R., van Beers, C., and Doorn, N. (2018). Value capture and value creation: the role of information technology in business models for frugal innovations in Africa. *Technol. Forecast. Soc. Change* 131, 227–239. doi: 10.1016/j.techfore.2017.09.030

Ivanova, V. N., Poltarykhin, A. L., Szromnik, A., and Anichkina, O. (2019). Economic policy for country's digitalization: a case study. *Entrep. Sustain.* 7:649.

Keping, Y. (2018). Governance and good governance: a new framework for political analysis. *Fudan. J. Humanit. Soc. Sci.* 11, 1–8. doi: 10.1007/s40647-017-0197-4

Kolosov, V. A., Vendina, O. I., Gritsenko, A. A., Glezer, O. B., Zotova, M. V., Sebentsov, A. B., et al. (2017). Economic and social reforms in the North Caucasus: goals, limitations, problems, and results. *Reg. Res. Russ.* 7, 259–270. doi: 10.1134/s2079970517030029

Kondratiuk-Nierodzińska, M. (2016). New knowledge generation capabilities and economic performance of Polish regions. *Equilibrium. Q. J. Econ. Econ. Policy* 11, 451–471. doi: 10.12775/equil.2016.021

Kyriacou, A. P., Muinelo-Gallo, L., and Roca-Sagalés, O. (2019). The efficiency of transport infrastructure investment and the role of government quality: an empirical analysis. *Transp. Policy* 74, 93–102. doi: 10.1016/j.tranpol.2018.11.017

Lee, S., Oh, S. W., and Nam, K. (2016). Transformational and transactional factors for the successful implementation of enterprise architecture in public sector. *Sustainability* 8:456. doi: 10.3390/su8050456

Linkov, I., Trump, B. D., Poinsatte-Jones, K., and Florin, M.-V. (2018). Governance strategies for a sustainable digital world. *Sustainability* 10:440. doi: 10.3390/su10020440

MacDonald, A. W., and Hasmath, R. (2020). "How citizens order their political mind: contemporary ideology in China," in *Proceeding of the Southern Political Science Association Annual Conference*, (San Juan).

Mansell, R. (2010). The information society and ICT policy: a critique of the mainstream vision and an alternative research framework. *J. Information Commun. Ethics Soc.* 8, 22–41. doi: 10.1108/14779961011024792

Mickoleit, A., Reimsbach-Kounatze, C., Serra-Vallejo, C., Vickery, G., and Wunsch-Vincent, S. (2009). *The Impact of the Crisis on ICTs and their Role in the Recovery*. Paris: OECD Publishing.

Miller, P., and Wilsdon, J. (2001). Digital futures—an agenda for a sustainable digital economy. *Corp. Environ. Strateg.* 8, 275–280.

Nandal, N., Nandal, M. N., Mankotia, K., and Jora, M. N. (2021). Investigating digital transactions in the interest of a sustainable economy. *Int. J. Mod. Agric.* 10, 1150–1162.

Nannestad, P., Svendsen, G. T., Dinesen, P. T., and Sønderskov, K. M. (2014). Do institutions or culture determine the level of social trust? The natural experiment of migration from non-western to western countries. *J. Ethn. Migr. Stud.* 40, 544–565. doi: 10.1080/1369183x.2013.830499

Naughton, B. (2014). China's economy: complacency, crisis & the challenge of reform. *Daedalus* 143, 14–25. doi: 10.1162/daed_a_00269

Okot-Uma, R. W., and London, C. S. (2000). *Electronic Governance: Re-Inventing Good Governance*. London: Commonwealth Secretary-General, 5.

Ott, J. C. (2011). Government and happiness in 130 nations: good governance fosters higher level and more equality of happiness. *Soc. Indic. Res.* 102, 3–22. doi: 10.1007/s11205-010-9719-z

Paster, T. (2013). Business and welfare state development: why did employers accept social reforms? *World Polit.* 65, 416–451.

Piątkowski, J., and Binczyk, F. (2002). *Właściwości i Zastosowanie Odlewniczych Stopów Mg-Al*. Belgium: Autoregressive conditional heteroskedasticity, 2.

Roblek, V., Bach, M. P., Meško, M., and Bertoncel, T. (2020). Best practices of the social innovations in the framework of the e-government evolution. *Amfiteatru Econ.* 22, 275–302. doi: 10.24818/ea/2020/53/275

Rotberg, R. I. (2014). Good governance means performance and results. *Governance* 27, 511–518.

Rothstein, B., and Eek, D. (2009). Political corruption and social trust: an experimental approach. *Ration. Soc.* 21, 81–112. doi: 10.1177/1043463108099349

Rothstein, B., Samanni, M., and Teorell, J. (2012). Explaining the welfare state: power resources vs. the quality of government. *Eur. Polit. Sci. Rev.* 4, 1–28. doi: 10.1017/s1755773911000051

Simangunsong, F., Hutasoit, I., and Sentosa, I. (2019). A strategic framework of good governance, infrastructure development and community empowerment in Indonesian public sector management. *African J. Hosp. Tour. Leis.* GCBSS, 1–12. doi: 10.4324/9781315091532-1

Smirnova, N. V., and Rudenko, G. V. (2017). Tendencies, problems and prospects of innovative technologies implementation by Russian oil companies. *J. Ind. Pollut. Control* 33, 937–943.

Song, M., Zheng, C., and Wang, J. (2021). The role of digital economy in China's sustainable development in a post-pandemic environment. *J. Enterp. Inf. Manag.* doi: 10.1108/JEIM-03-2021-0153 [Epub ahead of print].

Srivastava, M. (2009). Good governance-concept, meaning and features: a detailed study. *Mean. Featur. A Detail. Study*. doi: 10.2139/ssrn.1528449 [Epub ahead of print].

Stojanović, I., Ateljević, J., and Stević, R. S. (2016). Good governance as a tool of sustainable development. *Eur. J. Sustain. Dev.* 5:558.

Thurik, R., Zwan, P., and Hoogendoorn, B. (2019). Sustainable entrepreneurship: the role of perceived barriers and risk. *J. Bus. Ethics* 157, 1133–1154. doi: 10.1186/s12913-016-1423-5

Tsoukas, H., and Papoulias, D. B. (1996). Understanding social reforms: a conceptual analysis. *J. Oper. Res. Soc.* 47, 853–863. doi: 10.1057/jors.1996.111

Ubaydullaev, G. Z. (2021). Improving regional socio-economic policies based on human capital management. *Psychol. Educ. J.* 58, 1166–1174. doi: 10.17762/pae.v58i2.2256

Urbaniec, M. (2015). Towards sustainable development through eco-innovations: drivers and barriers in Poland. *Econ. Sociol.* 8:179. doi: 10.14254/2071-789x.2015/8-4/13

Vishnivetskaya, A., and Ablyazov, T. (2020). "Improving state regulation of the digital transformation in the investment and construction sector," in *Proceeding of the IOP Conference Series: Materials Science and Engineering*, (IOP Publishing), 12001.

Vlasov, A. I., Shakhnov, V. A., Filin, S. S., and Krivoshein, A. I. (2019). Sustainable energy systems in the digital economy: concept of smart machines. *Entrep. Sustain.* 6:1975. doi: 10.9770/jesi.2019.6.4(30)

Watanabe, C., Tou, Y., and Neittaanmäki, P. (2018). A new paradox of the digital economy-structural sources of the limitation of GDP statistics. *Technol. Soc.* 55, 9–23. doi: 10.1016/j.techsoc.2018.05.004

Xu, G., Lu, T., and Liu, Y. (2021). Symmetric reciprocal symbiosis mode of China's digital economy and real economy based on the logistic model. *Symmetry (Basel)* 13:1136. doi: 10.3390/sym13071136

Yang, F., and Zhao, X. (2018). Policies and economic efficiency of China's distributed photovoltaic and energy storage industry. *Energy* 154, 221–230. doi: 10.1016/j.isci.2020.101867

Yang, K., and Liu, W. (2016). Studying the Chinese communist party in historical context: an interview with Yang Kuisong, October 17, 2015. *J. Mod. Chinese Hist.* 10, 67–86. doi: 10.1080/17535654.2016.1168175

Yuan, S., Musibau, H. O., Genç, S. Y., Shaheen, R., Ameen, A., and Tan, Z. (2021). Digitalization of economy is the key factor behind fourth industrial revolution: how G7 countries are overcoming with the financing issues? *Technol. Forecast. Soc. Change* 165:120533. doi: 10.1016/j.techfore.2020.120533

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The Nexus Between the Big Five Personality Traits Model of the Digital Economy and Blockchain Technology Influencing Organization Psychology

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The basic aim of the study was to understand the role of the Big Five model of personality in predicting emotional intelligence and consequently in triggering the entrepreneurial behavior of the employees. The emotional intelligence of the individuals plays a very important role in decision making, enhancement of quality of living, and many other social realms. Hence, the intelligent use of emotions can make or break an individual's future considering their attitude toward exploiting the entrepreneurial opportunities available. This study has measured the impact of personality traits on emotional intelligence and EI's role in digital entrepreneurial behavior. The population used in this study was the middle management employees in the corporate sector of the mainland in China. The sample size taken in this study was 260 and selected through convenient sampling. The data was collected through a structured questionnaire measuring each variable. The data collected was employed to SmartPLS 3.3 for analyzing through structural equation modeling to measure the hypotheses. The study has found the partial effect of the Big Five model of personality on emotional intelligence, which significantly predicted the digital entrepreneurial behavior of the employees. The organizations can use the study findings to anticipate the employees' possible prospects and endeavors regarding their digital entrepreneurial behaviors.

Keywords: Big Five model, organizational psychology, block chain technology, digital entrepreneur, digital economy

INTRODUCTION

In the 21st century, the rapidly changing environment's challenges and transitions in the workplace and society are becoming increasingly common. In this context, organizations are pushed to compete effectively and strive to provide a healthy environment where their employees can flourish. Hence, organizations prefer to hire those employees who can adapt and actively perform

in changing environments and eventually enhance corporate performance considering their will to make a decision where necessary and given the authority (Masten, 2014). Moreover, positive relationships of organizational employees improve the well-being of the workplace, which leads to sustainable organizations. Therefore, to identify competent employees at the workplace, organizations seek help from the Big Five personality trait model and their emotional intelligence.

Emotional intelligence has emerged as a potential platform and source for developing sustainable organizations (Di Fabio, 2017). Emotional intelligence encompasses intrapersonal knowledge of an individual, self-motivation, understanding of one's emotions and management of them, including interpersonal awareness of others' emotions and respect for their feelings (Chirumbolo et al., 2019). Emotional intelligence can explain some of the remaining variances in predicting work performance and career success, which traditional intelligence has not explained. Employees with high emotional intelligence are better at detecting stress-related feelings and regulating their emotions to decrease it. They can also design strategies to cope with the negative effects of stress. It can be argued that creating a pleasant workplace relational environment would undoubtedly help employees polish their attributes that contribute to their well-being and lead to the development of a sustainable organization through effective decision making.

Personality determines an individual's behavior and influences their performance at the workplace. The Big Five personality model characterized individual personalities and is globally the most acceptable personality model. Personalities of the individuals have been categorized into five major categories namely: agreeableness, openness, extraversion, neuroticism, and conscientiousness (Teh et al., 2011; Templer, 2012; Kaur and Anand, 2018; Abdellaoui et al., 2019; Dholariya, 2019). It has been acknowledged that key personality traits expressed in the Big Five personality model have a strong association with a wide range of human behaviors (Keefer et al., 2018). Employees with different personality traits behave accordingly; for example, extrovert employees are more active in workplace social networks while conscientious employees have more positive feelings about their workplace (Sutin et al., 2010).

Prior researchers have studied the relationship between Big Five personality traits and emotional intelligence in different contexts (Vesely et al., 2013; Di Fabio and Saklofske, 2014; Luz Martín-Peña et al., 2018; Herrera et al., 2019). These studies conclude that the Big Five personality model includes conscientiousness, agreeableness, openness, neuroticism, and extraversion strongly associated with emotional intelligence.

The main objective of this study is to examine the role of the Big Five model of personality in employees' emotional intelligence and its consequential role in the digital entrepreneurial behavior of the employees, which contributes to organizational success. This study aims to understand the fundamental questions related to the emotional intelligence of employees, such as:

i What is the role of the Big Five model of personality in emotional intelligence?

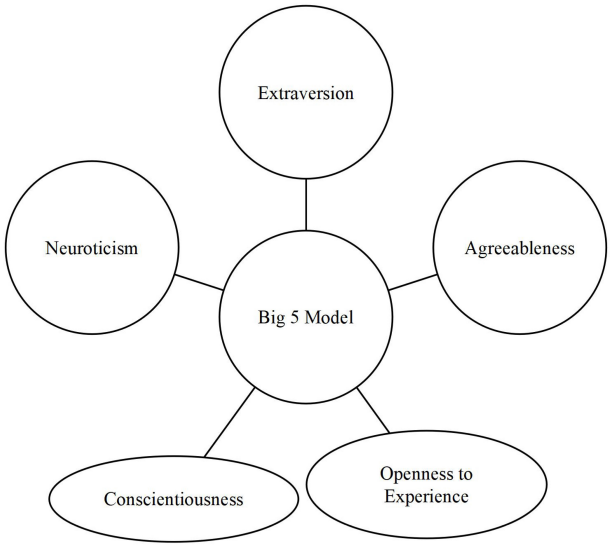

FIGURE 1 | Big Five personality traits model.

ii How does the emotional intelligence of the employees contribute to digital entrepreneurial behavior?

The current study will measure the role of Big Five personality traits in the employees' emotional intelligence working at the managerial level and how their emotional intelligence factor fosters their attitude toward entrepreneurial behavior. In the next sections of the paper, the literature of concerned variables is reviewed, followed by the methodology and data analysis. The paper is concluded with future recommendations and the limitations of the study.

LITERATURE REVIEW

Big Five Personality Traits

Personality traits are characterized as feelings, thoughts, and behaviors that tend to be constant across time and in a relevant context. Goldberg in 1993 proposed the Big Five personality comprehensive framework that encompasses a variety of personality characteristics that is globally accepted to understand the personality of humans (Teh et al., 2011; Baig and Waheed, 2016; Murugesan and Jayavelu, 2017; Kaur and Anand, 2018; Antoñanzas, 2020; Feher and Vernon, 2021). This model consists of five personality traits: consciousness, agreeableness, openness to experience, extraversion, and neuroticism, as given in **Figures 1**, **2**.

Figure 1 explains the five personality traits included in the Big Five models. A brief description of these traits is given below.

Conscientiousness

Conscientiousness is defined as an individual's willingness to accomplish a specific task, that is, to be dependent and persistent until the project is done (Murugesan and Jayavelu, 2017). Conscientious employees have the characteristics such

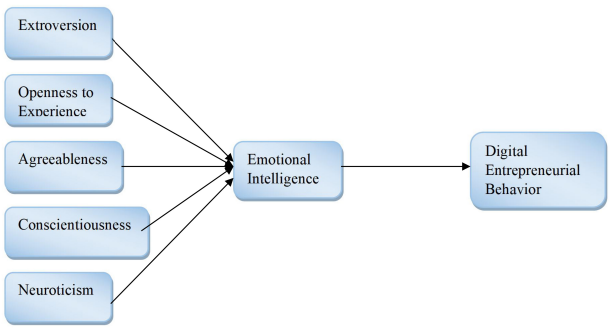

FIGURE 2 | Conceptual model.

as competence, organization, willingness, fight achievement, consideration, and self-discipline. Individuals with a high level of conscientiousness are more capable of weighing the pros and cons of a particular scenario (El Othman et al., 2020).

Agreeableness

Agreeableness describes nurturance, altruism, care, and emotional support, and it is also linked to being cooperative, trustful, tolerant, and forgiving (Digman, 2003). Friendly individuals have an emotional concern for the well-being of others, treat others with consideration for their rights and preferences, and usually have favorable opinions about others (Soto, 2019). Agreeableness positively impacts the intuitive and reliant decision-making styles (El Othman et al., 2020). Employees with a low level of agreeableness are aggressive, oppositional, manipulative, callous, and strong-willed (Shehzad et al., 2020, 2021). Agreeable employees are more motivated to establish an interpersonal connection which contributes to a higher level of well-being and satisfaction (Aydogmus et al., 2015).

Openness to Experience

Openness to experience is defined as more adventurous and open to experiencing new things, high on intellect and related to regularities that individuals find as an indicator of intelligence in others' lives. It is mostly linked to political ideas, cultural behavior, intelligence, and creativity (Schwaba et al., 2018). Openness to experience is associated with divergent thinking, intelligence, imagination, originality, and broad-mindedness (Cornwell et al., 2020). Employees with higher scores in this attribute show a need for diversity and unconventional values (McCrae and Costa, 2013).

Extraversion

Extraversion is associated with going out, socializing, and being friendly, talkative, and energetic (Arpaci et al., 2018). Extrovert individuals have more positive autobiographical experiences than neurotic individuals (Denkova et al., 2012). Individuals with a high level of extraversion traits are more capable of weighing the pros and cons of a particular scenario (El Othman et al., 2020). Extraversion has been identified as the main indicator of social behavior and had a favorable impact on spontaneous decision-making style (Soto and Tackett, 2015; Sarfraz et al., 2021). Highly extraverted employees are more friendly, sociable, outgoing, and they can understand their own and other's employees' emotions as compared to low extroversion Nawi (Hudani et al., 2012).

Neuroticism

Neuroticism is a personality trait that naturally reflects variations in positive and negative emotions (Soto, 2019). Anxiety, sadness, poor self-esteem, impulsivity, and mood fluctuations are mostly common traits among highly neurotic individuals. Therefore, neuroticism scores are predicted to be low in positive output behaviors (Murugesan and Jayavelu, 2017). Individuals having high neuroticism levels are more likely to adopt maladaptive techniques to control their emotions and are less likely to participate in reappraisal, and have more negative moods (Yoon and Barker Steege, 2013). Neurotic employees experience more negative life events, and such employees are more furious, depressed, embarrassed, and worried and more focused on the negativity around them (Magnus et al., 1993; Tong, 2010; Blackwell et al., 2017). These employees have a hard time expressing their feelings and understanding the behavior of the other employees in the organization (Aydogmus et al., 2015).

Emotional Intelligence

Emotional intelligence is defined as an individual's ability to access and describe his own and others' emotions accurately. To retrieve and generate feelings in the thinking process; more inclined to control and apply emotions in problem-solving processes (Salovey and Sluyter, 1997). In simple words, emotional intelligence encompasses both intrapersonal knowledge of oneself, self-motivation, awareness of one's own emotions and managing these emotions not only for themselves but also understanding and deciding to respect others feelings (Zampetakis et al., 2009; Aydogmus, 2016; Di Fabio and Kenny, 2016; Devries et al., 2018; Liébana-Presa et al., 2020). These characteristics of intra-interpersonal awareness enable one to acquire an in-depth understanding of relationships (Di Fabio and Kenny, 2016).

Emotional intelligence can explain some of the remaining variances in predicting work performance and career success which has not been explained by traditional intelligence. Employees with a high level of emotional intelligence are more likely to be satisfied with their lives, have stronger personal and social connections, and achieve professional success (Amdurer et al., 2014; Sony and Mekoth, 2016). Employee emotional intelligence is significantly linked with organizational success, such as performance and organizational commitment (Kafetsios and Zampetakis, 2008).

Digital Entrepreneurship

Digital entrepreneurship has been defined as the new start-up of a business to take risks in the hope of earning profits. In the last decade, physical things have been digitalized using social media, mobile services, clouds, big data, robotics, etc. (Elia et al., 2020). It has also helped the entrepreneurs to partner, collaborate, meet the demands, and develop new solutions and

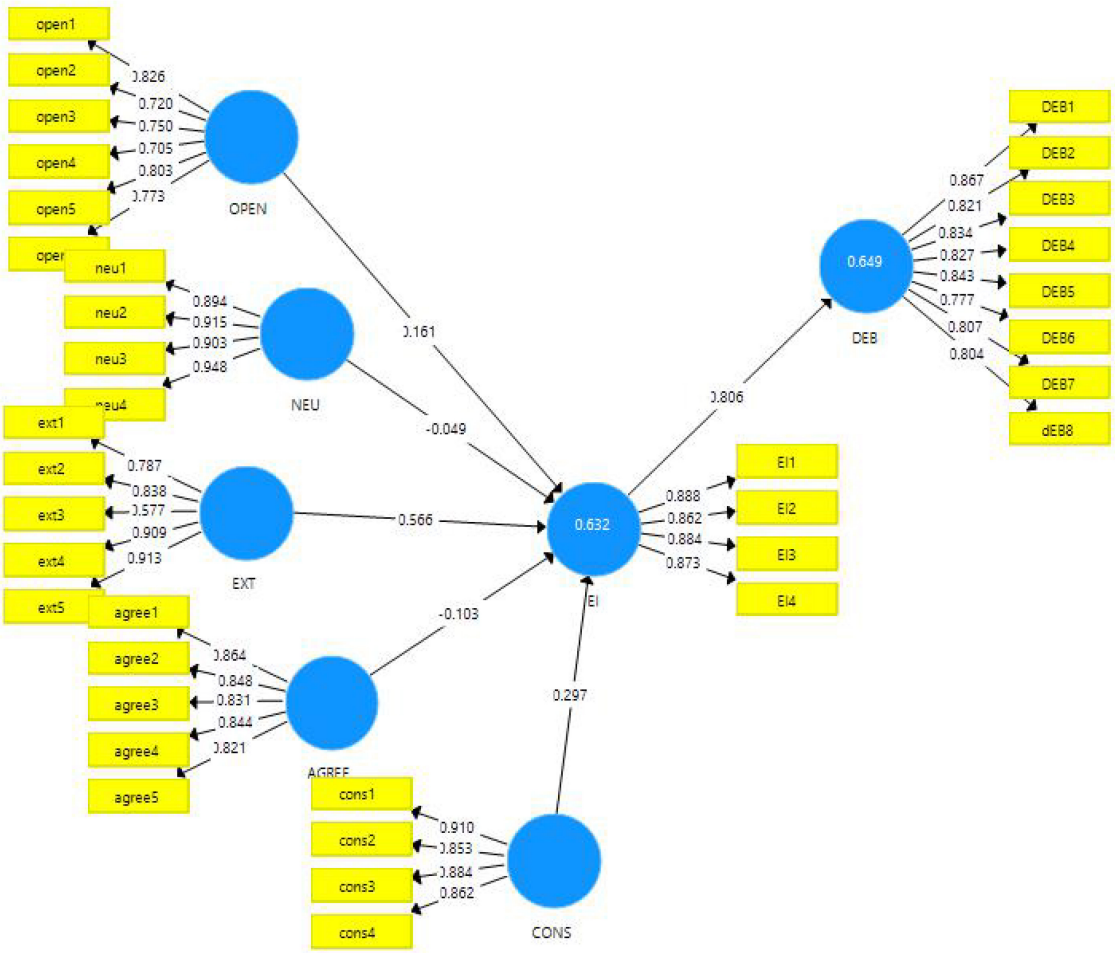

FIGURE 3 | Measurement model algorithm outcomes.

standards. This has given a new direction to entrepreneurial minds to exploit maximum opportunities with minimum resources (Obschonka et al., 2017; Elia et al., 2020). Previously many studies have been carried out from different perspectives to understand what personal and behavioral intentions of entrepreneurs distinguish them from ordinary people. Some factors that separate traditional entrepreneurs from digital entrepreneurs are easiness of entry, easiness of doing business, digital inventory, digital infrastructure, digital tools, and digital workplace (Taleghani et al., 2013; Elia et al., 2020).

Digital technologies have been a vital component in the start-ups of online businesses. Hence, it can be said that these novel technologies are the enablers for digital entrepreneurship. This makes the use of this platform for reaching new ventures and stakeholders like Netflix, meeting multidimensional demands like Uber, getting paid for work done online like Upwork and Fiverr (Elia et al., 2020). Using the Big Five model of personality to measure digital entrepreneurial intentions is suitable because previously, many studies have been conducted where Big Five models have yielded surprisingly accurate results (Back et al., 2010; Boyd and Pennebaker, 2016; Obschonka et al., 2017).

Emotional Intelligence and Big Five Personality Traits

Emotional intelligence is considered a predictor of the Big Five personality trait model (Avsec et al., 2009). The employees with higher scores on personality traits and emotional intelligence are more related to better task performance and managing emotions with others (O'Boyle et al., 2011). Prior literature reveals a strong association between emotional intelligence and Big Five-factor personality traits (Avsec et al., 2009; Aydogmus, 2016; Alghamdi et al., 2017; Antoñanzas, 2020; El Othman et al., 2020; Feher and Vernon, 2021).

Conscientiousness and Emotional Intelligence

Conscientiousness is the most important factor in emotional intelligence (Hudani et al., 2012; Aydogmus et al., 2015). Antoñanzas (2020) argued that conscientiousness has a positive correlation with emotional intelligence. According to the findings of Day et al. (2005), a strong relationship exists between emotional intelligence and conscientiousness. Individuals with

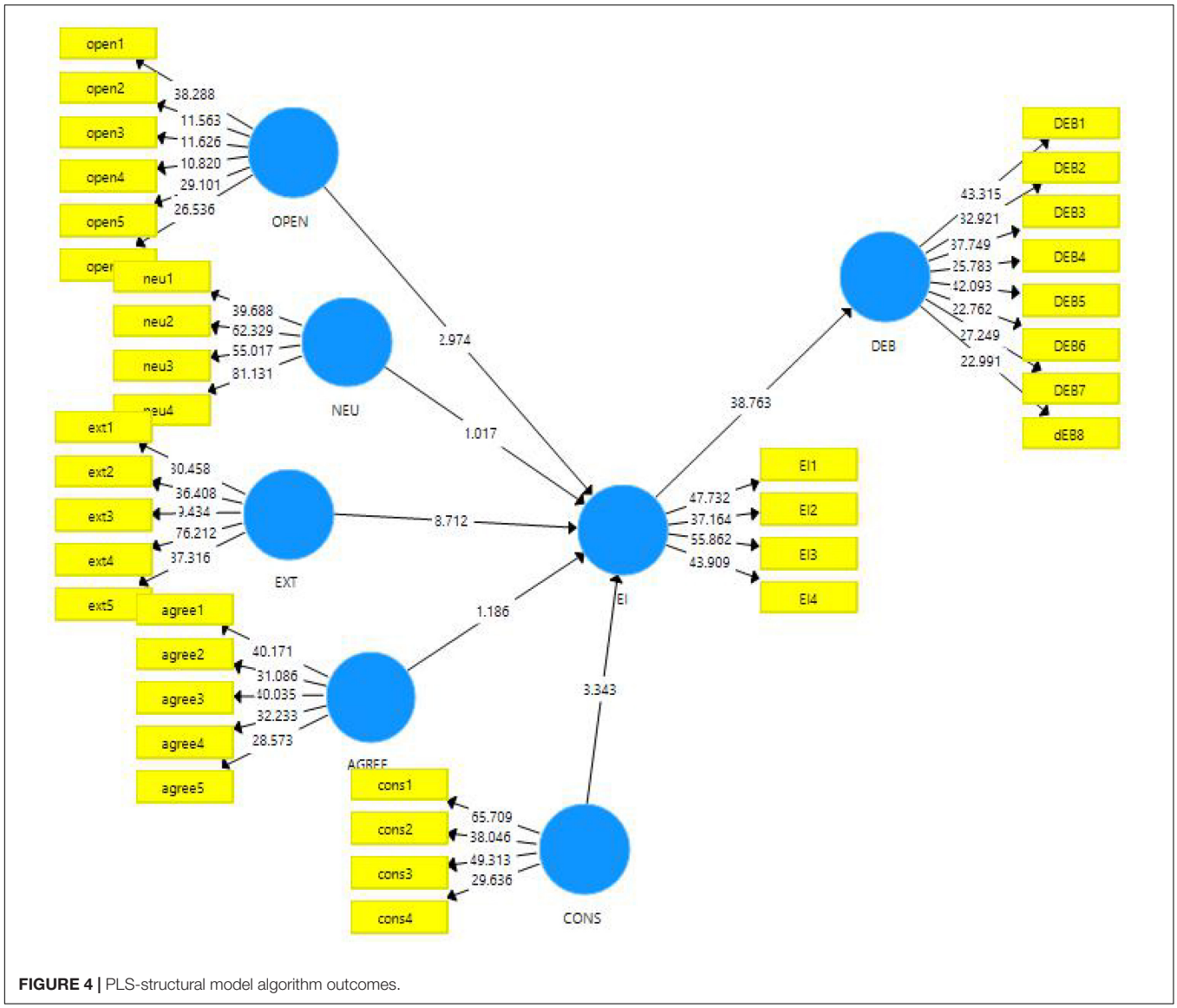

FIGURE 4 | PLS-structural model algorithm outcomes.

a high level of conscientiousness are more capable of weighing the pros and cons of a particular scenario (El Othman et al., 2020). The previously mentioned literature helps to develop the following hypothesis as follows:

> ***H_1:*** *Conscientiousness trait has a positive relationship with emotional intelligence.*

Agreeableness and Emotional Intelligence

Agreeable employees are more motivated to establish an interpersonal connection, which contributes to higher well-being and satisfaction (Aydogmus et al., 2015). Agreeableness captures differences in respect, love, and acceptance of others. Friendly individuals have an emotional concern for the well-being of others, treat others with consideration for their rights and preferences, and usually have favorable opinions about others (Soto, 2019). Agreeableness and emotional intelligence are significantly correlated with one another, highly agreeable employees are warm and are sensitive to others' wishes (Aydogmus, 2016; Jonason et al., 2017; Urquijo et al., 2019). The previously mentioned literature helps to develop the following hypothesis as follows:

> ***H_2:*** *The agreeableness trait has a positive relationship with emotional intelligence.*

Openness and Emotional Intelligence

Openness to experience is defined as the readiness of an individual to try out new things, high intellect, and related to regularities that individuals find as an indicator of intelligence in others' lives. It is mostly linked to political ideas, cultural behavior, intelligence, and creativity (Schwaba et al., 2018). Employees high in openness to experience are more inventive and aggressive in their search for new opportunities

(Strik et al., 2019). Openness to experience significantly affects employees' performance at the workplace, and people with high emotional intelligence are anticipated to achieve more success and contribute considerably to organizational performance (Carmeli et al., 2009). The previously mentioned literature helps to develop the following hypothesis as follows:

H_3: *Openness to experience has a positive relationship with emotional intelligence.*

Extraversion and Emotional Intelligence

Extraversion has been identified as the main indicator of social behavior and had a favorable impact on the spontaneous style of decision making (DeYoung et al., 2007). Extrovert individuals have positive autobiographical experiences as compared to neurotic individuals (Denkova et al., 2012). High extroversion employees are more friendly, sociable, outgoing, and they can understand their own and other's employees' emotions compared to low extroversion (Hudani et al., 2012). According to Day et al. (2005), a strong relationship exists between the people high on extraversion and more prone to making emotionally intelligent decisions. Based on the above literature, we propose our next hypothesis:

H_4: *Extraversion trait has a positive relationship with emotional intelligence.*

Neuroticism and Emotional Intelligence

Neurotic individuals are worried, depressed, and vulnerable, and they have a pessimistic outlook on life therefore, neuroticism scores are predicted to be low (Murugesan and Jayavelu, 2017). These employees have a hard time expressing their feelings and understanding the other employees' behavior in the organization (Aydogmus, 2016). Individuals with high neuroticism levels are more likely to adopt maladaptive techniques to control their emotions and are less likely to participate in reassessment and usually have more negative moods (Yoon and Barker Steege, 2013). Previous studies have described neuroticism as having a negative relationship with emotional intelligence (Sandhu et al., 2009). Neuroticism makes the least contribution to emotional intelligence and has no significant impact on emotional intelligence (Alghamdi et al., 2017). Based on the above discussion, we proposed our hypothesis as follows:

H_5: *Neuroticism trait has a negative relationship with emotional intelligence.*

Emotional Intelligence and Digital Entrepreneurial Behavior

The characteristic of an individual to understand the emotional behavior of others and their own self has been a key reason for success of such individuals (Di Fabio and Kenny, 2016). Previous research has examined that emotional intelligence is a strong forecaster of entrepreneurial behavior. However, personality traits have been an important constituent of entrepreneurial studies (Obschonka et al., 2017; Alexandru et al., 2019). An individual's confidence in his abilities to be successful in his tasks and intentions has also been a vital factor for their entrepreneurial achievements. Hence, emotional intelligence is predicted to make a significant role in digital entrepreneurial behavior.

H_6: *Emotional intelligence has a positive relationship with digital entrepreneurial behavior.*

RESEARCH METHODS

The current study follows the quantitative approach with the survey method for data collection. Since this study is about measuring the effects of personality traits mentioned in the Big Five model of personality on emotional intelligence and consequently on digital entrepreneurship behavior, the philosophy followed is post-positivist. The theories have been devised based on the literature, and hypotheses are formed to reach certain conclusions. Therefore, a deductive approach of research is followed. Further, the hypotheses were tested for their approval and rejection based on the data collected from the sample selected. The population frame used in this study was made up of student employees at middle-level management in the mainland in China. The data obtained were checked for reliability and validities and then further run on SmartPLS software 3.3. The results obtained were used to reach the acceptance and rejection of the hypotheses of the study, as given in **Figures 3**, **4**.

The sample was selected through convenience sampling because reaching out to all the population was not feasible considering a large strength of employees in the corporate sector. Hence, the sample size taken in this study was 260 which is considered a good sample size. We distributed the questionnaire to 292 employees and 260 were reliable to estimate the Structural Equation Modeling (SEM) analysis. The rest were screened out due to maintaining the reliability of the analysis. The unit of analysis is the employees from the corporate sector in the mainland in China. The data collection is done through a structured questionnaire and a survey technique was employed. The respondents were informed about the survey beforehand, appointments were taken, and the questionnaires were filled right away to avoid ambiguity in understanding items. All the measurements are considered from previously well-known and accepted studies. The data collected from the sample was then used in the SmartPLS software for the structural equation modeling.

Measurement Scale

This study considered measurement scales from earlier research for all the constructs to measure the concerned variables in the model. Overall, 24 items were used to measure the Big Five personality traits and emotional intelligence. The author considered a 24-item scale for each Big Five personality trait from Teh et al. (2011) and a four-item short-scale form (Marchena-Giráldez et al., 2021) to measure the emotional intelligence in this study and digital entrepreneurial behavior from Davidson and Vaast (2010). All the items were measured through a 5-point Likert Scale from (1 to 5) Strongly Agree to Strongly Disagree.

TABLE 1 | Demographic summary.

	Frequency	%
Gender		
Male	135	51.92
Female	125	48.07
Do you think personality traits are important?		
Yes	190	73.07
No	70	26.92
Which personality trait is more important in the Big Five?		
Consciousness	60	23.07
Agreeableness	65	25.00
Openness	65	25.00
Extraversion	10	3.86
Neuroticism	60	23.07
Does the big personality model describe individual behavior?		
Yes	225	86.53
No	35	13.46
Do you think, personality can alter emotional intelligence?		
Yes	200	76.92
No	60	23.07

N = 260.

TABLE 2 | Reliabilities and variance extracted.

Constructs	Code	FD	α	CR	AVE
Conscientiousness			0.900	0.931	0.770
	cons1	0.910			
	cons2	0.853			
	cons3	0.884			
	cons4	0.862			
Agreeableness			0.897	0.924	0.708
	agree1	0.864			
	agree2	0.848			
	agree3	0.831			
	agree4	0.844			
	agree5	0.821			
Openness to experience			0.872	0.893	0.584
	open1	0.826			
	open2	0.720			
	open3	0.750			
	open4	0.705			
	open5	0.803			
	open6	0.773			
Extraversion			0.867	0.906	0.663
	ext1	0.787			
	ext2	0.838			
	ext3	0.577			
	ext4	0.909			
	ext5	0.913			
Neuroticism			0.935	0.954	0.837
	neu1	0.894			
	neu2	0.915			
	neu3	0.903			
	neu4	0.948			
Emotional intelligence			0.900	0.930	0.769
	EI1	0.888			
	EI2	0.862			
	EI3	0.884			
	EI4	0.873			
Digital entrepreneurial behavior			0.932	0.944	0.677
	DEB1	0.867			
	DEB2	0.821			
	DEB3	0.834			
	DEB4	0.827			
	DEB5	0.843			
	DEB6	0.777			
	DEB7	0.807			
	DEB8	0.804			

N = 260.

ANALYSIS AND RESULTS

This analysis is based on the SEM, a two-stage estimation in Smart Partial Least Square (SmartPLS). The SEM analysis has two sequential steps, including estimating the measurement model and structural model. Both of these steps share different purposes. Measurement model estimation aims to estimate the reliability and validity of constructs and the items. This step also usually has the measurements of convergent validity and discriminant validity. The reliability, convergent validity, and discriminant validity are measured through Cronbach alpha and construct's reliability, AVE values, factor loadings, Fornell and Larcker ratio, and HTMT ratio. This step helps the estimation process to analyze the reliability of constructs that are in the research model. The summary of demography is mentioned in **Table 1**.

Table 1 illustrates the summary of respondents in this research. The questionnaire of the research included four demographical questions. Overall, the outcomes of empirical details demonstrated that males and females have equally participated in the survey thus, there are no such biases in the outcome of the research, which are 48 and 52%, respectively. Moreover, around 73% of respondents believe that the Big Five personality traits are important to understand the personality and its effect on emotional intelligence.

The first stage of SEM analysis is the measurement model. This study considered the Cronbach alpha and Construct Reliability (CR) to estimate the reliability of all constructs in the model. All the values of Cronbach alpha and CR are above the threshold of 0.70 (Huo et al., 2020; Lia et al., 2020). Thus the reliability of all six constructs is satisfied thus reliable to use. The factor loadings measure the items or individual measurements reliability to measure the distinct construct, and it must be greater than 0.70 (Hair et al., 2017). Thus all items of each contract are above the threshold thus, items are reliable. Afterward, the AVE values are also above the threshold of 0.50 (Hair et al., 2017) and all values above 0.50 demonstrated the discriminant validity. Thus, the convergent validity is maintained, and all constructs and their items are reliable and converted to measure the construct. All the outcome coefficients are illustrated in **Table 2**.

However, respondents believe that all big traits are equally important, but the extraversion trait is found less important

based on the respondent's details. Afterward, more than 86% of people believe that these five traits describe individuals' overall behavior, and 75% respond that these traits can alter individuals' emotional intelligence. Secondly, the structural model assessment estimated the causal relationship between the variables in this case; this stage will produce the statistical significance of paths or relationship between the Big Five personality traits and emotional intelligence. This study considered SmartPLS 3.3.3. on 5000 sub-sample in algorithm and bootstrapping estimation stages.

The discriminant validity is measured through the Fornell and Larcker criterion of correlation and the HTMT (Heterotrait-Monotrait) Ratio (Hair et al., 2017). Both measures are used to measure the discriminant validity of the constructs. These two tests are used to measure if there is any case of multicollinearity. If the values of the HTMT ration (according to Franke and Sarstedt, 2019) are below 0.90, these results indicate that the variables in the study are discriminantly valid and do not have any impact on each other. Since this study showed all the diagonal values above the below values, the discriminant validity is maintained, and it showed that there is no such issue of higher correlation. It implies that items of concerning variables cannot discriminate with each other thus are unable to satisfy the discriminant validity. The results for Fornell and Larcker criterion were illustrated in **Tables 3**, **4**.

The second part of the analysis measured the structural model assessment. The structural model assessment is related to the understanding of the casual relationship. Structural models are validated by computing beta (β), R^2, and corresponding *t*-values using a bootstrapping methodology based on a 5000 resampling. The structural model assessment results are illustrated in **Table 5**. Start with the first hypothesis (H_1) the agreeableness does not predict the emotional intelligence with $t - statistic = 1.186$ thus H_1 confirmed statistically insignificant relationship. Secondly, the second trait of the Big Five models is consciousness. Consciousness meaningfully predicts emotional intelligence as consciousness has a positive significant impact on emotional intelligence under $t - statistic = 3.343 : p - value = 0.000$ therefore H_2 is also confirmed. Thirdly, the extraversion trait also meaningfully predicts the emotional intelligence among employees as the *p*-values and *t*-statistics imply a significant relationship between these constructs as $t - statistic = 8.712 : p - value = 0.000$ so H_3 is also accepted. Fourth, the H_4 was rejected since it did not demonstrate that neuroticism does not have a significant positive impact on emotional intelligence as $t - statistic = 1.017 : p - value = 0.310$. Finally, the last trait, openness also demonstrated a positive and significant impact on emotional intelligence as $t - statistic = 2.974 : p - value = 0.003$. Emotional intelligence also showed the most powerful impact on digital entrepreneurial behavior $t - statistic = 38.763 : p - value = 0.000$ thus accepting the mediating role of emotional intelligence H_6.

DISCUSSION

Big Five personality traits are a source of emotional intelligence these days (Di Fabio and Saklofske, 2021). This study has explored the exogenous effect of the Big Five personality traits model on employees' emotional intelligence in Chinese settings. The Five – factors personality theory provides a straightforward framework for comprehending others and enhancing relationships by understanding why individuals behave the way people do. Several psychologists now consider that the five personality traits are biologically based as well as universally accepted. These personal attributes represent the most significant elements that define our social environment. The discussion part compares and contrasts the findings of the current study with the earlier literature. Therefore, the below discussion emphasizes the current findings of research with previous literature.

This study considered the parallel relationship from Kappagoda (2013). The study's findings and interpretations are based on the measurement and structural models obtained from the structural equation modeling. As a preliminary step, the data obtained from the respondents were checked for reliability. The reliabilities obtained in this study were above 0.8, and the AVE for the variables was above the cut-off value of 0.5 (Sarstedt et al., 2019). Similarly, the Fornell and Larcker criterion and HTMT ratios gave the values that meet the acceptability criteria for these two tests (see **Tables 3**, **4**). The hypotheses of the study developed from the literature were measured using the path model. The results obtained can be seen in **Table 5**.

Overall, this research demonstrated that out of five personality traits, three personality traits demonstrated a positive association with emotional intelligence, however, previously it has been found that emotional intelligence also meaningfully correlated with the Big Five personality traits (Avsec et al., 2009; Aydogmus, 2016; Boyd and Pennebaker, 2016; Obschonka et al., 2017; Antoñanzas, 2020; El Othman et al., 2020). Day et al. (2005) concluded that emotional intelligence has a significant association with extraversion, openness, and agreeableness in particular, and no significant association was found between neuroticism and consciousness. The previous research findings strongly defend and strengthen our research findings because few personality traits may not have a significant relationship with emotional intelligence as in current authors found a non-significant association of agreeableness and neuroticism with emotional intelligence. This factor may be prevailed due to different cultural aspects, values, and norms thus produced different results.

According to the best of our knowledge, this study is the first to consider the direct effect of the Big Five personality traits individually on emotional intelligence as mediating variable and digital entrepreneurship as the dependent variable. This study investigated the direct effect of the Big Five personality traits (extraversion, openness, agreeableness, neuroticism, and consciousness) on employees' emotional intelligence in Chinese settings. If seen individually, agreeableness could not find significant results in this study which is in contradiction with the previous studies (Aydogmus, 2016; Jonason et al., 2017; Soto, 2019; Urquijo et al., 2019) this is because people higher on agreeableness tend to please others as much as they can which drives them away from their emotional intelligence (Obschonka et al., 2017). The first rejected hypothesis implies that emotionally less intelligent employees can agree with people's

TABLE 3 | Fornell and Larcker criterion.

	AGREE	CONS	DEB	EI	EXT	NEU	OPEN
AGREE	0.842						
CONS	0.881	0.878					
DEB	0.648	0.665	0.823				
EI	0.564	0.605	0.806	0.877			
EXT	0.597	0.600	0.879	0.764	0.814		
NEU	0.209	0.190	0.212	0.286	0.387	0.915	

N = 260.

TABLE 4 | HTMT ratio.

	AGREE	CONS	DEB	EI	EXT	NEU	OPEN
AGREE							
CONS	0.909						
DEB	0.710	0.721					
EI	0.623	0.669	0.874				
EXT	0.666	0.669	0.654	0.855			
NEU	0.228	0.207	0.229	0.311	0.680		
OPEN	0.483	0.418	0.589	0.549	0.480	0.686	

N = 260.

TABLE 5 | Direct effects.

H.	Paths	O	M	STDEV	*t*-Stats	*p*-Values	R^2
H1	AG → EI	−0.103	−0.099	0.086	1.186	0.236	0.624
H2	CON → EI	0.297	0.297	0.089	3.343	0.001	
H3	EX → EI	0.566	0.563	0.065	8.712	0.000	
H4	NE → EI	−0.049	−0.047	0.048	1.017	0.310	
H5	OP → EI	0.161	0.161	0.054	2.974	0.003	
H6	EI → DEB	0.806	0.808	0.021	38.763	0.000	0.648

N = 260.
H., hypothesis; O, original sample; M, sample mean, STDEV, standard deviation.

opinions on different points and fail to manage their own emotions compared to those who are high on the power of acceptance and agreeableness. As for conscientiousness, it has found significant results regarding their positive impact on emotional intelligence, which is in adherence with the studies conducted in the past (Day et al., 2005; Hudani et al., 2012; Aydogmus et al., 2015; Antoñanzas, 2020; El Othman et al., 2020). Secondly, the conscientiousness of employees tend to have a thoughtful mind, mindful and much organized than unconscious employees son the workplace. Therefore, people those have consciousness personality trait often are emotionally intelligent and protectively manage their work activities.

Furthermore, extraversion also found a significant positive impact on emotional intelligence, supported by the past findings of Day et al. (2005). Extraversion may not influence emotional intelligence in Chinese settings. It may be because of the introverted personalities of Chinese employees. This fact is also demonstrated in demographic details that extraversion may not be an important personality trait according to respondents. Neuroticism in this study could not find significance in emotional intelligence. These findings follow (Sandhu et al., 2009; Alghamdi et al., 2017) because negative vibes do not add to the emotional intelligence but rather wear off. The positive association of neuroticism with emotional intelligence describes that Chinese employees are experiencing a lot of stress. Lastly, the finding regarding the openness to experience have also been aligned with the past research of Carmeli et al. (2009) who found that individuals with high openness to experience are more prone to emotional intelligence. Finally, the openness also demonstrated a positive association that meaningfully explains that employees are open to learning new skills and competence are emotionally intelligent. Therefore, employees with these traits are emotionally intelligent and effective at the workplace (Kappagoda, 2013; Antoñanzas, 2021; Di Fabio and Saklofske, 2021). The last hypothesis of the study about emotional intelligence playing a role in digital entrepreneurial behavior has been in line with the past researches (Obschonka et al., 2017; Elia et al., 2020) who found that emotional intelligence has been a key contributor to the entrepreneurial activities and behaviors of individuals. This is because the individuals higher on EI tend to appear stronger

for decision making and hence contribute to the entrepreneurial activities. The ultimate interest of this study was to check the role of emotional intelligence in bridging the relationship of personality traits and the digital entrepreneurial behavior. There have been very less studies considering the changing demands of the entrepreneurship taking into account the emotional intelligence. Hence, this study has tried to empirically check these relationships among the variables of interest. It has been found that emotional intelligence very significantly and strongly predicts the digital entrepreneurial behaviors. The findings of this study endorse the previous studies (Zampetakis et al., 2009; Taleghani et al., 2013; Obschonka et al., 2017).

CONCLUSION

The Big Five personality model has been found to have great significance in improving emotional intelligence of individuals. This study has investigated the relationship between the Big Five personality traits and the emotional intelligence and consequently on the entrepreneurial behaviors among employees in China. The study has found a partial role of Big Five model of personality on emotional intelligence not finding significant results for agreeableness and neuroticism. Moreover, emotional intelligence has positively and significantly predicted the digital entrepreneurial behavior of employees in China. The results signify the importance of exploiting opportunities available to the middle-level employees in progressing in their fields. These findings are important for human resource specialists and other top management stakeholders to understand the employee's behavior. The results suggest that employees in the China should be given opportunities according to their job descriptions to exploit their full potential. Moreover, it also highlights the potential importance of personality traits in terms of emotional intelligence because it supports employees in effectively managing work activities at the workplace.

Limitations and Future Research

This research has few research limitations. Firstly, this study is a cross-sectional study; thus, more research is required in longitudinal nature in the current scenario to collect more data on the said variables and produce more comprehensive results in understanding employees' aptitude in organizations regarding their emotional intelligence and prospects of entrepreneurship. Moreover, this research is conducted in China thus, a clear representation of Chinese cultural settings can be observed in the research outcomes. But these findings are based on a single culture (Chinese), and country constrained; therefore, more research is required to generalize these findings in different emerging or developed countries like Pakistan or the United States. Moreover, moderating variables such as organizational support can be used in future studies to understand better the model proposed in this study.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

Ethical approval for this study and written informed consent from the participants of the study were not required following local legislation and national guidelines.

AUTHOR CONTRIBUTIONS

YD and AA: initial draft and methods. SC and PC: revision and supervision. AN and MH: analysis and interpretation. All authors contributed to the article and approved the submitted version.

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REFERENCES

Abdellaoui, A., Chen, H. Y., Willemsen, G., Ehli, E. A., Davies, G. E., Verweij, K. J. H., et al. (2019). Associations between loneliness and personality are mostly driven by a genetic association with Neuroticism. *J. Pers.* 87, 386–397. doi: 10.1111/jopy.12397

Alexandru, G., Corina, G., and Ali, K. (2019). The interaction between the "green" and "digital" economy. *J. Res. Trade Manag. Econ. Dev.* 6, 57–70.

Alghamdi, N. G., Aslam, M., and Khan, K. (2017). Personality traits as predictor of emotional intelligence among the university teachers as advisors. *Educ. Res. Int.* 2017, 1–6. doi: 10.1155/2017/9282565

Amdurer, E., Boyatzis, R. E., Saatcioglu, A., Smith, M. L., and Taylor, S. N. (2014). Long term impact of emotional, social and cognitive intelligence competencies and GMAT on career and life satisfaction and career success. *Front. Psychol.* 5:1447. doi: 10.3389/FPSYG.2014.01447

Antoñanzas, J. L. (2020). The relationship of personality, emotional intelligence, and aggressiveness in students: a study using the big five personality questionnaire for children and adults (BFQ-NA. *Eur. J. Invest. Health Psychol. Educ.* 11, 1–11. doi: 10.3390/EJIHPE11010001

Antoñanzas, J. L. (2021). The relationship of personality, emotional intelligence, and aggressiveness in students: a study using the big five personality questionnaire for children and adults (bfq-na). *Eur. J. Invest. Health Psychol. Educ.* 11, 1–11.

Arpaci, I., Baloğlu, M., and Kesici, Ş (2018). The relationship among individual differences in individualism-collectivism, extraversion, and self-presentation. *Pers. Individ. Dif.* 121, 89–92. doi: 10.1016/j.paid.2017.09.034

Avsec, A., Takšić, V., and Mohorić, T. (2009). The relationship of trait emotional intelligence with the big five in croatian and slovene university student samples. *Horizons Psychol.* 110, 99–110.

Aydogmus, C. (2016). How to satisfy generation Y? The roles of personality and emotional intelligence. *Int. Rev. Manag. Bus. Res.* 5, 1342–1358.

Aydogmus, C., Ergeneli, A., and Camgoz, S. M. (2015). The role of psychological empowerment on the relationship between personality and job satisfaction. *Res. J. Bus. Manag.* 2, 251–276. doi: 10.17261/PRESSACADEMIA.2015312979

Back, M. D., Stopfer, J. M., Vazire, S., Gaddis, S., Schmukle, S. C., Egloff, B., et al. (2010). Facebook profiles reflect actual personality, not self-idealization. *Psychol. Sci.* 21, 372–374. doi: 10.1177/0956797609360756

Baig, N. U. A., and Waheed, A. (2016). Significance of factors influencing online knowledge sharing: a study of higher education in Pakistan. *Pakistan J. Commer. Soc. Sci. (PJCSS)* 10, 1–26.

Blackwell, D., Leaman, C., Tramposch, R., Osborne, C., and Liss, M. (2017). Extraversion, neuroticism, attachment style and fear of missing out as predictors of social media use and addiction. *Pers. Individ. Dif.* 116, 69–72. doi: 10.1016/j.paid.2017.04.039

Boyd, R. L., and Pennebaker, J. W. (2016). "A way with words: using language for psychological science in the modern era," in *Consumer Psychology In A Social Media World*, eds C. V. Dimofte, C. P. Haugtvedt, and R. F. Yalch (Abingdon: Routledge/Taylor & Francis Group), 222–236.

Carmeli, A., Yitzhak-Halevy, M., and Weisberg, J. (2009). The relationship between emotional intelligence and psychological wellbeing. *J. Manag. Psychol.* 24, 66–78. doi: 10.1108/02683940910922546

Chirumbolo, A., Picconi, L., Morelli, M., and Petrides, K. V. (2019). The assessment of trait emotional intelligence: psychometric characteristics of the TEIQue-full form in a large Italian adult sample. *Front. Psychol.* 9:2786. doi: 10.3389/FPSYG.2018.02786

Cornwell, T. O., McCarthy, I. D., and Biro, P. A. (2020). Integration of physiology, behaviour and life history traits: personality and pace of life in a marine gastropod. *Anim. Behav.* 163, 155–162. doi: 10.1016/j.anbehav.2020.03.009

Davidson, E., and Vaast, E. (2010). "Digital entrepreneurship and its sociomaterial enactment," in *Proceedings of the Annual Hawaii International Conference on System Sciences*, (Washington, DC: IEEE Computer Society), 1–10. doi: 10.1109/HICSS.2010.150

Day, A. L., Therrien, D. L., and Carroll, S. A. (2005). Predicting psychological health: assessing the incremental validity of emotional intelligence beyond personality, type a behaviour, and daily hassles. *Eur. J. Pers.* 19, 519–536. doi: 10.1002/PER.552

Denkova, E., Dolcos, F., and Dolcos, S. (2012). Reliving emotional personal memories: affective biases linked to personality and sex-related differences. *Emotion* 12, 515–528. doi: 10.1037/A0026809

Devries, J. M., Rathmann, K., and Gebhardt, M. (2018). How does social behavior relate to both grades and achievement scores? *Front. Psychol.* 9:857. doi: 10.3389/fpsyg.2018.00857

DeYoung, C. G., Quilty, L. C., and Peterson, J. B. (2007). Between facets and domains: 10 aspects of the big five. *J. Pers. Soc. Psychol.* 93, 880–896. doi: 10.1037/0022-3514.93.5.880

Dholariya, P. (2019). Openness to experience personality trait as a predictor of career well-being among IT professionals. *Int. J. Indian Psychol.* 7, 505–508. doi: 10.25215/0704.058

Di Fabio, A. (2017). Positive healthy organizations: promoting well-being, meaningfulness, and sustainability in organizations. *Front. Psychol.* 8:1938. doi: 10.3389/FPSYG.2017.01938

Di Fabio, A., and Kenny, M. E. (2016). From decent work to decent lives: positive self and relational management (PS&RM) in the twenty-first century. *Front. Psychol.* 7:361. doi: 10.3389/FPSYG.2016.00361

Di Fabio, A., and Saklofske, D. H. (2014). Comparing ability and self-report trait emotional intelligence, fluid intelligence, and personality traits in career decision. *Pers. Individ. Dif.* 64, 174–178. doi: 10.1016/J.PAID.2014.02.024

Di Fabio, A., and Saklofske, D. H. (2021). The relationship of compassion and self-compassion with personality and emotional intelligence. *Pers. Individ. Dif.* 169:110109. doi: 10.1016/J.PAID.2020.110109

Digman, J. M. (2003). Personality structure: emergence of the five-factor model. *Annu. Rev.* 41, 417–440. doi: 10.1146/ANNUREV.PS.41.020190.002221

El Othman, R., El Othman, R., Hallit, R., Obeid, S., and Hallit, S. (2020). Personality traits, emotional intelligence and decision-making styles in Lebanese universities medical students. *BMC Psychol.* 8:46. doi: 10.1186/S40359-020-00406-4

Elia, G., Margherita, A., and Passiante, G. (2020). Digital entrepreneurship ecosystem: how digital technologies and collective intelligence are reshaping the entrepreneurial process. *Technol. Forecast. Soc. Change* 150:119791. doi: 10.1016/j.techfore.2019.119791

Feher, A., and Vernon, P. A. (2021). Looking beyond the big five: a selective review of alternatives to the big five model of personality. *Pers. Individ. Dif.* 169:110002. doi: 10.1016/J.PAID.2020.110002

Franke, G., and Sarstedt, M. (2019). Heuristics versus statistics in discriminant validity testing: a comparison of four procedures. *Internet Res.* 29, 430–447. doi: 10.1108/IntR-12-2017-0515

Hair, J. F. J., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. (2017). *A Primer On Partial Least Squares Structural Equation Modeling (PLS-SEM)*, 2nd Edn. Thousand Oaks, CA: Sage Publications Inc.

Herrera, G. P., Constantino, M., Tabak, B. M., Pistori, H., Su, J.-J., and Naranpanawa, A. (2019). Data on forecasting energy prices using machine learning. *Data Brief* 25:104122. doi: 10.1016/J.DIB.2019.104122

Hudani, N., Nawi, M., Redzuan, M., and Hamsan, H. (2012). Inter relationship between emotional intelligence and personality trait of educator leaders. *Int. J. Acad. Res. Bus. Soc. Sci.* 2, 223–237.

Huo, C., Hameed, J., Ul, I., Noman, S. M., and Chohan, S. R. (2020). The impact of artificial and non- artificial intelligence on production and operation of new products -an emerging market analysis of technological advancements a managerial perspective. *Revista Argentina de Clínica Psicológica* 29, 69–82. doi: 10.24205/03276716.2020.1008

Jonason, P. K., Foster, J. D., Egorova, M. S., Parshikova, O., Csathó, Á, Oshio, A., et al. (2017). The dark triad traits from a life history perspective in six countries. *Front. Psychol.* 8:1476. doi: 10.3389/FPSYG.2017.01476

Kafetsios, K., and Zampetakis, L. A. (2008). Emotional intelligence and job satisfaction: testing the mediatory role of positive and negative affect at work. *Pers. Individ. Dif.* 44, 712–722. doi: 10.1016/j.paid.2007.10.004

Kappagoda, U. W. M. R. S. (2013). The relationship between emotional intelligence and five factor model of personality of english teachers in Sri Lanka. *Int. J. Bus. Econ. Law* 2, 53–59.

Kaur, H., and Anand, S. (2018). Segmenting generation Y using the big five personality traits: understanding differences in fashion consciousness, status consumption and materialism. *Young Consum.* 19, 382–401. doi: 10.1108/YC-03-2018-00788

Keefer, K. V., Parker, J. D. A., and Saklofske, D. H. (2018). "Three decades of emotional intelligence research: perennial issues, emerging trends, and lessons learned in education: introduction to emotional intelligence in education," in *Emotional Intelligence In Education: Integrating Research With Practice*, eds K. V. Keefer, J. D. A. Parker, and D. H. Saklofske (Berlin: Springer International Publishing), 1–19. doi: 10.1007/978-3-319-90633-1_1

Lia, H., Haq, I. U., Nadeem, H., Albasherc, G., Alqatanic, W., Nawaz, A., et al. (2020). How environmental awareness relates to green purchase intentions can affect brand evangelism? Altruism and environmental consciousness as mediators. *Revista Argentina de Clinica Psicologica* 15, 811–825. doi: 10.24205/03276716.2020.1079

Liébana-Presa, C., Martínez-Fernández, M. C., Benítez-Andrades, J. A., Fernández-Martínez, E., Marqués-Sánchez, P., and García-Rodríguez, I. (2020). Stress, emotional intelligence and the intention to use cannabis in spanish adolescents: influence of COVID-19 confinement. *Front. Psychol.* 11:582578. doi: 10.3389/fpsyg.2020.582578

Luz Martín-Peña, M., Díaz-Garrido, E., and Sánchez-López, J. M. (2018). The digitalization and servitization of manufacturing: a review on digital business models. *Strateg. Change* 27, 91–99. doi: 10.1002/jsc.2184

Magnus, K., Diener, E., Fujita, F., and Pavot, W. (1993). Extraversion and neuroticism as predictors of objective life events: a longitudinal analysis. *J. Pers. Soc. Psychol.* 65, 1046–1053. doi: 10.1037/0022-3514.65.5.1046

Marchena-Giráldez, C., Acebes-Sánchez, J., Román, F. J., and Granado-Peinado, M. (2021). Validation of the spanish version of thework group emotional intelligence profile short version (WEIP-S) in the sports context. *Int. J. Environ. Res. Public Health* 18, 1–13. doi: 10.3390/IJERPH18020715

Masten, A. S. (2014). Global perspectives on resilience in children and youth. *Child Dev.* 85, 6–20. doi: 10.1111/CDEV.12205

McCrae, R. R., and Costa, P. T. Jr. (2013). "Introduction to the empirical and theoretical status of the five-factor model of personality traits," in *Personality Disorders And The Five-Factor Model Of Personality*, eds T. A. Widiger and P. T. Costa Jr. (Washington, DC: American Psychological Association), 15–27.

Murugesan, R., and Jayavelu, R. (2017). The influence of big five personality traits and self-efficacy on entrepreneurial intention: the role of gender. *J. Entrep. Innov.n Emerg. Econ.* 3, 41–61. doi: 10.1177/2393957516684569

O'Boyle, E. H., Humphrey, R. H., Pollack, J. M., Hawver, T. H., and Story, P. A. (2011). The relation between emotional intelligence and job performance: a meta-analysis. *J. Organ. Behav.* 32, 788–818. doi: 10.1002/JOB.714

Obschonka, M., Fisch, C., and Boyd, R. (2017). Using digital footprints in entrepreneurship research: a Twitter-based personality analysis of superstar entrepreneurs and managers. *J. Bus. Ventur. Insights* 8, 13–23. doi: 10.1016/j.jbvi.2017.05.005

Salovey, P., and Sluyter, D. J. (1997). *Emotional Development And Emotional Intelligence?: Educational Implications*. New York, NY: Basic Books, 288.

Sandhu, K. S., Sharma, R. K., and Singh, A. (2009). Personality hardiness of Indian coaches in relation to their age and coaching experience. *J. Exerc. Sci. Physiother.* 5, 38–41.

Sarfraz, M., Mohsin, M., Naseem, S., and Kumar, A. (2021). Modeling the relationship between carbon emissions and environmental sustainability during COVID-19: a new evidence from asymmetric ARDL cointegration approach. *Environ. Dev. Sustain.* 23, 16208–16226. doi: 10.1007/S10668-021-01324-0

Sarstedt, M., Hair, J. F., Cheah, J. H., Becker, J. M., and Ringle, C. M. (2019). How to specify, estimate, and validate higher-order constructs in PLS-SEM. *Australas. Mark. J.* 27, 197–211. doi: 10.1016/j.ausmj.2019.05.003

Schwaba, T., Luhmann, M., Denissen, J. J. A., Chung, J. M., and Bleidorn, W. (2018). Openness to experience and culture-openness transactions across the lifespan. *J. Pers. Soc. Psychol.* 115, 118–136. doi: 10.1037/PSPP0000150

Shehzad, K., Xiaoxing, L., Sarfraz, M., and Zulfiqar, M. (2020). Signifying the imperative nexus between climate change and information and communication technology development: a case from Pakistan. *Environ. Sci. Pollut. Res.* 27, 30502–30517. doi: 10.1007/s11356-020-09128-x

Shehzad, K., Zaman, U., José, A. E., Koçak, E., and Ferreira, P. (2021). An officious impact of financial innovations and ICT on economic evolution in china: revealing the substantial role of BRI. *Sustainability* 13:8962. doi: 10.3390/SU13168962

Sony, M., and Mekoth, N. (2016). The relationship between emotional intelligence, frontline employee adaptability, job satisfaction and job performance. *J. Retailing Consum. Serv.* 30, 20–32. doi: 10.1016/J.JRETCONSER.2015.12.003

Soto, C. J. (2019). How replicable are links between personality traits and consequential life outcomes? The life outcomes of personality replication project. *Psychol. Sci.* 30, 711–727. doi: 10.1177/0956797619831612

Soto, C. J., and Tackett, J. L. (2015). Personality traits in childhood and adolescence: structure, development, and outcomes. *Curr. Dir. Psychol. Sci.* 76, 358–362. doi: 10.1177/0963721415589345

Strik, N. P., Hamstra, W., and Segers, M. S. R. (2019). Antecedents of knowledge withholding: a systematic review & integrative framework. *Group Organ. Manag.* 46, 223–251. doi: 10.1177/1059601121994379

Sutin, A. R., Costa, P. T., Wethington, E., and Eaton, W. (2010). Turning points and lessons learned: stressful life events and personality trait development across middle adulthood. *Psychol. Aging* 25, 524–533. doi: 10.1037/A0018751

Taleghani, G. R., Ghafary, A., Keyhani, A., and Ahmadi, S. R. (2013). Personality characteristics and entrepreneurship inonline context. *Int. Res. J. Appl. Basic Sci.* 4, 4084–4092.

Teh, P. L., Yong, C.-C., Chong, C. W., and Yew, S. Y. (2011). Do the big five personality factors affect knowledge sharing behaviour? A study of Malaysian universities. *Malays. J. Libr. Inf. Sci.* 16, 47–62.

Templer, K. J. (2012). Five-factor model of personality and job satisfaction: the importance of agreeableness in a tight and collectivistic asian society. *Appl. Psychol.* 61, 114–129. doi: 10.1111/j.1464-0597.2011.00459.x

Tong, E. M. W. (2010). Personality influences in appraisal-emotion relationships: the role of neuroticism. *J. Pers.* 78, 393–417. doi: 10.1111/j.1467-6494.2010.00620.x

Urquijo, I., Extremera, N., and Azanza, G. (2019). The contribution of emotional intelligence to career success: beyond personality traits. *Int. J. Environ. Res. Public Health* 16:4809. doi: 10.3390/IJERPH16234809

Vesely, A. K., Saklofske, D. H., and Leschied, A. D. W. (2013). Teachers—the vital resource: the contribution of emotional intelligence to teacher efficacy and well-being. *Can. J. Sch. Psychol.* 28, 71–89. doi: 10.1177/0829573512468855

Yoon, H. S., and Barker Steege, L. M. (2013). Development of a quantitative model of the impact of customers' personality and perceptions on Internet banking use. *Comput. Hum. Behav.* 29, 1133–1141. doi: 10.1016/J.CHB.2012.10.005

Zampetakis, L. A., Kafetsios, K., Bouranta, N., Dewett, T., and Moustakis, V. S. (2009). On the relationship between emotional intelligence and entrepreneurial attitudes and intentions. *Int. J. Entrep. Behav. Res.* 15, 595–618.

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Understanding Digital Learning Behaviors: Moderating Roles of Goal Setting Behavior and Social Pressure in Large-Scale Open Online Courses

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Pandemic has changed the whole scenario worldwide, not only related to business but also has equally affected the education sector. The classes have gone online from their physical nature, making it more convenient for students to learn. They provide online courses and lectures at the convenience of teachers and students. This study has also been one such effort in identifying the role of technological applications, intentions, and time flexibility in the digital learning behavior of students in China. The sample used in this study was the students taking online courses through their universities. The sample size was 343 students selected through purposive sampling. Smart PLS 3.3.3 has been used for data analysis *via* structural equation modeling. This study has found that technological applications play an important role in digital learning behavior, positively moderated by goal-setting behavior. Similarly, intentions predict digital learning behavior. Moreover, social pressure has also been found to augment the role of time flexibility in digital learning behavior. These results are very useful for universities that make understanding the online nature of studies more comprehensive.

Keywords: digital entrepreneurship, learning behavior, technological applications, goal setting behavior, sustainable digital economy

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INTRODUCTION

As a result of the spread of coronavirus disease 2019 (COVID-19), countries worldwide have taken unprecedented actions in various areas to combat the pandemic. This scenario also impacted education, resulting in the largest disruption of educational systems in history. Currently, most countries have announced extended closings, prohibiting almost 1.6 billion children and teenagers from attending school. However, several European Union organizations and international organizations have long advocated for digital technologies in education. The COVID-19 influenced closure has an impact on education and learning, as well as instructional methods. Nevertheless, e-learning quickly filled this void, as schools, universities, and academic facilities shifted their learning and teaching to the internet. Due to its particular benefits, digital learning in China is advancing quickly, and its long-term viability has become increasingly important.

While digital learning has been quickly developing in recent years, China is experiencing a digital learning surge due to the pandemic. Because people spend greater time at home than before, digital learning has become an essential educational resource. The pandemic has shifted the traditional chalk and board teaching paradigm to one based on digital technology. The number of people

taking online courses has increased dramatically, and this trend is certain to continue. Regulators are currently attempting to increase involvement at a massive scale while guaranteeing that digital Learning solutions are accessible to all. However, it would be naive to believe that digital learning is progressing smoothly. Regarding the relationship between students and teachers, there is much that can be done to improve virtual coaching platforms and online education, just as there is in physical classrooms. So far, digital learning has raised some queries and suggested some future directions of online learning.

Digital education, as one of the most important components of quality education, has unique qualities that support the long-term development of education, such as flexibility, low cost, repetition, ease, low threshold, high efficiency, broadly accessible users, and rich instruction. These advantages give digital learning an advantage over conventional classroom learning (Isaac et al., 2019; Khalil et al., 2021). Similarly, digital learning can open up new learning opportunities for new students while significantly altering learning provision and the competitive environment. Digital learning overcomes time and location restrictions by offering educational opportunities to distant learners and allowing flexible learning modes, helping students to freely select and pace their learning paths by their actual circumstances, as well as an advantage from contingent teaching (Moore et al., 2011). From the distance education model just at the turn of the 21st century to the present popular internet education model, the concept and pattern of digital education have changed considerably. It has also evolved beyond the distribution of fixed content to the usage of dynamic, public classrooms, and digital training (de Souza Rodrigues et al., 2021). There are some technological applications of digital learning. The benefits of learning paired with educational technology include accommodating slow learners in more individual ways and the ability to promote the learning enthusiasm of students in undertaking exercises or projects assigned by teachers. The use of digital technology in education is thought to improve results and inspire students individually, based on the benefits achieved. Improving digital learning outcomes is a direct indicator of the effectiveness and efficiency with which learning is implemented. As a result, the development of learning through the use of technological advancements is critical, and the teacher or educator should use it as much as feasible. It is necessary to avoid turning this psychological development into a negative experience, reflecting poorly on educators and pupils. The way of human development is employed will determine whether it has positive or negative consequences (Kirkwood and Price, 2006). Students will rapidly become bored if the display of the learning content is not effectively designed or looks like a learning textbook.

Furthermore, due to their poor knowledge of technology, teachers who do not comprehend the application of technology will be unable to create learning using this technology. The role of the teacher is limited to that of a facilitator, whereas pupils must improve their capacity to comprehend the information or topic offered by the teacher. For students to learn joyfully and passionately. Collaboration can be aided by educational technology (Sarfraz et al., 2018; Shehzad et al., 2020). Teachers can interact with students throughout class, but students can also speak with one another. Students collaborate to solve challenges through online lessons and learning games. Students can share their views and ideas and encourage one another in collaborative tasks. At the same time, technology allows students to communicate with teachers physically. Students can ask questions about what they're learning in class and get extra help with subjects they don't grasp. Students can upload their homework from home, and teachers can use their laptops to access and view completed assignments.

Despite the rapid advancement of Web technology in teaching, student enthusiasm for using technology in the classroom is waning. With the tremendous technological advancements in China, the Internet is becoming more significant in many sectors of life, including education. Despite the flexibility, ease, and ingenuity of the Internet when contrasted to conventional teaching methods (Chen, 2018). Despite enormous expenditures in new technology by governments, universities, and service providers, the full advantage and value of digital learning platforms have yet to be realized (Barclay et al., 2018). This involves deploying ongoing research into the factors that influence student happiness (Herrador-Alcaide et al., 2019). On one side, universities, authorities, and service providers might use authentic and reliable methodologies to target areas that need to be modified or improved based on the determinants of student happiness, thereby improving the quality of online learning services (Cidral et al., 2018).

Educators, course creators, and training developers, on the other hand, can profit from such studies to give learners the necessary online learning environments and more appropriate online learning programs. Instead of the other way around, online students can organize their study time around the rest of their day. You can work when convenient for you, allowing you to balance employment and family obligations while continuing your education. Students have complete control and accountability over their learning when they use flexible learning. Rather than being forced to attend a class, people can choose when and how much time they spend learning. This power allows them to plan their education around their obligations and assures that they are studying at the optimal moment. For instance, some learners may be more productive in the evenings, but conventional education may limit them by only providing classes throughout the day.

Flexible learning allows students to determine how and when they will learn by customizing their course to their specific needs. They also benefit from learning at their own pace, which can assist in relieving a lot of stress. Teachers frequently rush through subjects before giving pupils an assignment to complete. This might put pressure on individuals to finish tasks fast, but it leaves no room for learners to ask questions. Suppose a student does not understand a concept or idea that the teacher has communicated. In that case, they will not accomplish the assignment to their full potential, obstructing their learning. Because of the flexibility of online learning, people can study their time grasping subjects and ensuring complete knowledge before moving on. Students are involved in reviewing their assessment findings, working with their teachers to develop reasonable but ambitious objectives for

growth, and attempting to drive their education with regular reference to those goals, which is just one of many types of student-involved data use.

These goal-setting strategies positively impact student results and school cultures when they are properly applied. It is natural for students to be impacted by their peers as they navigate new social structures such as friendships, dogmas, and where they fit in when they first enter university. Peer pressure may influence students to do or say things they would not usually do or say. It is not always a terrible thing: societal influence to study more or take a stand against harassment can result in great outcomes (Sarfraz et al., 2020, 2021). On the other hand, some factors can be harmful, such as societal pressure to treat others badly or engage in risky behavior like binge drinking. Social conditioning can affect the self-esteem of a student and cause them to feel isolated from their friends and family. Some practical ways learners can be assisted include promoting a culture of diversity and inclusion, fostering open dialogs with students and parents about peer pressure, developing critical communication skills to help manage negative peer pressure situations, and building resilience. All these factors have a significant impact on digital learning. Hence, to understand digital learning behaviors, this study was designed and executed.

This study revolved around certain objectives as follows: (1) to estimate the digital learning behaviors among students; (2) to evaluate the impact of technological applications on digital learning of the students; (3) to analyze the role of flexibility in timings on digital learning behaviors of students; (4) to identify and check the significance of moderating factors such as goal setting and social pressures toward digital learning.

LITERATURE REVIEW

Impact of Technological Applications on Digital Learning

In digital learning, technology has been widely used to assist instructors in accomplishing various educational goals, and adaptable technologies can help them achieve their aims (Kreijns et al., 2013). Digital technology has the advantage of being very scalable. This is also true in education, where huge classrooms are still a preferred mode of instruction due to their cost effectiveness around the globe (Vermeulen et al., 2017). Due to various potential cost efficiency and adaptability, digital technologies have acquired a lot of traction in education. While several new digital technologies have been studied for adoption, there are very few comparable similarities (Sarfraz et al., 2018; Budd et al., 2020). Technological quality control, which can predict behavioral intention to utilize technology, is the most well-established approach for measuring adoption. The student response method received the most positive feedback. E-lectures were next, supported by classroom discussion, and finally, a portable virtual reality (Kisin, 2021). CRSs, also characterized as student evaluation systems, personalized response systems, immediate reply systems, digital response systems, clickers, even public response systems, have such a wide range of applications in the classroom. A CRS lets lecturers ask mobile telecommunication questions earlier, throughout, and then after their presentations, so students can respond using their own electronic devices (Sprenger and Schwaninger, 2021). The responses are compiled in real-time and displayed to individual students or the entire class. This helps lecturers to keep track of the comprehension of their students when it comes to topics they discuss.

Furthermore, the mental capacity of students is typically 20 min (Muir et al., 2020). Students can chat with each other because lecturers speak in front of the class. The front channel and covert operation are two types of communication that happen at the same time. Students who seem timid and shy have benefited from using computer tools that allow them to remain anonymous, particularly when the themes are problematic (Asarta and Schmidt, 2020). Several universities have adopted the practice of documenting lectures by using different technological applications.

Students were provided access recordings that enabled them to examine topics through their own time and create a learning environment (Lasfeto, 2020). Digital literacy, portable voice, and online chatting are just some of the multimedia instructional networks that have sprung up due to the rapid expansion of the World wide web and modern communications technology (Tohara, 2021). Traditional education would be replaced by using the accessibility and attractiveness of the technology to use digital teaching resources to achieve national competitiveness. As a result, a great deal of research into mobile learning is being done to provide better system performance and widespread use. Keeping in view the literature, the following hypothesis was formulated.

H1: Technological applications have a positive impact on digital learning behavior.

Impact of Online Learning Intention on Digital Learning

From student intention and capacity perspectives, views or beliefs, and online learning situations, studies have been undertaken on the continuing intention of university students when it comes to learning online (Zulfiqar et al., 2021). Furthermore, few studies have examined how the factors will combine and influence the intentions of students to learn digitally (Chang et al., 2017; Sarfraz et al., 2020). The researchers looked at how the view of individuals on online learning changed over time and the connections between their personality learning abilities, interaction with other users, perspectives, and online learning intention (Zhu et al., 2020). University online courses, given in either a digital or mixed modality, have seen a substantial increase in enrollment in recent decades as online learning better supports the different demands of students by trying to break down based on geographical obstacles (Herodotou et al., 2020).

Academic institutions, in particular, have seen a shift in an image from completely digital training to differentiated instruction, which is now a well-established component of university education (Li et al., 2020). Given the rapid expansion of blended education in higher education, one major difficulty has suddenly appeared: preserving the intention and good

views of students toward online learning. Researchers used specific models that focus on the attitudinal characteristics of the participants, significantly and positively associated, learning intention, or online course outcomes in previous studies on the continuing online learning intention of university students (Syauqi et al., 2020). The study was carried out in an online learning environment.

The technology acceptance model (TAM) is a paradigm for determining the desire of a student to be using technology and participate in online learning (Husain et al., 2020). The perceptions of learners when it comes to utility and simplicity may also influence their desire to keep their education online. The expectation confirmation model (ECM) was based on the ECT (expectation confirmation theory), technology acceptance model (TAM), and theory of planned behavior (TPB) Expectations of customers and perceptions of product performance, according to the ECT, may play a role in post-purchase satisfaction (Avotra et al., 2021a,b). Many studies looked into learning motivation theories and discovered that learning intention elements affected the desire of students to learn online. The ECT and fairness theory discovered that interactional justice, interpersonal communication fairness, achievement value, perceived utility, and inherent value all influenced the intention of students to learn online (Cicha et al., 2021). The effectiveness of positively predicting digital learning behavior is measured using online learning intents as a major benchmark. Online learning intention is related to digital learning behaviors so, the following hypothesis was developed.

H2: Online learning intentions positively predict digital learning behavior.

Impact of Flexible Timing on Digital Learning

Students can work at their own pace with digital learning, and there are chances to encourage active instructional practices (Scully et al., 2021). Digital Blended learning necessitates strong self-regulated learning (SRL) abilities due to the large online component since learners must interact with internet resources and study independently (Broadbent et al., 2021). Educational strategies have been developed depending on the use of tactics or how the other learner employs specific tactics (Tohara, 2021). Digital learning entails weekly repetitions of online and face-to-face elements throughout a program. Learners are given digital materials to gain basic analysis of the changing topical module at their speed through the active internet connection. The face-to-face component entails instructional strategies and higher-order reasoning guided by an instructor, allowing students to practice and apply what they learned during the online preparation.

As the dissemination of data among two specific parties takes precedence, among the most important features of e-services is the availability of information (Shkarlet et al., 2020). Most academics believe that it is a widespread perception of the capability of the internet that it is mostly utilized to fulfill the passion for learning and the need for knowledge in the educational sector (Sein-Echaluce et al., 2020). E-learning satisfaction is the most important aspect of the e-learning of a student, supported by e-learning instructor quality, course materials selection, and e-learning administrative and service supporting quality (Mousavi et al., 2020). Technologies, especially information technology in the context of e, have changed the face of education in the knowledge economy (Oke and Fernandes, 2020). Institutions of higher learning face both challenges and opportunities as a result of the latently coming move away from the traditional model of teaching and training. One of the defining characteristics is the advent of communication and information technology (ICT), which has changed the nature of education like other industries. The following hypothesis was structured to check the significance of the impact between flexible timing and digital learning.

H3: Flexible timings have an impact on digital learning behavior.

The Moderating Role of Goal Setting

Digital technologies benefit those who utilize them and, as a result, influence their behavior. Technology is transforming the way professors teach, and students learn. Management and faculty understanding of learning technology (LT) is influenced by technology, which changes the type and degree of adoption employed during education (Syed et al., 2021). With the advent of digital learning, digital literacy (DL), and digital communication literacy, the structure of information distribution transformed. Digital learning is a type of information delivery that employs technology to teach educational purposes (Sayaf et al., 2021). This type of technology makes use of web-enabled gadgets and represents digital learning (Aditya, 2021). While DL is defined as the capacity to use technology to locate, evaluate, generate, and convey information, it necessitates academic, behavioral, and technical expertise (Taylor et al., 2021). Disruptive innovation occurs when a particular technologies attempt to replace established and standard processes, resulting in unanticipated effects (Huo et al., 2021). University leaders require digitally literate employees to manage the frequent and rapid changes in technology that support administration and instruction. The scant research available examines the level of digital learning among rural community college employees (Hromalik et al., 2021). Although technology allows for quick responses and direct feedback from students, digital learning adoption and comprehension go beyond academic achievement. Keeping in view the literature, a hypothesis was developed on the moderating role of goal setting which is as follows.

H4: Goal setting behavior moderates the relationship of technological applications and digital learning behavior.

The Moderating Role of Social Pressure

Many are engaging in technology-assisted complementary work, aided by numerous collaboration platforms that allow communication from any location or time (TASW). The challenges of balancing work and non-work time have been exacerbated by a global epidemic that has disrupted typical work schedules and locales (Goldman, 2021). Because of the COVID-19 epidemic, employees

worldwide witnessed a sudden change in their work positions. For many workers, this meant redefining the distinction between works and associated with introducing (García-Peñalvo, 2021). Nowadays, ICTs provide workers with additional connectivity with individuals, teams, and organizations, which is a particularly important and influential feature (Richey et al., 2005). Workers can engage with one another without time limits or the necessity for co-location by using mobile phones, desktop computers, and communications connectivity.

Employees are increasingly working outside of traditional working hours, at night, or on weekends, thanks to the adaptability and accessibility of information and communication technologies (Albano et al., 2021). Collaboration technologies are distinct from other organizational technology in that they enable workers and organizations to be connected at all times. The capacity to monitor the activities of others contributed to advancements in who workers asked for task advice, according to the use of a common IT system by computer specialists. Employees will have additional opportunities to engage in supplemental work if these techniques are used frequently and intensely, as no technology hurdles are blocking these practices (Chittenden, 2021). Collaboration solutions, such as Google Workspace or Microsoft 365, comprise a variety of apps that allow remote coworkers to share files, update information individually or collaboratively, and communicate synchronously *via* video and conference calls. Typically, these technologies are used to facilitate collaboration. The moderating role of societal pressures was analyzed under the following hypothesis.

H_5: Social Pressure moderates the relationship of flexible timings and digital learning behavior.

Based on these hypotheses, the following conceptual framework was designed (Please see **Figure 1**).

METHODOLOGY

Sampling and Instrument Development

Standard error of the mean (SEM) has been used in this study for data analysis to achieve the objectives. The data was collected through the technique of questionnaire. Data collection for this cross-sectional study took place in the universities of China. The respondents filled these questionnaires with their free consent. The population used in this study was the students at universities taking online courses during the pandemic. The sample size *N* for this study was 343, which were selected through purposive sampling. Since the pandemic was in the whole country, so all students were going through online learning. This sample is considered enough (Liébana-Presa et al., 2020), considering the general guidelines.

The data obtained during data collection was segregated based on frequency and percentages regarding the categorization of each question in demography. The results can be seen in **Table 1**. In respondents, there were 188 men and 155 women. Under the question of age, 139 respondents were under 25 years, while 46 were between 25 and 30, 79 respondents between 31 and 40, 56 between 41 and 50, and 23 over 50 years. Similarly, for the education question, 32 respondents were from higher secondary education, 115 from bachelors, 128 from masters, and 68 belonged to doctorate and other categories (Please see **Table 1**).

Questionnaires used for data collection were consist of 32 items in total, representing six variables. The flexible timings variable consisted of four items, digital learning behavior of eight items, goal-setting behavior of six items, online learning intention of six items, the social pressure of four items, and technological application variable consisted of four items. It was designed on seven points Likert scale with 1 being strongly disagreed, and 7 = strongly agree. The scale was adapted according to past research (Devries et al., 2018). This study contained three independent variables (technological applications, online

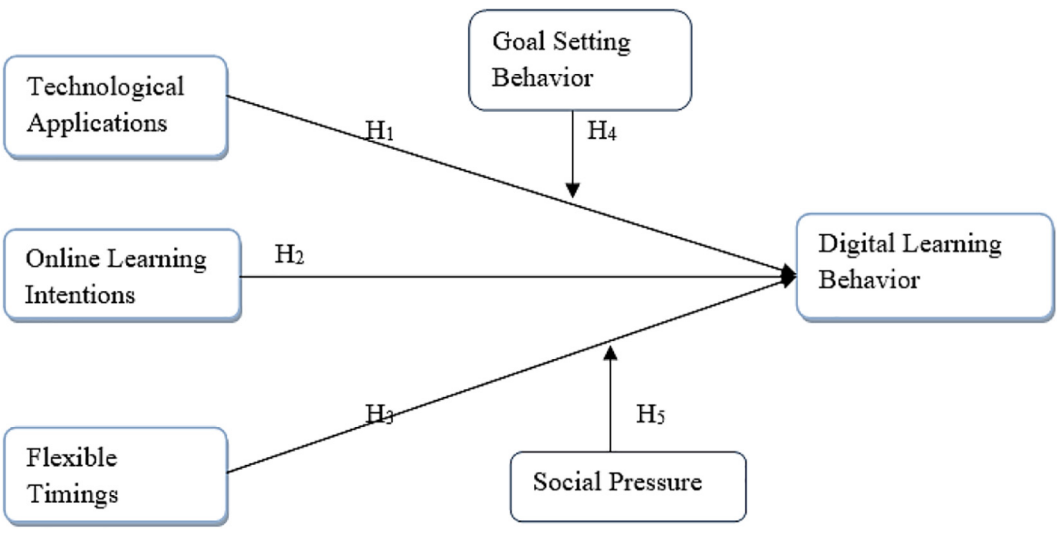

FIGURE 1 | Conceptual model.

TABLE 1 | Demographic summary.

Demographic summary	Frequency	Percentage
Gender		
Male	188	54.81
Female	155	45.18
Age		
<25	139	40.52
25–30	46	13.41
31–40	79	23.03
41–50	56	16.32
50>	23	6.70
Education		
Higher secondary	32	9.32
Bachelor	115	33.52
Masters	128	37.31
Doctorate	66	19.24
Others	2	0.58
Fields of study		
Management	111	32.36
Social Sciences	137	39.94
Natural Sciences	95	27.69

N = 343.

learning intentions, and flexible timings), two moderators (goal-setting behavior and social pressure), and one dependent variable (digital learning behavior) (Lin and Chen, 2017; Devries et al., 2018). Data collection was done through online questionnaires depending upon the accessibility to the internet and availability. To maintain the anonymity of the respondents, the data obtained was saved on the server having HTTP security. Through Smart PLS 3.3.3 (SmartPLS GmbH[1]), PLS-SEM was used to check the hypotheses.

DATA ANALYSIS

The data collected were checked for the reliability and validity of the questionnaire. For reliability, two types of reliability were used, i.e., Cronbach alpha reliability and composite reliability. The alpha reliability of the variables ranged from 0.849 to 0.93, which meets the threshold of 0.7. Similarly, the composite reliability is also from 0.883 to 0.943. These results can be seen in **Table 2**.

Moreover, for the validity of data, factor loading for each variable was also obtained as defined criteria (Nawaz et al., 2019; An et al., 2021). The factor loadings for all variables were above 0.8 except for the online learning intentions variable that showed as low as 0.502, which is also acceptable in certain cases (Khalil et al., 2021). These results for factor loadings can also be seen in **Table 2**.

The factor loadings obtained to check the validity can be seen in **Figure 2**, obtained through PLS-Algorithm for the measurement model.

The data was further validated through the Fornell and Larcker criterion of correlation, as shown in **Table 3**. To validate data, each top value given in each column should be higher than the rest of the values underneath (Cepeda-Carrion et al., 2019). The topmost value for DLB is 0.819, FT is 0.898, GSmod is 0.71, OLI is 0.686, SPMod is 0.782, and TechApp is 0.873, hence, meeting the said criteria for validity. Similarly, another measure to validate the data is through the HTMT ratio. This test was also run on the data and the results can be seen in **Table 4**. The values for heterotrait-monotrait ratio should be less than 0.9 for data to be valid (Cepeda-Carrion et al., 2019). The values in this study are less than 0.9 hence, the data is valid. The highest ratio for HTMT was found at 0.887, which is between the DLB variable and TechApp variable. The rest of the rations are even lesser than this (see **Table 4**).

Furthermore, the data was checked for the direct effects of the variables through a structural model using PLS consistent bootstrapping method (Lemes et al., 2021; see **Figure 3**).

TABLE 2 | Measurement model and descriptive statistics.

Constructs	Code	FD	α	CR	AVE
Flexible timings			0.921	0.943	0.806
	FT1	0.870			
	FT2	0.913			
	FT3	0.880			
	FT4	0.927			
Digital learning behavior			0.930	0.942	0.671
	EB1	0.851			
	EB2	0.827			
	EB3	0.827			
	EB4	0.825			
	EB5	0.829			
	EB6	0.783			
	EB7	0.801			
	EB8	0.808			
Goal setting behavior			0.871	0.883	0.559
	GS1	0.811			
	GS2	0.663			
	GS3	0.713			
	GS4	0.636			
	GS5	0.844			
	GS6	0.795			
Online learning intention			0.849	0.833	0.470
	OLI1	0.502			
	OLI2	0.538			
	OLI3	0.502			
	OLI4	0.622			
	OLI5	0.936			
	OLI6	0.875			
Social pressure			0.921	0.944	0.808
	EB1	0.919			
	EB2	0.901			
	EB3	0.867			
	EB4	0.908			
Technological apps			0.896	0.927	0.762
	TECH1	0.883			
	TECH2	0.861			
	TECH3	0.873			
	TECH4	0.874			

FD, Factor Loadings; CR, Composite Reliability; AVE, Average Variance Extracted; α, Cronbach Alpha reliability; FT, Flexible Timings; DLB, Digital Learning Behavior; GSB, Goal Setting Behavior; OLI, Online Learning Intention; SP, Social Pressure.

[1]https://www.smartpls.com

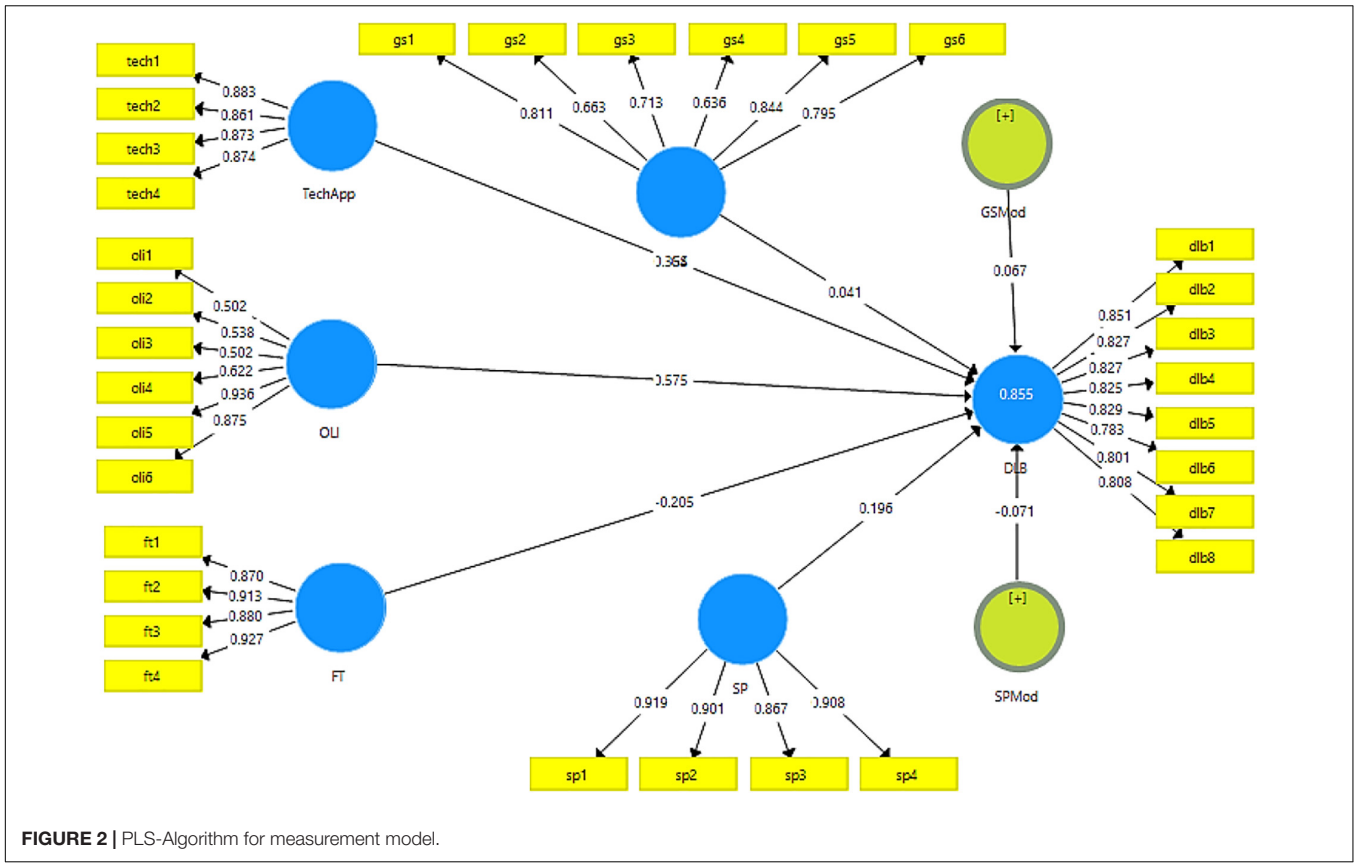

FIGURE 2 | PLS-Algorithm for measurement model.

TABLE 3 | Fornell and larcker criterion.

Variables	DLB	FT	GSMod	OLI	SPMod	TechApp
DLB	**0.819**					
FT	0.268	**0.898**				
GSMod	−0.386	−0.276	**0.710**			
OLI	0.804	0.580	−0.425	**0.686**		
SPMod	−0.177	−0.211	0.395	−0.161	**0.782**	
TechApp	0.812	0.272	−0.536	0.721	−0.200	**0.873**

FT, Flexible Timings; DLB, Digital Learning Behavior; GSMod, Goal Setting Behavior as moderator; OLI, Online Learning Intention; SPMod, Social Pressure as moderator; TechApp, Technological Application.

TABLE 4 | HTMT ratio.

	DLB	FT	GSMod	OLI	SPMod	TechApp
DLB						
FT	0.278					
GSMod	0.325	0.286				
OLI	0.627	0.876	0.424			
SPMod	0.177	0.210	0.447	0.158		
TechApp	0.887	0.288	0.490	0.604	0.207	

FT, Flexible Timings; DLB, Digital Learning Behavior; GSMod, Goal Setting Behavior as moderator; OLI, Online Learning Intention; SPMod, Social Pressure as moderator; TechApp, Technological Application.

Interestingly, *t*-statistics for all the hypotheses were found significant. The detail is presented in **Table 5**.

All the results obtained were found significant at $p < 0.005$ except for H_5 which was significant at $p < 0.05$. For the first hypothesis, technological applications were found to have the most significant effect on digital learning behavior with *t*-statistic 7.742 followed by online learning intention with t-statistic 7.171. Flexible timings have also been found to play an important role in predicting digital learning behavior (*t*-statistic = 4.01). Moreover, goal-setting behavior was found to trigger the role of

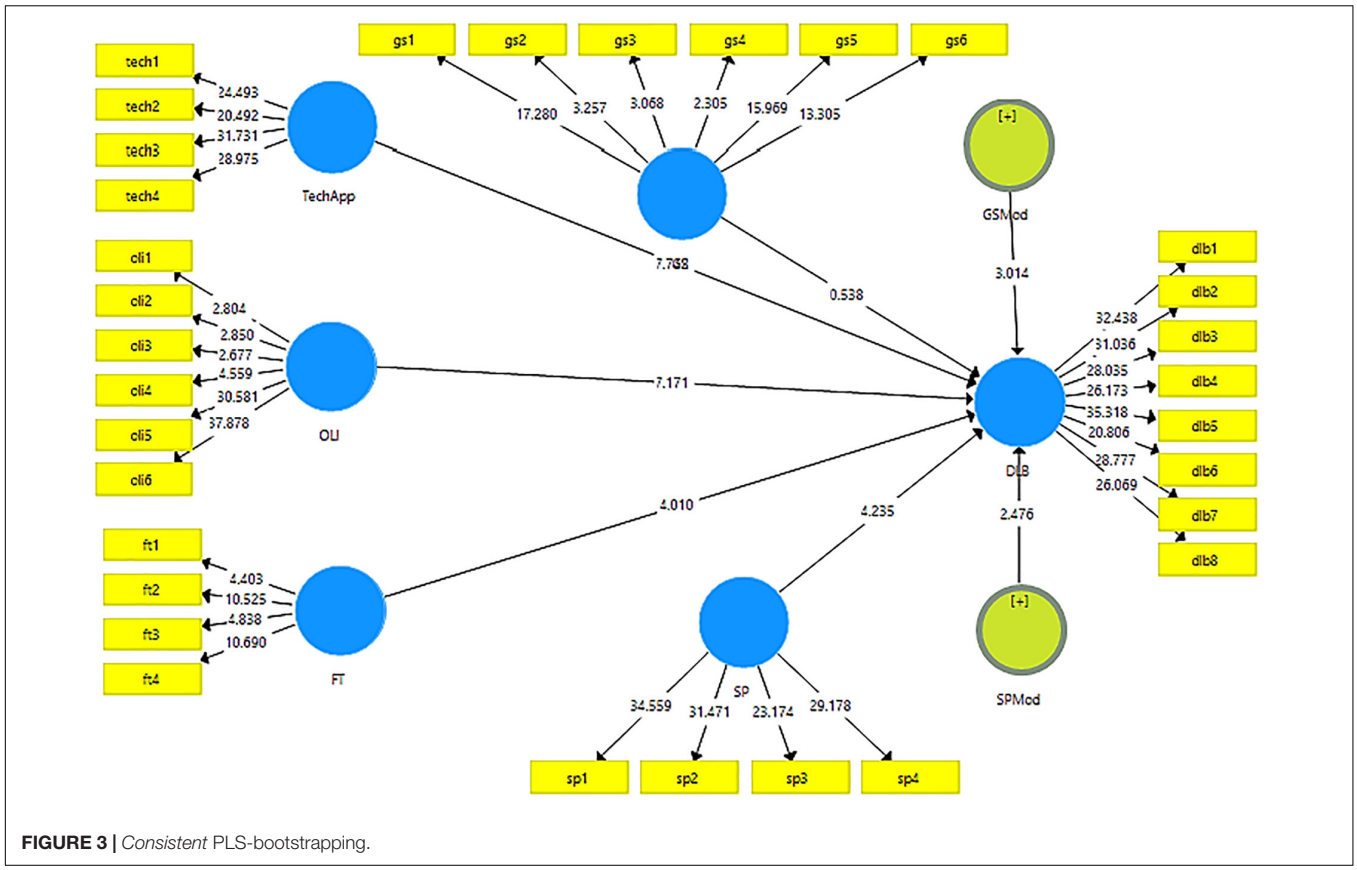

FIGURE 3 | *Consistent* PLS-bootstrapping.

technological applications in predicting digital learning behavior (t-statistic = 3.014). The moderation of social pressure in predicting digital learning behavior has also been significant in enhancing the role of flexible timings. These results can be seen in the following table. Overall, all these independent variables predicted digital learning behavior at 85.2%, indicating the vitality of these variables for DLB (Please see **Table 5**).

DISCUSSION

This research was based on several hypotheses to analyze digital learning behaviors with moderating roles of goal-setting behavior and social pressure in large-scale open online courses. Similarly, this study has also been one such effort in identifying the role of technological applications, intentions, and time flexibility in the digital learning behavior of students in China. Among two major approaches for conducting the research, structural equation modeling was carried out using Smart PLS. A theoretical framework was designed, and questionnaires were sent to the participants. The results supported the hypotheses. The results were also in accordance with many researchers, and some were of a different opinion. The possible reasoning for the obtained results is also discussed here. 55% of the respondents were men and 45% were women. They all had different education levels ranging from higher secondary to Doctorate from management sciences, social sciences, and natural sciences.

The cut-off value for reliability is said to be 0.7 (Haq and Awan, 2020). All the values in this study are above 0.7 ranging from 0.849 to 0.93 for alpha reliability and 0.883 to 0.943 for composite reliability. Hence the data in this study is reliable. The maximum threshold stated in the literature for factor loadings is 0.6 (Howell et al., 2018; Linkov et al., 2018), All the values in this study are above 0.8 except the online learning intentions variable that showed as low as 0.502 which is also acceptable in certain cases. The possible reason for getting these results was the authenticity and reliability of the data collected from the participants. Discriminant validity was also tested and found satisfactory for the research. This is also due to the authenticity of the data. For the other criterion i.e., HTMT ratio, the researchers agree that the value should not exceed 0.9, i.e., all values should be less (Cepeda-Carrion et al., 2019). The results for this study

TABLE 5 | Results for structural model.

Paths	H	T-Stats	*P*-Value	Adjusted R^2	Results
TechApp → DLB	H1	7.742	0.000***	0.852	Supported
OLI → DLB	H2	7.171	0.000***		Supported
FT → DLB	H3	4.010	0.000***		Supported
GSBMod → DLB	H4	3.014	0.003***		Supported
SPMod → DLB	H5	2.476	0.014**		Supported

*Significance level ***0.005%, **0.05%, H, Hypothesis; O, Original Sample; M, Sample Mean; SD, Standard Deviation; E&T, Education and Training; ESE, Entrepreneurial Self-efficacy; IM, Intrinsic Motivation; EB, Entrepreneurial Behavior.*

meet this criterion hence, making the data valid for use. In the third phase of data analysis, the data were analyzed for structural model or path analysis using bootstrapping with Smart PLS 3.3.3.

This is usually the subsequent stage of the measurement model. The significance of the relationships is usually expressed in the form of path analysis, which either shows the direct effects or the indirect effects. The direct effects are the general linear regression, however, indirect effects indicate the mediating variables. For the first hypothesis, technological applications were found to have the most significant effect on digital learning behavior with a *t*-statistic 7.742. This is because technological applications are the most important contributors to digital learning. Many past researchers had shown similar results in their findings (Zhu et al., 2020; Zulfiqar et al., 2021). The second highly significant result was obtained in the hypothesis of online learning intention with *t*-statistic 7.171. This is due to the fact that intention plays an important role in learning through any medium. The results are also in favor of many researchers such as (Scully et al., 2021). Flexible timings have also been found to play an important role in predicting digital learning behavior (*t*-statistic = 4.01). The most amazing feature of digital learning is the flexibility in the timings of learning due to which, this hypothesis may have been significant toward digital learning of the students. Moreover, goal-setting behavior was found to trigger the role of technological applications in predicting digital learning behavior (*t*-statistic = 3.014). This is also due to the fact that goal-setting behaviors are the root cause of many successes. These results are also in accordance with many researchers such as (Alabdulaziz, 2021). The moderation of social pressure in predicting digital learning behavior has also been significant in enhancing the role of flexible timings. Overall, all these independent variables 85.2% predicted digital learning behavior, indicating the vitality of these variables for digital learning behaviors. All hypotheses were supported in this study. This happened due to the fact that all these factors influence the digital learning behaviors of the students.

CONCLUSION

With the increasing use of the internet, the introduction of different technological applications and pandemics has changed the overall realm of learning and education in China and worldwide. This study is also such exploration into the learning behaviors of students considering the online nature of education. Students are also more prone to online learning showing vivid intentions for digital learning behavior. Furthermore, this has also freed the students from the strict timings of university, providing online recordings of the lectures available anytime. Moreover, goal-setting behavior and social pressures have augmented the digital learning behaviors among students. These findings have been an important milestone in this pandemic for teachers and institutes in making their course outlines and learning more effective for students. This research has several implications for future researchers and e-commerce players who are interested in repeating this research with their available resources in different regions. These can be exploited well in finding new avenues for certain research like this.

STUDY LIMITATIONS

There are certain limitations of the study toward digital learning behaviors such as solo acts. In digital learning, students have to learn independently; they need personal coaching and contact with the instructor. No matter how difficultly we strive to convert verbal interactions to digital sites completely, and no matter how normal it appears to make connections across digital screens, an online reality can never be fully human. None can ever be a substitute for personal contact. Thirdly, constantly being connected to digital resources is the new normal. Still, the fact is that excessive usage of a laptop or tablet can lead to impaired vision, physical difficulties, and strain injuries. Fourthly, it is doubtful that your digital learning audience will be inspired to self-study if they have so little self-discipline. Lastly, there is always a possible lack of control so, there is no guarantee that your messages will be received, no matter how carefully you plan your eLearning course. You give your students autonomy over their digital learning experience, which is fantastic, but will they use it efficiently? There is still the possibility that students will just skim through the information without paying attention. These are some limitations that need to be kept in mind while designing further digital learning behaviors.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Xian Technological University, China.

AUTHOR CONTRIBUTIONS

PZ conceived and designed the concept, literature review, data collection and wrote the manuscript. The author has read and agreed to the published version of the manuscript.

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REFERENCES

Aditya, D. S. (2021). Embarking digital learning due to COVID-19: Are teachers ready? *JOTSE J. Technol. Sci. Educ.* 11, 104–116.

Alabdulaziz, M. S. (2021). COVID-19 and the use of digital technology in mathematics education. *Educ. Inf. Technol.* 2021, 1–25.

Albano, R., Curzi, Y., and Parisi, T. (2021). *Does Control Change Nature in Industrial Digital Work? A Secondary Analysis of the 1991–2015 European Working Conditions Surveys in The Collective Dimensions of Employment Relations*. New York, NY: Springer, 81–116.

An, H., Razzaq, A., Nawaz, A., Noman, S. M., and Khan, S. A. R. (2021). Nexus between green logistic operations and triple bottom line: evidence from infrastructure-led Chinese outward foreign direct investment in Belt and Road host countries. *Environ. Sci. Pollut. Res.* 2021, 1–24. doi: 10.1007/s11356-021-12470-3

Asarta, C. J., and Schmidt, J. R. (2020). The effects of online and blended experience on outcomes in a blended learning environment. *Internet High. Educ.* 44:100708. doi: 10.3389/fpsyg.2017.01403

Avotra, A. A. R. N., Chengang, Y., Sandra Marcelline, T. R., Asad, A., and Yingfei, Y. (2021a). Examining the Impact of E-Government on Corporate Social Responsibility Performance: The Mediating Effect of Mandatory Corporate Social Responsibility Policy, Corruption, and Information and Communication Technologies Development During the COVID era. *Front. Psychol.* 12:4221. doi: 10.3389/fpsyg.2021.737100

Avotra, A. A. R. N., Chengang, Y., Wei, X., Ming, J., and Marcelline, T. R. S. (2021b). Struggling With Business Corporate Cynical Impression? Powerful Methods of CSR to Enhance Corporate Image and Consumer Purchase Intention. *Front. Public Heal.* 9:1250. doi: 10.3389/fpubh.2021.726727

Barclay, C., Donalds, C., and Osei-Bryson, K.-M. (2018). Investigating critical success factors in online learning environments in higher education systems in the Caribbean. *Inf. Technol. Dev.* 24, 582–611. doi: 10.1080/02681102.2018.1476831

Broadbent, J., Sharman, S., Panadero, E., and Fuller-Tyszkiewicz, M. (2021). How does self-regulated learning influence formative assessment and summative grade? Comparing online and blended learners. *Internet High. Educ.* 50:100805.

Budd, J., Miller, B. S., Manning, E. M., Lampos, V., Zhuang, M., Edelstein, M., et al. (2020). Digital technologies in the public-health response to COVID-19. *Nat. Med.* 26, 1183–1192.

Cepeda-Carrion, G., Cegarra-Navarro, J.-G., and Cillo, V. (2019). Tips to use partial least squares structural equation modelling (PLS-SEM) in knowledge management. *J. Knowl. Manag.* 23, 67–89. doi: 10.1108/JKM-05-2018-0322

Chang, C.-T., Hajiyev, J., and Su, C.-R. (2017). Examining the students' behavioral intention to use e-learning in Azerbaijan? The general extended technology acceptance model for e-learning approach. *Comput. Educ.* 111, 128–143.

Chen, P. (2018). Research on Sharing Economy and E-Learning in the Era of "Internet Plus.". in *Proceedings of the 2018 2nd International Conference on Education Science and Economic Management (ICESEM 2018)* (ICESEM)751–754. doi: 10.2991/ICESEM-18.2018.173

Chittenden, T. (2021). A digital distraction? The role of digital tools and distributed intelligence in woodblock printmaking practice. *Digit. Creat.* 2021, 1–23.

Cicha, K., Rizun, M., Rutecka, P., and Strzelecki, A. (2021). COVID-19 and higher education: first-year students' expectations toward distance learning. *Sustainability* 13:1889.

Cidral, W. A., Oliveira, T., Di Felice, M., and Aparicio, M. (2018). E-learning success determinants: Brazilian empirical study. *Comput. Educ.* 122, 273–290. doi: 10.1016/j.compedu.2017.12.001

de Souza Rodrigues, M. A., Chimenti, P., and Nogueira, A. R. R. (2021). An exploration of eLearning adoption in the educational ecosystem. *Educ. Inf. Technol.* 26, 585–615. doi: 10.1007/s10639-020-10276-3

Devries, J. M., Rathmann, K., and Gebhardt, M. (2018). How Does Social Behavior Relate to Both Grades and Achievement Scores? *Front. Psychol.* 9, 1–8. doi: 10.3389/fpsyg.2018.00857

García-Peñalvo, F. J. (2021). Avoiding the dark side of digital transformation in teaching. An institutional reference framework for eLearning in higher education. *Sustainability* 13:2023.

Goldman, G. (2021). 'We are all just prisoners here of our own device': The moral challenge of balancing technology, work and capitalistic pursuits. *TD J. Transdiscipl. Res. South. Africa* 17, 1–10.

Haq, I. U., and Awan, T. M. (2020). Impact of e-banking service quality on e-loyalty in pandemic times through interplay of. - *XIMB J. Manag.* 17, 39–55.

Herodotou, C., Muirhead, D. K., Aristeidou, M., Hole, M. J., Kelley, S., Scanlon, E., et al. (2020). Blended and online learning: a comparative study of virtual microscopy in Higher Education. *Interact. Learn. Environ.* 28, 713–728.

Herrador-Alcaide, T. C., Hernández-Solís, M., and Sanguino Galván, R. (2019). Feelings of satisfaction in mature students of financial accounting in a virtual learning environment: an experience of measurement in higher education. *Int. J. Educ. Technol. High. Educ.* 16:20. doi: 10.1186/s41239-019-0148-z

Howell, R., van Beers, C., and Doorn, N. (2018). Value capture and value creation: The role of information technology in business models for frugal innovations in Africa. *Technol. Forecast. Soc. Change* 131, 227–239.

Hromalik, C. D., Myhill, W. N., Ohrazda, C. A., Carr, N. R., and Zumbuhl, S. A. (2021). Increasing Universal Design for Learning knowledge and application at a community college: the Universal Design for Learning Academy. *Int. J. Incl. Educ.* 2021, 1–16.

Huo, C., Hameed, J., Nawaz, A., Adnan Raheel Shah, S., Albahser, G., Alqahtani, W., et al. (2021). Scientific risk performance analysis and development of disaster management framework: A case study of developing Asian countries. *J. King Saud Univ. Sci.* 33:101348. doi: 10.1016/j.jksus.2021.101348

Husain, S. F., Yu, R., Tang, T.-B., Tam, W. W., Tran, B., Quek, T. T., et al. (2020). Validating a functional near-infrared spectroscopy diagnostic paradigm for Major Depressive Disorder. *Sci. Rep.* 10, 1–9. doi: 10.1038/s41598-020-66784-2

Isaac, O., Aldholay, A., Abdullah, Z., and Ramayah, T. (2019). Online learning usage within Yemeni higher education: The role of compatibility and task-technology fit as mediating variables in the IS success model. *Comput. Educ.* 136, 113–129. doi: 10.1016/j.compedu.2019.02.012

Khalil, M., Khawaja, K. F., and Sarfraz, M. (2021). The adoption of blockchain technology in the financial sector during the era of fourth industrial revolution: a moderated mediated model. *Qual. Quant.* 2021, 1–18.

Kirkwood, A., and Price, L. (2006). Adaptation for a Changing Environment: Developing learning and teaching with information and communication technologies. *Int. Rev. Res. Open Distrib. Learn.* 7:294. doi: 10.19173/irrodl.v7i2.294

Kisin, N. (2021). "Technological Aids, IT-Applications and Online Education in English Language Teaching and Learning," in *Sinteza 2021-International Scientific Conference on Information Technology and Data Related Research*, (Singidunum University), 254–258.

Kreijns, K., Van Acker, F., Vermeulen, M., and Van Buuren, H. (2013). What stimulates teachers to integrate ICT in their pedagogical practices? The use of digital learning materials in education. *Comput. Human Behav.* 29, 217–225.

Lasfeto, D. (2020). The relationship between self-directed learning and students' social interaction in online learning environment. *J. e-learning Knowl. Soc.* 16, 34–41.

Lemes, V. B., Araujo Gaya, A. C., Brand, C., Dias, A. F., Cristi-Montero, C., Mota, J., et al. (2021). Associations among psychological satisfaction in physical education, sports practice, and health indicators with physical activity: Direct and indirect ways in a structural equation model proposal. *Int. J. Pediatr. Adolesc. Med.* 8, 246–252. doi: 10.1016/j.ijpam.2020.11.004

Li, X.-T., Zou, J., Wang, T.-H., Ma, H.-C., Chen, G.-J., and Dong, Y.-B. (2020). Construction of covalent organic frameworks via three-component one-pot Strecker and Povarov reactions. *J. Am. Chem. Soc.* 142, 6521–6526. doi: 10.1021/jacs.0c00969

Liébana-Presa, C., Martínez-Fernández, M. C., Benítez-Andrades, J. A., Fernández-Martínez, E., Marqués-Sánchez, P., and García-Rodríguez, I. (2020). Stress, Emotional Intelligence and the Intention to Use Cannabis in Spanish Adolescents: Influence of COVID-19 Confinement. *Front. Psychol.* 11, 1–9. doi: 10.3389/fpsyg.2020.582578

Lin, M., and Chen, H. (2017). A Study of the Effects of Digital Learning on Learning Motivation and Learning Outcome. *Eur. J. Math. Sci. Tech. Educ.* 8223, 3553–3564. doi: 10.12973/eurasia.2017.00744a

Linkov, I., Trump, B. D., Poinsatte-Jones, K., and Florin, M.-V. (2018). Governance strategies for a sustainable digital world. *Sustainability* 10:440.

Moore, J. L., Dickson-Deane, C., and Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same? *Internet High. Educ.* 14, 129–135. doi: 10.1016/j.iheduc.2010.10.001

Mousavi, A., Mohammadi, A., Mojtahedzadeh, R., Shirazi, M., and Rashidi, H. (2020). E-Learning Educational Atmosphere Measure (EEAM): A New

Instrument for Assessing E-Students' Perception of Educational Environment. *Res. Learn. Technol.* 2020:28.

Muir, I. L., Munroe-Chandler, K. J., Loughead, T. M., Sutherland, C. A., and Hawksley, K. G. (2020). The UWorkItOut UWin Program: Improving university students' psychological distress through physical activity. *Int. J. Kinesiol. Sport. Sci.* 8, 36–44.

Nawaz, A., Waqar, A., Shah, S. A. R., Sajid, M., and Khalid, M. I. (2019). An innovative framework for risk management in construction projects in developing countries: Evidence from Pakistan. *Risks* 7:7010024. doi: 10.3390/risks7010024

Oke, A., and Fernandes, F. A. P. (2020). Innovations in teaching and learning: Exploring the perceptions of the education sector on the 4th industrial revolution (4IR). *J. Open Innov. Technol. Mark. Complex.* 6:31.

Richey, R. G., Genchev, S. E., and Daugherty, P. J. (2005). The role of resource commitment and innovation in reverse logistics performance. *Int. J. Phys. Distrib. Logist. Manag.* 35, 233–257.

Sarfraz, M., Mohsin, M., Naseem, S., and Kumar, A. (2021). Modeling the relationship between carbon emissions and environmental sustainability during COVID-19: A new evidence from asymmetric ARDL cointegration approach. *Environ. Dev. Sustain.* 2021, 1–19. doi: 10.1007/s10668-021-01324-0

Sarfraz, M., Qun, W., Hui, L., and Abdullah, M. I. (2018). Environmental risk management strategies and the moderating role of corporate social responsibility in project financing decisions. *Sustainability* 10:2771.

Sarfraz, M., Shah, S. G. M., Ivascu, L., and Qureshi, M. A. A. (2020). Explicating the impact of hierarchical CEO succession on small-medium enterprises' performance and cash holdings. *Int. J. Financ. Econ.* 2020:2289. doi: 10.1002/ijfe.2289

Sayaf, A. M., Alamri, M. M., Alqahtani, M. A., and Al-Rahmi, W. M. (2021). Information and Communications Technology Used in Higher Education: An Empirical Study on Digital Learning as Sustainability. *Sustainability* 13:7074.

Scully, D., Lehane, P., and Scully, C. (2021). 'It is no longer scary': digital learning before and during the Covid-19 pandemic in Irish secondary schools. *Technol. Pedagog. Educ.* 30, 159–181.

Sein-Echaluce, M. L., Fidalgo-Blanco, A., García-Peñalvo, F. J., and Balbín, A. M. (2020). *Global Impact of Local Educational Innovation in International Conference on Human-Computer Interaction*. New York, NY: Springer, 530–546.

Shehzad, K., Xiaoxing, L., Sarfraz, M., and Zulfiqar, M. (2020). Signifying the imperative nexus between climate change and information and communication technology development: a case from Pakistan. *Environ. Sci. Pollut. Res.* 27, 30502–30517. doi: 10.1007/s11356-020-09128-x

Shkarlet, S., Oliychenko, I., Dubyna, M., Ditkovska, M., and Zhovtok, V. (2020). Comparative analysis of best practices in e-Government implementation and use of this experience by developing countries. *Adm. si Manag. Public* 2020, 118–136.

Sprenger, D. A., and Schwaninger, A. (2021). Technology acceptance of four digital learning technologies (classroom response system, classroom chat, e-lectures, and mobile virtual reality) after three months' usage. *Int. J. Educ. Technol. High. Educ.* 18, 1–17.

Syauqi, K., Munadi, S., and Triyono, M. B. (2020). Students' Perceptions toward Vocational Education on Online Learning during the COVID-19 Pandemic. *Int. J. Eval. Res. Educ.* 9, 881–886.

Syed, A. M., Ahmad, S., Alaraifi, A., and Rafi, W. (2021). Identification of operational risks impeding the implementation of eLearning in higher education system. *Educ. Inf. Technol.* 26, 655–671.

Taylor, N. K., Aboelata, N., Mahoney, M., Seay-Morrison, T., Singh, B., Chang, S.-I., et al. (2021). Building bridges between community health centers and academic medical centers in a COVID-19 pandemic. *J. Am. Board Fam. Med.* 34, S229–S232. doi: 10.3122/jabfm.2021.S1.200182

Tohara, A. J. T. (2021). Exploring Digital Literacy Strategies for Students with Special Educational Needs in the Digital Age. *Turkish J. Comput. Math. Educ.* 12, 3345–3358.

Vermeulen, M., Kreijns, K., Van Buuren, H., and Van Acker, F. (2017). The role of transformative leadership, ICT—infrastructure and learning climate in teachers' use of digital learning materials during their classes. *Br. J. Educ. Technol.* 48, 1427–1440.

Zhu, Y., Zhang, J. H., Au, W., and Yates, G. (2020). University students' online learning attitudes and continuous intention to undertake online courses: A self-regulated learning perspective. *Educ. Technol. Res. Dev.* 68, 1485–1519.

Zulfiqar, S., Al-reshidi, H. A., Al Moteri, M. A., Feroz, H. M. B., Yahya, N., and Al-Rahmi, W. M. (2021). Understanding and Predicting Students' Entrepreneurial Intention through Business Simulation Games: A Perspective of COVID-19. *Sustainability* 13:1838.

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Role of Education and Mentorship in Entrepreneurial Behavior: Mediating Role of Self-Efficacy

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Farmers have been very precious for societies for ages. Their active experiments, valuable knowledge about their surroundings, environment, and crops' requirements have been a vital part of society. However, the psychological perspectives have been a hole in the loop of farming. Hence, this study has investigated the antecedents of entrepreneurial behaviors of farmers with the mediating risk of their entrepreneurial self-efficacy (ESE). The population chosen for this study was the farming community of suburbs of China, and a sample size of 300 was selected for the data collection. This is a survey study, where a structured questionnaire was adapted on a five-point Likert scale. The data were collected from the farming community to know their psychological and behavioral preferences about their profession. This study has produced interesting results that education, training, and intrinsic motivation play a vital role in farmers' ESE, affecting their entrepreneurial behaviors. This study will add to the body of knowledge and provide an eminent path for emerging entrepreneurs to find more mentorship opportunities to overcome the limitations in upcoming endeavors influencing education and training.

Keywords: education, training, entrepreneurial self-efficacy, entrepreneurial behavior, intrinsic motivation

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INTRODUCTION

Numerous research on farmers' education and entrepreneurial behavior revealed that there is a link between education and agricultural innovation (Yoshida et al., 2019). The link between education and entrepreneurship is a subject of conflicting data, and it might be positive or negative, significant or insignificant (Lipset, 2018). Farmers with a basic education were 8.7% more innovative and productive than farmers with no education, according to a World Bank survey performed in 1992 to assess the link between farmer education and agricultural efficiency in low-income nations (Bachewe et al., 2018). According to the World Bank's findings, there is a favorable link between a farmer's educational level and innovation in production (Zulfiqar and Thapa, 2018).

In a study on the impact of education on agriculture performed in Nepal, researchers discovered that education increases innovative agricultural production largely through boosting farmers' decision-making abilities and, secondarily, by reducing their technical efficiency (Paudel et al., 2020). The phrase "technical efficiency" refers to a farmer's capacity to make better input decisions and make more economically sound judgments. Entrepreneurship is a subject of study that continuously expands its boundaries to better comprehend it, including the farming sector (Dias et al., 2019). Some regard entrepreneurship as a distinct profession, similar to Schumpeter's creativity as a vital engine of economic growth and employment creation. This is also the most prevalent reason why professionals and academics advocate for entrepreneurial education. Business historians pioneered the study of entrepreneurship between 1940 and 1950 (Pérez, 2019).

Nevertheless, the study of entrepreneurship came across severe methodological hurdles, leaving the research fragmented and marginalized. Globally, there has been a growing interest in entrepreneurship in recent decades. Entrepreneurship is now widely regarded as a source of job creation and economic growth (Kim et al., 2018). It is credited for beginning technical advancement, which is a key engine of socioeconomic progress. Entrepreneurship has the potential to open up agricultural prospects in China and drive growth in the economy (Qobo and Le Pere, 2018). The most significant aspect of a person's entrepreneurial performance is his/her entrepreneurial intention. Studies have highlighted family education, economic growth, governmental, entrepreneurial orientation, and associated incentive programs and technical assistance, and geographical entrepreneurial atmosphere as essential determinants inside the entrepreneurial environment.

Furthermore, various psychological models of entrepreneurship have been presented to explain an individual's entrepreneurial purpose and actions in light of the interplay between internal and external influences (Wang et al., 2016). The Theory of Planned Behavior is now the most important of these frameworks. Training can help you to develop the personality qualities, abilities, and skills needed and become an entrepreneur (An et al., 2021). Studies have found adverse association between financial performance and boardroom gender diversity (Ajaz et al., 2020). Earnings management plays a moderating role in the cash holdings (Sarfraz et al., 2020a).

Entrepreneurship is necessary for smallholder farmers' survival in an ever-changing and increasingly complicated global market. Researchers say there are chances for expanding knowledge of the historical impact of values and culture on entrepreneurial behavior, using more careful techniques than in the past, and attempting to clarify the relevance of culture and its relationship to certain other variables (Xialong et al., 2021). There are several perspectives on who qualifies as an entrepreneur. Even though academics believe that a collection of entrepreneurial activities defines an entrepreneur, this set is not well defined. The goal of this desk research was to uncover farmers' entrepreneurial habits. This study aimed to find an answer to the following research question: What characteristics of entrepreneurial conduct characterize farmers?

The farmers mostly acquire business abilities through a process of studying by doing rather than through formal schooling. Entrepreneurial education has been suggested as a necessary component of acquiring entrepreneurship and company management abilities (Šūmane et al., 2018; Shah et al., 2020). Entrepreneurial learning identifies and takes advantage of possibilities by starting, organizing, and managing a business socially and behaviorally. Entrepreneurship among the farming community contributes to multifaceted development in various ways, including assembling and harnessing various inputs, taking risks, innovating and imitating production techniques to reduce costs while increasing amount and quality, open marketplace frontiers, and organizing the production plant at different levels.

Starting a private enterprise like a farm may be difficult and time-consuming, so there is an increasing wealth of data on the entrepreneurial skills required to operate and expand a farm (Van der Burg et al., 2019). Mentorship can help farmers develop entrepreneurial skills. However, the effects of mentoring on entrepreneurial learning have only been studied to a limited extent (Ferreira et al., 2020). As a result, farmer-mentoring programs targeted at helping farmers' development and learning have been examined to see how the mentoring idea is included, what types of learning are encouraged, and what impacts on entrepreneurship training are discovered (Permadi et al., 2020). The sociological dimension to entrepreneurial orientation involves engaging with other people, businesses, and those outside the company. The behavioral aspect of entrepreneurial orientation reflects the learning in both the farmer's and the farming conduct (Niewolny and Whitter-Cummings, 2020).

Different types of farmer mentorship programs have been established to help farmers develop their entrepreneurial and farm management abilities, based on concepts from small business-supporting systems in non-agricultural industries (Sinyolo and Mudhara, 2018). While several studies discuss farmer mentorship programs, there are not many. The previous work focuses on discussing how these programs are put up. It is not specific about the benefits and drawbacks of such initiatives. Overall, studies of the impact of mentorship programs on entrepreneurship training have been undertaken (Jamaluddin et al., 2019). This is where the article hopes to help. As a result, we look into the benefits of entrepreneurial orientation from two previous mentorship programs. These programs assist farmers in honing their business and farm management abilities and putting them to good use.

The learning environment has a significant influence on self-efficacy views. Learning takes place in a social setting. The behaviors of others in the social environment and the intrinsic qualities of the culture in which learning occurs influence everyone's constructs (Seah, 2018). Self-efficacy aids learning by encouraging endurance and giving the impression that one can attempt new approaches. As farmers grow more efficient, they become more conscious of how their new information is built on top of their prior knowledge. Agricultural extension education programs, for example, can offer farmers new information to boost self-efficacy while engaging in vicarious, enactive, and social experiences (Widyani et al., 2017). While there is a wealth of literature on educating and mentoring farmers to improve their entrepreneurial behavior, research on the use of self-efficacy as a mediating variable in farmer entrepreneurial behavior is still missing (Al-Shammari and Waleed, 2018). Limited research has utilized self-efficacy as a mediating variable in farmer entrepreneurial activity, according to this study.

According to literature, research using self-efficacy as a mediating variable has been conducted in academic motivation, career intention, organizational citizenship behavior, and treatment adherence (Klassen and Klassen, 2018). Self-efficacy has been utilized as a mediating variable by certain investigations. However, they have focused on other criteria such as goals and achievement, ethical leadership, technical inventiveness in sports, and the perceived academic atmosphere. Furthermore, previous research emphasizes self-efficacy as a predictor of information sharing behavior. Because there is minimal research investigating the mediation impact of self-efficacy on the entrepreneurial

behavior of farmers, particularly in the agricultural environment, self-efficacy is used as a mediating variable in this study. This study revolved around certain objectives as follows: (1) To identify the role of education and training to entrepreneurial self-efficacy (ESE), (2) To analyze the role of mentorship and intrinsic motivation to self-efficacy, and (3) To investigate the antecedents of entrepreneurial behaviors of farmers with the mediating risk of their ESE.

LITERATURE REVIEW

Education and Training on Self-Efficacy

Entrepreneurship is a skill that may be gained through education (Nowiński et al., 2019). Among the essential sources of economic progress is entrepreneurship (Wardana et al., 2020). Farmers have emerged as rising entrepreneurial subjects due to legislative incentives and the current economic circumstances (Peng et al., 2015). Entrepreneurship is widely viewed as a significant and successful means of addressing challenges such as agricultural development, farmer revenue, and the farming industry, and it has attracted public attention (Elnadi and Gheith, 2021). Studying the elements that influence their motivation to innovate might help entrepreneurs to improve their position and performance. This research examines the effects of farmers' entrepreneurial education and self-efficacy on their entrepreneurial orientation from the framework of perceived behavioral control. Entrepreneurial education has a considerable favorable impact on farmers' entrepreneurship intention but no apparent impact on their entrepreneurial intentions (Nurlaela et al., 2020). According to this research, entrepreneurship can be learned by "learning by doing" in the course about becoming an entrepreneur, as well as from related entrepreneurship courses. Entrepreneurial education strives to improve the quality of entrepreneurship, aspiration, drive, innovation, and entrepreneurial spirit among farmers in order to prepare them for a certain profession, organization, or business strategy (Karimi, 2019). It also attempts to help entrepreneurs acquire the conceptual resources and competencies they need to succeed and uncover and recognize business possibilities. Several entrepreneurial training programs have been hosted by universities and linked external institutions in recent years, and these programs have steadily received recognition. Farmers in such programs are typically aspiring business people or entrepreneurs who believe they will lack the necessary knowledge and skills after beginning a business (Abraham, 2020).

These participants hope that by participating in such programs, they will develop their entrepreneurial skills and gain the ability to generate, comprehend, and pursue possibilities. In social psychology, behavior is described as a personal perception that includes subjective evaluations of oneself, people, affairs, actions, and events, among other things. It also significantly impacts a person's responses and conduct (Darmanto and Yuliari, 2018). Entrepreneurial education is said to instill a sense of entrepreneurship in people and influence their perception and motivation. Entrepreneurial training and education can increase people's managerial skills while also changing their awareness and attitudes regarding entrepreneurship (Liu et al., 2019). The goal of entrepreneurship education is to assist people in developing their entrepreneurial skills. As a result, this hypothesis suggests that an individual's attitude toward entrepreneurship is strongly connected to their business expertise. Self-learning and external entrepreneurial spirit training can strengthen the farmers' understanding of the entrepreneurial process and infuse them with a proactive approach (Fuller et al., 2018).

When it comes to beginning a new firm, entrepreneurs believe that having a strong entrepreneurial intention is a must. Entrepreneurial purpose refers to a person's determination to start a new business and to see it through to completion. Studies have shown that entrepreneurial training boosts entrepreneurs' entrepreneurial intentions and behaviors and improves their entrepreneurial performance (Akhtar, 2021). As a result, we believe that entrepreneurial education can help farmers with entrepreneurial orientation or potential to build entrepreneurial skills and knowledge and boost their chances of launching a firm (Liang and Chen, 2020). Keeping in view the role of education for entrepreneurship, the following hypothesis was devised.

***H1**: Education and training play a role in ESE*

Mentorship in Entrepreneurial Self-Efficacy

Entrepreneurial self-efficacy seems to be triggered in part by entrepreneur mentorship (St-Jean and Tremblay, 2020). Compared with someone with low self-efficacy, a farmer with high self-efficacy is more willing to pursue and complete a task (Elliott et al., 2020). The level of reported self-efficacy in one area is frequently unrelated to perceived self-efficacy in some other (Baluku et al., 2020). Scholars of entrepreneurship have established the concept of "entrepreneurial self-efficacy" to concentrate on activities in the entrepreneurial domain to improve the prediction performance of self-efficacy assessments (Neneh, 2020). According to social learning theory, the most crucial contributions to enhancing self-efficacy in the mentorship relationship are parallel learning and motivation from mentors. Although theoretically and empirically support the impact of mentoring on self-efficacy, particularly in the entrepreneurial context, longitudinal data illustrate this relationship (Dunning, 2021). As a result, whether mentorship has a long-term or short-term influence on self-efficacy, as well as the circumstances under which this effect might be sustained, are yet unknown (Akyavuz and Asici, 2020). The primary purpose of this research is to see if mentoring could help beginner entrepreneurs to build their ESE. Entrepreneurial mentorship matches a new entrepreneur with a seasoned one who can offer guidance and methods of thinking to help the newbie avoid expensive and even deadly blunders (Blaique and Pinnington, 2021; Pereyra et al., 2021). Government agencies have put initiatives to assist entrepreneurs in the early stages of their business; mentorship is one of these programs (Hillemane, 2020). Mentorship is a term that comes from Homer's Odyssey, in which the hero Odysseus entrusts his son Telemachus to his companion Mentor while he is at war. A mentor is a person who, influenced by Greek mythology, has specific attributes or is in a place of authority and who

compassionately watches over a younger person so that they might benefit from the mentor's support and counsel. Mentoring assistance is provided in various settings, including, but not limited to, aiding impoverished adolescents (Jafar et al., 2021).

This research is about mentorship in a stand-alone aggregate capacity, face-to-face, structured process with benevolent, accomplished business professionals who want to give back to local communities by assisting beginner entrepreneurs (Kuratko et al., 2021). Mentors help mentees to develop self-efficacy by providing vicarious experiences as positive examples, allowing them to evaluate and enhance their entrepreneurial and business competencies through social comparison and imitation (van Esch et al., 2021). Mentorship functions evaluate the strength and depth of the mentorship received and so serve as a substitute for the relationship's effectiveness (Lefebvre et al., 2020). We propose the following hypothesis, knowing that performing mentorship responsibilities throughout a mentee will likely increase the farmer's self-efficacy. To analyze the role of mentorship toward farmers' self-efficacy, the following hypothesis was formulated.

H2: *Mentorship plays a role in ESE*

Role of Intrinsic Motivation in Entrepreneurial Self-Efficacy

The relevance of task variety and task identity includes job importance, freedom, feedback, and psychological states, including work purpose, experienced accountabilities, and awareness of work outcomes (Çetin and Aşkun, 2018). In this model, increasing task-related motivation necessitated numerous interventions, particularly at the organizational and managerial levels, while growing psychological states was partially dependent on the individual employee, as an experienced role for the outcomes and understanding of work results were also dependent on task complexity, layout, and managerial behaviors (Lazzara et al., 2021). The importance of personal characteristics reminded us of the potential impact of self-efficacy, which may manifest as increased responsibility for consequences and understanding of outcomes. In the association between core personality and in-role work performance, intrinsic motivation played a partly mediation role (Kelley et al., 2020).

The researchers also stressed the need to conduct this sort of research in a non-Western setting because few studies exist in this field. While attempting to anticipate the impacts of self-efficacy and daily job creation on work productivity, a mediator function for work satisfaction was identified (Miraglia et al., 2017). It is worth noting that intrinsic motivation differentiates from job enjoyment in that it is the result of an activity rather than the process of doing it. Intrinsic motivation arises as a result of engaging in a particular activity. On the other hand, work happiness usually refers to a state of flow (Fischer et al., 2019). We felt very confident in suggesting that intrinsic motivation would perhaps serve as an intermediary between self-efficacy and inspiration and between self-efficacy and achievement, with significant explanatory significant contribution from social cognitive theory (SCT), self-determination theory (SDT), and core self-evaluations theory. Similarly, we felt confident in suggesting that intrinsic motivation would perhaps serve as a mediator among consciousness and effectiveness, with job characteristics and accurate information (Mahasneh and Alwan, 2018).

H3: *Intrinsic motivation plays a role in ESE*

Role of Entrepreneurial Self-Efficacy Toward Entrepreneurial Behavior

Entrepreneurship has been shown to significantly affect economic growth, creating jobs, and creativity in a country (Li et al., 2020). Entrepreneurial passion is linked to good thoughts and attitudes toward activities that are important to one's self-identity. Self-efficacy is a basic element of SCT, which promotes farmers' tendency to fulfill their obligations and meet their goals (Shaheen and AL-Haddad, 2018). When adjusted to a shared activity context, self-efficacy is regarded to become a very perspective-specific attribute that leads to a greater outcome-forecasting rate. The ability to establish creative business solutions and a higher level of entrepreneurial passion appears to be the basis of having entrepreneurial aspirations (Jiang et al., 2017). The environmental quality has been improved during coronavirus disease (COVID-19) (Sarfraz et al., 2020b). However, there is a resemblance between self-efficacy and expectation theory since both are personality tools. The latter would be cognitively founded on the following presumptions: the probability that exertion will lead to quality level and the possibility that competence will result (Shaheen and AL-Haddad, 2018). On the other hand, self-efficacy is engaged with implementing the activity rather than the consequence (Haddad and Taleb, 2016). It was shown that self-efficacy positively mediated the relationship between improvisation behavior and the entrepreneurial process. It would further underline how important it is to effectiveness and entrepreneurial behavior (Khalil et al., 2021).

The entrepreneurial choice is motivated by the entrepreneurs' skills, understanding, expertise, intelligence, learning, and behavioral intention. As stated previously in this research, intentions can lead to organizational innovation if they are properly implemented; furthermore, motivating factors, skills, and comprehension all influence entrepreneurship behavior (McGee and Peterson, 2019). Entrepreneurial behaviors were formerly thought of as discrete units of individual effort that can be identified by an audience and seem to have significance for that audience; however, according to this description, entrepreneurial behavior is carried out by the people who combine to form these organizations, not by organizations or teams (Haddad and Taleb, 2016). The literature provided the basis for the creation of the following hypothesis.

H4: *ESE plays a role in entrepreneurial behavior*

Mediation of Entrepreneurial Self-Efficacy in Role of Education and Training in Entrepreneurial Behavior

Entrepreneurship can help promote global entrepreneurship and innovation, speed economic growth, close the wealth gap across regions, tackle employment, diversity, and poverty issues, and encourage the long-term success of businesses

(Morozova et al., 2019). Entrepreneurship may improve economic performance, achieve market development, expand job opportunities, and maintain employment levels; hence, the amount of entrepreneurship in a country is critical (Hernández-Carrión et al., 2017). Entrepreneurial intention directs people's attention, experience, and behaviors toward a certain entrepreneurial goal. ESE is a necessary condition for entrepreneurship ability (Asimakopoulos et al., 2019).

Entrepreneurial self-efficacy could be used to anticipate possible entrepreneurs' ESE and conduct (Schmutzler et al., 2019). Individuals with strong entrepreneurial consciousness believe the world is full of chances. In contrast, those who have levels of ESE see the world through the lens of cost and danger. People with high ESE are better at seizing possibilities for achievement, can more accurately forecast the future, and have much more energy to spend on entrepreneurial tasks in the face of problems, risks, and uncertainty (Şahin et al., 2019).

It is proposed that significant others' normative beliefs regarding entrepreneurship impart an inherent resourcefulness quality, which supports the interactive effects of subjective norms upon entrepreneurial aspirations, performance expectancy, and thus entrepreneurial ambitions (Sims and Chinta, 2019). Self-efficacy is a person's belief in his/her capacity to do a set of tasks or activities successfully. Self-efficacy, strongly linked to deliberate action, impacts an individual's views of a circumstance and how he/she adapts to it (Al-Ghazali and Afsar, 2021). The following hypothesis was formed to test the significance of the mediating role of ESE.

H5: *ESE mediates the role of education and training in entrepreneurial behavior*

The Mediating Role of Entrepreneurial Self-Efficacy for Intrinsic Motivation in Entrepreneurial Behavior

Self-efficacy has long been thought to be a significant predictor of entrepreneurial intent. Roblek et al. (2020) defined self-efficacy as "a person's experience in his or her capacity to complete a task." It is a person's belief in his/her ability to complete a task or overcome a difficult situation. ESE is the perception that talents may be applied to accomplish specific goals (Schmitt et al., 2018). ESE is significantly associated with entrepreneurial intention, according to previous studies. In entrepreneurial education, self-efficacy is frequently utilized to accurately predict entrepreneurial ambitions (Zeb et al., 2019). In entrepreneurial intention, self-efficacy is commonly utilized to predict entrepreneurial intents better and explain the complicated entrepreneurial behavior of bringing the latest entrepreneurs (Mouselli and Khalifa, 2017). Individuals determine their skills to execute the anticipated activity based on how strongly or adversely stimulated they feel about a specific task before beginning a business. Starting a business involves various hurdles and risks to entrepreneurs (Oparin et al., 2017). As a result, to start a new profitable business, individuals must have faith in themselves that they will be capable of overcoming the various problems that may arise and achieve their objectives with the abilities they possess. As a result, numerous behavioral models have been expanded and adjusted to have included self-efficacy as a significant driver of entrepreneurial desire.

Entrepreneurial self-efficacy was also proposed to moderate the influence of proactive behavior and innovation on entrepreneurial intention in the study (Son et al., 2018). Self-efficacy is a concept drawn from social learning theory that refers to a person's belief during his/her capacity to complete a task. External factors, observational learning, and social modeling all influence ESE, acting as both facilitators and barriers; consequently, ESE focuses on the emotional structure that allows people to believe they are capable of performing various tasks and behaviors in a dynamic environment (Ahmed et al., 2020). As a result, those with a strong sense of personal are more likely to start a new business. As a result, we shall forecast this theory. Based upon the literature, the following hypothesis was devised.

H6: *ESE mediates the role of intrinsic motivation in entrepreneurial behavior*

Based upon the literature review, this research was designed, and the following conceptual framework was developed. The research revolves around this, see **Figure 1**.

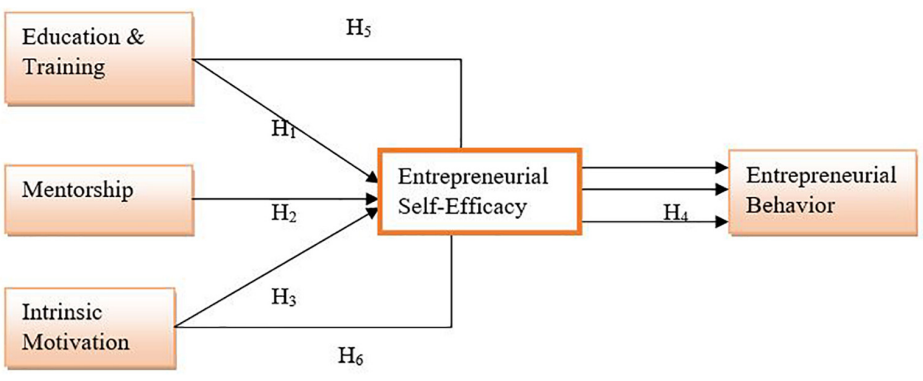

FIGURE 1 | Conceptual model.

RESEARCH METHODS

In this section of the article, the methodology used in this study has been explained. The relationships for the hypotheses developed from the literature review are measured in this section. Variables of interest in this study are ESE and entrepreneurial behavior as a result. This study follows a post-positivist approach where the variables are quantified and measured using objective theories (Creswell and Creswell, 2018). Hence, among quantitative and qualitative approaches for data analysis, this study incorporates the quantitative methods for analyzing the data. The data is analyzed to obtain the results regarding the relationship between education and training, mentorship, and intrinsic motivation with entrepreneurial behavior and ESE risks involved (Mustafa et al., 2018). This is a cross-sectional study where the data was collected through a questionnaire designed with structured questions. The questionnaire was planned by adapting the scales used in previous studies for measuring the same variables. It contained 27 items in total following an interval scaling (Hernández-Carrión et al., 2017; Şahin et al., 2019; Al-Ghazali and Afsar, 2021). The population used in this study is the farmer community in China suburbs. The respondents were selected through convenient random sampling since approaching such a scattered community was a challenge in itself with time constraints. The total usable questionnaire in this study was 300. The data were analyzed using software SmartPLS 3.3.3. The demographic sheet used in this questionnaire contained five questions that included age, gender, education, and ownership or employed status with name as optional. The age and education were categorized into five brackets, while the status was categorized into two as owner or employed. The data obtained were analyzed using frequencies and percentages. The obtained results are mentioned in **Table 1**.

TABLE 1 | Demographic summary.

Demographic summary	Frequency	%
Gender		
Male	238	79.33
Female	62	20.66
Age		
<25	24	0.08
25–30	18	0.06
31–40	67	22.33
41–50	105	35.00
50>	86	28.66
Education		
Higher secondary	169	56.33
Bachelor	98	32.66
Masters	21	0.07
Doctorate	–	–
Others	10	0.03
Status		
Owner	229	76.33
Employed	71	23.66

N = 300.

Instrument Development

This study used a questionnaire that contained a demographic sheet and the structured items of each corresponding variable. The questionnaire consisted of 27 items; each item was measured with its particular scale developed in the past by different researchers. The scales were adapted accordingly. It was designed on a five-point Likert scale where the responses were classified into five categories ranging from strongly disagree to agree strongly. There were five variables in the questionnaire. The dependent variable of the study, that is, entrepreneurial behavior, was measured with eight items. The mediating variable, ESE, was measured with four items, while the independent variables were education and training with six items, mentorship with four, and intrinsic motivation with five items. The consolidated questionnaire was tested for reliability using Cronbach alpha (α) reliability and composite reliability. On the other hand, the validity of the data was checked with factor loadings and the correlations and heterotrait-monotrait (HTMT) ratio.

DATA ANALYSIS

The data in this study were analyzed using the software SmartPLS 3.3.3. The statistical tool used for data analysis is structural equation modeling, measured in two stages in this software. The first phase of the analysis used the measurement analysis in which the data were checked for reliability and validity. This study has used the most practicing tests, that is, Cronbach alpha (α) reliability test and the composite reliability. The threshold for alpha (α) reliability, as mentioned by Hair et al. (2017), is 0.70. All the values in this study are above 0.70, ranging from 0.852 to 0.934 for alpha (α) reliability and 0.891 to 0.953 for composite reliability. Hence, the data in this study are reliable. As long as validity is concerned, the data are validated through factor loading. The threshold value for factor loading is said to be 0.60 (Nawaz et al., 2019, Nawaz et al., 2021). All the values in this study are above 0.60 except item M3, which is 0.50, acceptable (Hair et al., 2017). Moreover, the average variance extracted (AVE) should also be above 0.5 (Hair et al., 2017). Hence, the data showed convergent validity. These results can be seen in **Table 2**.

Additionally, the data were also convergently validated using the correlations *via* Fornell and Larcker criterion. The criterion for valid correlation results from this test is that the values in the diagonal, the top value in each column, is the highest than the rest of the values (Peterson and Kim, 2013; Hair et al., 2017). Hence, the data are valid in this study; see **Table 3**.

Another measure to check the validity of data is HTMT ratio. According to Hair et al. (2017), the cutoff value is 0.9. The results for this study meet this criterion; hence, making the data valid for use. The results can be seen in **Table 4**.

In the next phase of structural equation modeling through SmartPLS, the data are analyzed through a structural model *via* a consistent bootstrapping technique. In this stage, the linear relationships of the variables are measured. These relationships are shown in the form of path models. The straight lines show the direct effects, while the indirect effects are measured through

TABLE 2 | Measurement model and descriptive statistics.

Constructs	Code	FD	α	CR	AVE
Education and training			0.871	0.891	0.577
	ET1	0.833			
	ET2	0.697			
	ET3	0.745			
	ET4	0.687			
	ET5	0.806			
	ET6	0.778			
Mentorship			0.934	0.953	0.836
	M1	0.898			
	M2	0.909			
	M3	0.897			
	M4	0.952			
Intrinsic motivation			0.852	0.897	0.645
	IM1	0.770			
	IM2	0.826			
	IM3	0.500			
	IM4	0.916			
	IM5	0.926			
Entrepreneurial self-efficacy			0.894	0.926	0.758
	ESE1	0.882			
	ESE2	0.850			
	ESE3	0.879			
	ESE4	0.872			
Entrepreneurial behavior			0.931	0.943	0.675
	EB1	0.860			
	EB2	0.829			
	EB3	0.832			
	EB4	0.815			
	EB5	0.836			
	EB6	0.787			
	EB7	0.802			
	EB8	0.808			

CR, construct reliability; AVE, average variance extracted; α, Cronbach alpha.

TABLE 3 | Fornell and Larcker criterion.

Variables	E&T	EB	ESE	IM	M
E&T	0.760				
EB	0.597	0.821			
ESE	0.551	0.808	0.871		
IM	0.621	0.804	0.786	0.803	
M	0.468	0.206	0.267	0.375	0.914

E&T, education and training; ESE, entrepreneurial self-efficacy; IM, intrinsic motivation; EB, entrepreneurial behavior.

the mediating variables. The results obtained can be seen in **Figures 2**, **3**.

The results of the structural modeling are shown in the **Table 5**. There were six hypotheses in total. All hypotheses were supported in this study except for mentorship could not find any significance in predicting ESE (*t-statistic* = 2.387; *p-value* = 0.017**). The first hypothesis was about the role

TABLE 4 | Heterotrait-Monotrait ratio.

Variables	E&T	EB	ESE	IM	M
E&T					
EB	0.545				
ESE	0.518	0.880			
IM	0.681	0.882	0.883		
M	0.667	0.221	0.293	0.490	

E&T, education and training; ESE, entrepreneurial self-efficacy; IM, intrinsic motivation; EB, entrepreneurial behavior.

of education and training in ESE (*t-statistic* = 1.467; *p-value* = 0.143). This hypothesis was accepted at 5% CI for two-tailed. For the third hypothesis, intrinsic motivation significantly predicted the ESE (*t-statistic* = 17.890; *p-value* = 0.00***). This is the strongest predictor of ESE, while these three independent variables altogether show 62.75% change in ESE. On the other hand, 65.3% change in entrepreneurial behavior is caused by its subsequent predictors. For H_4, ESE is the biggest predictor of entrepreneurial behavior (*t-statistic* = 35.212; *p-value* = 0.00***), hence supporting the hypothesis. Moreover, the ESE successfully mediated the role of education and training in entrepreneurial behavior (*t-statistic* = 2.378; *p-value* = 0.00***); and intrinsic motivation and entrepreneurial behavior (*t-statistic* = 13.375; *p-value* = 0.00***); hence, supporting H_5 and H_6.

DISCUSSION

This research is based on several hypotheses to analyze the role of education and mentorship in the entrepreneurial behavior of farmers having the mediating risk of ESE. Similarly, the other main relationship of the study was to find the role of education and training, mentorship, and intrinsic motivation in ESE. Of the two major approaches for conducting the research, structural equation modeling was carried out using Smart PLS. A theoretical framework was designed, and questionnaires were sent to the participants. The results supported the hypotheses. The results were also following many researchers, and some were of a different opinion. The possible reasoning for the obtained results is also discussed in this study. A 80% of the respondents were men and 20% were women. They all had different education levels ranging from higher secondary to doctorate.

The cutoff values for reliability are said to be 0.7 (Chang and Chu, 2006). All the values in this study are above 0.70, ranging from 0.852 to 0.934 for alpha (α) reliability and 0.891 to 0.953 for composite reliability. Hence, the data in this study are reliable. The maximum threshold value stated in the literature for factor loadings is 0.6 (Hair et al., 2017; Haq et al., 2020). All the values in this study are above 0.60 except item M3, which is 0.50, acceptable (Peterson and Kim, 2013). The possible reason for getting these results was the authenticity and reliability of the data collected from the participants. Discriminant validity was also tested and found satisfactory for the research. This is also due to the authenticity of the data. For the other criterion, that is, HTMT ratio, the researchers agree that the value should not exceed 0.9, that is, all values should be less (Hair et al., 2017). The results

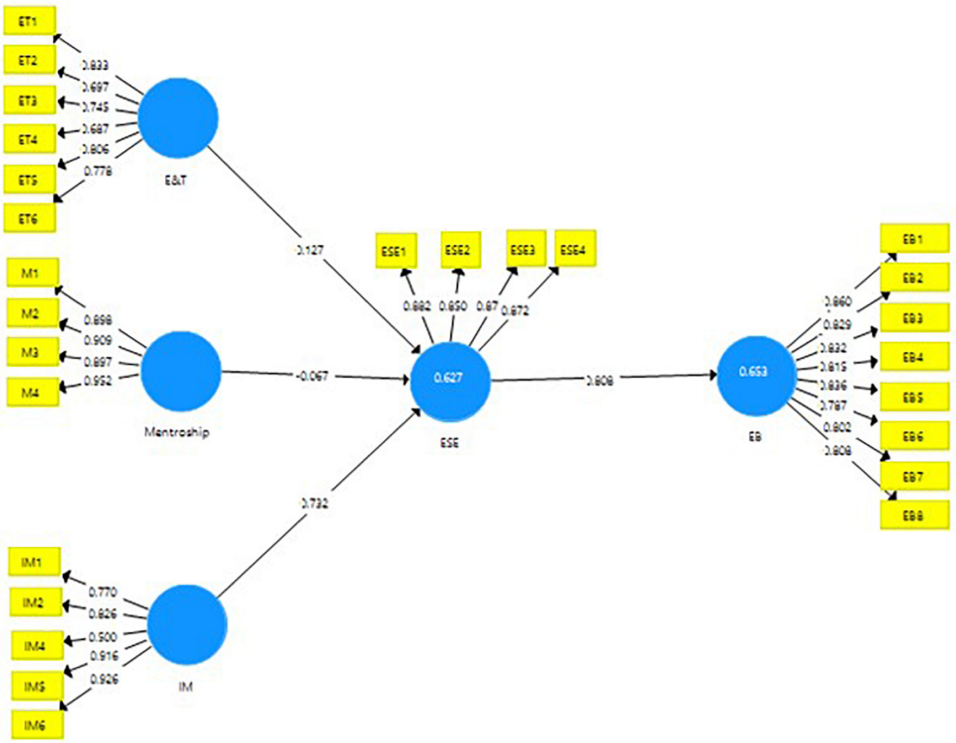

FIGURE 2 | PLS-algorithm for measurement model.

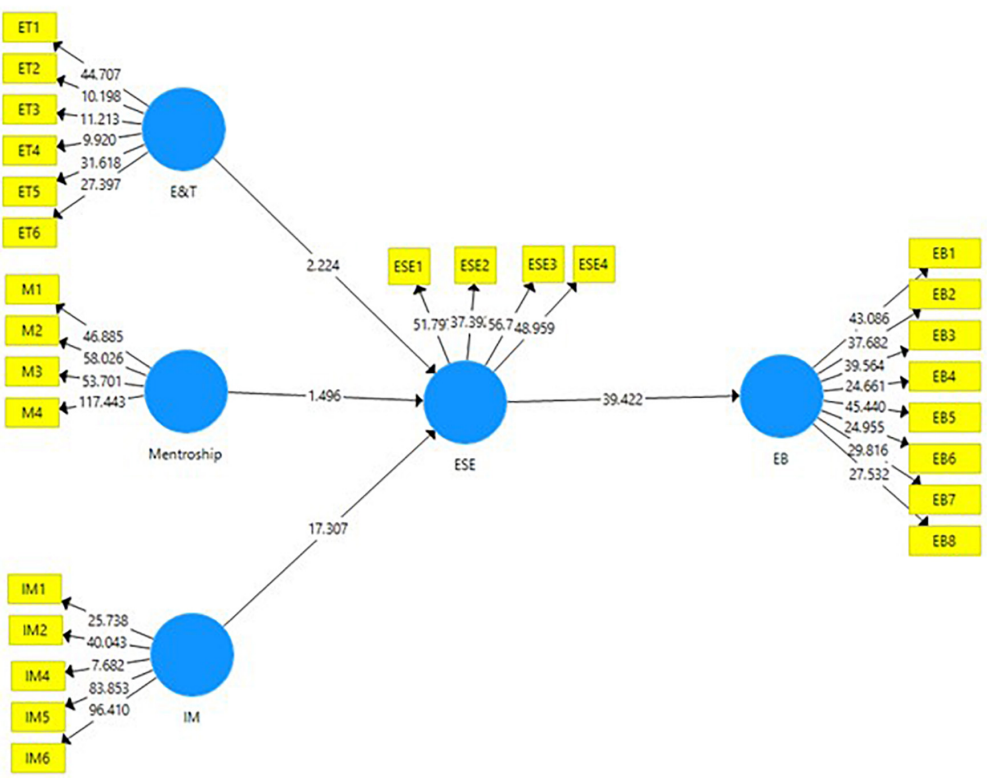

FIGURE 3 | PLS-bootstrapping for structural model.

TABLE 5 | Results for structural model.

Paths	H	O	M	SD	T-Stats	*P*-value	R^2	Results
E&T → ESE	H_1	0.127	0.130	0.053	2.387	0.017**	0.627	*Supported*
Mentorship → ESE	H_2	−0.067	−0.066	0.045	1.467	0.143		Not supported
IM → ESE	H_3	0.732	0.731	0.041	17.890	0.000***		*Supported*
ESE →EB	H_4	0.808	0.810	0.023	35.212	0.000***	0.653	*Supported*
E&T →ESE → EB	H_5	0.103	0.105	0.043	2.378	0.018**		*Supported*
IM → ESE → EB	H_6	0.591	0.593	0.044	13.375	0.000***		*Supported*

*Significance level *** = 0.005%; ** = 0.05%; H, hypothesis; O, original sample; M, sample mean; E&T, education and training; ESE, entrepreneurial Self-efficacy; IM, intrinsic motivation; EB, entrepreneurial behavior.*

for this study meet this criterion hence, making the data valid for use. In the third phase of data analysis, the data was analyzed for structural model or path analysis using bootstrapping with Smart PLS 3.3.3.

This is usually the subsequent stage of the measurement model. The significance of the relationships is usually expressed in the form of path analysis, which either shows the direct effects or the indirect effects. The direct effects are the general linear regression; however, indirect effects indicate the mediating variables. For the first hypothesis, the role of education and training was analyzed in ESE. This hypothesis was accepted at 5% CI. This is because educating the farmers along with training provided the farmers the opportunity of self-efficacy toward entrepreneurship. Many past researchers have shown similar results in their findings (Karimi, 2019; Wardana et al., 2020).

CONCLUSION

The farming industry is flourishing with new technologies and turning toward organic farming with the increase in population. With more demand in organic farming, it is becoming the center of attention for many researchers. This study has also been an attempt to investigate the behavioral and psychological preferences of the farmers. So, the environments and returns for the hard work of farmers could be paid back.

For the third hypothesis, intrinsic motivation significantly predicted ESE. This is the strongest predictor of ESE, while these three independent variables altogether showed a 62.75% change in ESE. On the other hand, 65.3% change in entrepreneurial behavior is caused by its subsequent predictors (Miraglia et al., 2017; Fischer et al., 2019). For H_4, ESE is the biggest predictor of entrepreneurial behavior, hence supporting the hypothesis. The possible reason behind the acceptance of this hypothesis lies in self-efficacy, as self-efficacy allows the farmers to boost their entrepreneurial behavior (Abraham, 2020).

Moreover, the ESE successfully mediated the role of education and training in entrepreneurial behavior and intrinsic motivation and entrepreneurial behavior; hence, supporting H_5 and H_6. This also proved the significance of ESE as a mediator. The possible logic behind its significance is the variable itself. It provides the farmers a satisfaction of dependence on their own, which is necessary for adapting the innovation (Shaheen and AL-Haddad, 2018; Nurlaela et al., 2020). All hypotheses were supported in this study except for mentorship that could not find any significance in predicting ESE. This happened because mentors are not directly involved in mentoring the self-efficacy of the farmers. This study has found certain behavioral preferences of the farmers like any other professionals regarding their ESE. Mentorship did not find to have any role to play in predicting ESE. However, education training and intrinsic motivation are major driving forces for ESE and entrepreneurial behavior. The current study is a major contribution in psychology concerning farmers who have not been investigated previously taking their behaviors into account. This research has several implications for the future researchers and e-commerce players who are interested in repeating this research with their available resources in different regions. These can be exploited well in finding new avenues for certain researches like this.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Zhejiang University of Technology, China. The patients/participants provided their written informed consent to participate in this study. The study was conducted according to the Declaration of Helsinki.

AUTHOR CONTRIBUTIONS

BH and JW conceived and designed the concept. QZ, ZT, and JZ collected the data and provided technical support. SW helped in resources and validation. BH wrote the manuscript. YL contributed to draft manuscript preparation. All authors read and agreed to the published version of the manuscript.

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REFERENCES

Abraham, E. (2020). *Entrepreneurial Self-Efficacy of Tribal Farmers: A Mixed Methods Study in Nagaland, India*. Ph.D thesis, Minnesota: University of Minnesota Digital Conservancy.

Ahmed, U., Mozammel, S., and Zaman, F. (2020). Impact of ecological innovation, entrepreneurial self-efficacy and entrepreneurial orientation on environmental performance and energy efficiency. *Int. J. Energy Econ. Policy* 10:289.

Akhtar, Z. (2021). Effect of Entrepreneurial Training for Human Resource Management of Prisoners: A Framework. *Int. J. Crim. Just. Sci.* 16, 217–235.

Akyavuz, E. K., and Asici, E. (2020). The effect of volunteer management mentoring program on mentors' entrepreneurship tendency and leadership self-efficacy. *Part. Educat. Res.* 8, 1–16. doi: 10.17275/per.21.26.8.2

Al-Ghazali, B. M., and Afsar, B. (2021). Narcissism and entrepreneurial intentions: the roles of entrepreneurial self-efficacy and environmental complexity. *J. High Technol. Manag. Res.* 32:100395. doi: 10.1016/j.hitech.2020.100395

Al-Shammari, M., and Waleed, R. (2018). Entrepreneurial intentions of private university students in the kingdom of Bahrain. *Int. J. Innovat. Sci.* 10, 43–57. doi: 10.1108/ijis-06-2017-0058

Ajaz, A., Shenbei, Z., and Sarfraz, M. (2020). Delineating the influence of boardroom gender diversity on corporate social responsibility, financial performance, and reputation. *LogForum* 16, 61–74.

An, H., Razzaq, A., Nawaz, A., Noman, S. M., and Khan, S. A. R. (2021). Nexus between green logistic operations and triple bottom line: evidence from infrastructure-led Chinese outward foreign direct investment in Belt and Road host countries. *Environ. Sci. Pollut. Res.* 28, 51022–51045. doi: 10.1007/s11356-021-12470-3

Asimakopoulos, G., Hernández, V., and Peña Miguel, J. (2019). Entrepreneurial intention of engineering students: the role of social norms and entrepreneurial self-efficacy. *Sustainability* 11:4314. doi: 10.1186/s12913-016-1423-5

Bachewe, F. N., Berhane, G., Minten, B., and Taffesse, A. S. (2018). Agricultural transformation in Africa? Assessing the evidence in Ethiopia. *World Devel.* 105, 286–298. doi: 10.1177/0379572118765341

Baluku, M. M., Matagi, L., and Otto, K. (2020). Exploring the link between mentoring and intangible outcomes of entrepreneurship: the mediating role of self-efficacy and moderating effects of gender. *Front. Psychol.* 11:1556. doi: 10.3389/fpsyg.2020.01556

Blaique, L., and Pinnington, A. H. (2021). *Occupational Commitment of Women Working in SET: The Impact of Coping Self-Efficacy and Mentoring*. New Jersey, NJ: Wiley.

Çetin, F., and Aşkun, D. (2018). The effect of occupational self-efficacy on work performance through intrinsic work motivation. *Manag. Res. Rev.* 41, 186–201. doi: 10.1108/mrr-03-2017-0062

Chang, E. C. C., and Chu, Y. (2006). Corruption and trust: exceptionalism in Asian democracies? *J. Politics* 68, 259–271.

Creswell, J. W., and Creswell, J. D. (2018). *Mixed Methods Procedures. Research Defign: Qualitative, Quantitative, and Mixed M Ethods Approaches*. Los Angeles: SAGE, 418.

Darmanto, S., and Yuliari, G. (2018). Mediating role of entrepreneurial self efficacy in developing entrepreneurial behavior of entrepreneur students. *Acad. Entrepreneur. J.* 24, 1–14. doi: 10.1037/0021-9010.90.6.1265

Dias, C. S. L., Rodrigues, R. G., and Ferreira, J. J. (2019). Agricultural entrepreneurship: Going back to the basics. *J. Rural Stud.* 70, 125–138. doi: 10.1016/j.jrurstud.2019.06.001

Dunning, L. (2021). *Project Entrepreneurship: A Study of the Influence of Peer Mentorship on Entrepreneurship*. Arizona: Arizona State University.

Elliott, C., Mavriplis, C., and Anis, H. (2020). An entrepreneurship education and peer mentoring program for women in STEM: mentors' experiences and perceptions of entrepreneurial self-efficacy and intent. *Int. Entrepreneur. Manag. J.* 16, 43–67. doi: 10.1007/s11365-019-00624-2

Elnadi, M., and Gheith, M. H. (2021). Entrepreneurial ecosystem, entrepreneurial self-efficacy, and entrepreneurial intention in higher education: Evidence from Saudi Arabia. *Int. J. Manag. Educat.* 19:100458. doi: 10.1016/j.ijme.2021.100458

Ferreira, B., Morais, D., Szabo, A., Bowen, B., and Jakes, S. (2020). A gap analysis of farm tourism microentrepreneurial mentoring needs in North Carolina, USA. *J. Agricult.* 10, 1–17. doi: 10.5304/jafscd.2020.101.025

Fischer, C., Malycha, C. P., and Schafmann, E. (2019). The influence of intrinsic motivation and synergistic extrinsic motivators on creativity and innovation. *Front. Psychol.* 10:137. doi: 10.3389/fpsyg.2019.00137

Fuller, B., Liu, Y., Bajaba, S., Marler, L. E., and Pratt, J. (2018). Examining how the personality, self-efficacy, and anticipatory cognitions of potential entrepreneurs shape their entrepreneurial intentions. *Personal. Indiv. Diff.* 125, 120–125.

Haddad, S. I., and Taleb, R. A. (2016). The impact of self-efficacy on performance (An empirical study on business faculty members in Jordanian universities). *Comput. Hum. Behav.* 55, 877–887. doi: 10.1016/J.CHB.2015.10.032

Hair, J. F. J., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. (2017). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Alabama: University of South Alabama.

Haq, I. U., Paracha, A., and Shakeel, W. (2020). A Multiple Parallel Mediation between Transformational Leadership and Project-Based Performance - A Process Model. *J. Financ. Engin.* 07:2050026.

Hernández-Carrión, C., Camarero-Izquierdo, C., and Gutiérrez-Cillán, J. (2017). Entrepreneurs' social capital and the economic performance of small businesses: The moderating role of competitive intensity and entrepreneurs' experience. *Strat. Entrepreneur. J.* 11, 61–89.

Hillemane, B. S. M. (2020). Entrepreneurial ecosystem for tech start-ups in Bangalore: an exploration of structure and gap. *J. Small Bus. Enterpr. Devel.* 27, 1167–1185. doi: 10.1108/jsbed-07-2019-0233

Jafar, M. F., Yaakob, M. F. M., Mustapha, R., Aziz, M. N. A., Yusof, M. R., and Awang, H. (2021). Quality of Mentoring of Mentor Teachers: Perspective of the Trainee Teachers. *Int. J. Evaluat. Res. Educat.* 10, 632–640. doi: 10.11591/ijere.v10i2.21035

Jamaluddin, R., Ali, M. H., Kadir, S. A., Kamis, A., and Mohamed, S. (2019). Impact of fashion entrepreneurship programme on entrepreneurial interests, intention and competencies. *J. Techn. Educat. Train.* 11:3125.

Jiang, H., Xiong, W., and Cao, Y. (2017). Research on the mechanism of entrepreneurial education quality, entrepreneurial self-efficacy and entrepreneurial intention in social sciences, engineering and science education. *Eur. J. Math.* 13, 3709–3721.

Karimi, S. (2019). The Mediating Role of Career Adaptability and Entrepreneurial Self-efficacy between Personality Traits and Entrepreneurial Intentions. *Iran. Agricult. Extens. Educat. J.* 15, 111–126.

Kelley, T. R., Knowles, J. G., Holland, J. D., and Han, J. (2020). Increasing high school teachers self-efficacy for integrated STEM instruction through a collaborative community of practice. *Int. J. STEM Educat.* 7, 1–13.

Khalil, M., Khan, M. A., Zubair, S. S., Saleem, H., and Tahir, S. N. (2021). Entrepreneurial self-efficacy and small business performance in Pakistan. *Manag. Sci. Lett.* 11, 1715–1724. doi: 10.5267/J.MSL.2021.2.011

Kim, K., ElTarabishy, A., and Bae, Z. (2018). Humane entrepreneurship: How focusing on people can drive a new era of wealth and quality job creation in a sustainable world. *J. Small Bus. Manag.* 56, 10–29. doi: 10.1111/jsbm.12431

Klassen, R. M., and Klassen, J. R. L. (2018). Self-efficacy beliefs of medical students: a critical review. *Perspect. Med. Educat.* 7, 76–82.

Kuratko, D. F., Neubert, E., and Marvel, M. R. (2021). Insights on the mentorship and coachability of entrepreneurs. *Bus. Horizons* 64, 199–209. doi: 10.1016/j.bushor.2020.11.001

Lazzara, E. H., Benishek, L. E., Hughes, A. M., Zajac, S., Spencer, J. M., Heyne, K. B., et al. (2021). Enhancing the organization's workforce: Guidance for effective training sustainment. *Consult. Psychol. J.* 1:73.

Lefebvre, J. S., Bloom, G. A., and Loughead, T. M. (2020). A citation network analysis of career mentoring across disciplines: A roadmap for mentoring research in sport. *Psychol. Sport Exerc.* 49:101676. doi: 10.1016/j.psychsport.2020.101676

Li, C., Murad, M., Shahzad, F., Khan, M. A. S., Ashraf, S. F., and Dogbe, C. S. K. (2020). Entrepreneurial passion to entrepreneurial behavior: Role of entrepreneurial alertness, entrepreneurial self-efficacy and proactive personality. *Front. Psychol.* 11:1611. doi: 10.3389/fpsyg.2020.01611

Liang, C., and Chen, C.-C. (2020). Empowering entrepreneurial intention through entrepreneurial self-efficacy: comparison of farmers with and without entrepreneurial experience in Taiwan. *Asia Pacif. Bus. Rev.* 27, 1–17.

Lipset, S. M. (2018). *Values, Education, and Entrepreneurship. In Promise of Development*. England, UK: Routledge, 39–75.

Liu, X., Lin, C., Zhao, G., and Zhao, D. (2019). Research on the effects of entrepreneurial education and entrepreneurial self-efficacy on college students'

entrepreneurial intention. *Front. Psychol.* 10:869. doi: 10.3389/fpsyg.2019.00869

Mahasneh, A. M., and Alwan, A. F. (2018). The Effect of Project-Based Learning on Student Teacher Self-Efficacy and Achievement. *Int. J. Instruct.* 11, 511–524.

McGee, J. E., and Peterson, M. (2019). The Long-Term Impact of Entrepreneurial Self-Efficacy and Entrepreneurial Orientation on Venture Performance. *J. Small Bus. Manag.* 57, 720–737. doi: 10.1111/jsbm.12324

Miraglia, M., Cenciotti, R., Alessandri, G., and Borgogni, L. (2017). Translating self-efficacy in job performance over time: The role of job crafting. *Hum. Perform.* 30, 254–271. doi: 10.1080/08959285.2017.1373115

Morozova, I. A., Popkova, E. G., and Litvinova, T. N. (2019). Sustainable development of global entrepreneurship: infrastructure and perspectives. *Int. Entrepr. Manag. J.* 15, 589–597. doi: 10.1007/s11365-018-0522-7

Mouselli, S., and Khalifa, B. (2017). Entrepreneurship in crisis: the determinants of syrian students' entrepreneurial intentions. *Bus. Manag. Econ. Engin.* 15, 159–173. doi: 10.3846/bme.2017.386

Mustafa, M., Gavin, F., and Hughes, M. (2018). Contextual determinants of employee entrepreneurial behavior in support of corporate entrepreneurship: a systematic review and research agenda. *J. Enterpr. Cult.* 26, 285–326. doi: 10.1142/s0218495818500115

Nawaz, A., Waqar, A., Shah, S. A. R., Sajid, M., and Khalid, M. I. (2019). An innovative framework for risk management in construction projects in developing countries: Evidence from Pakistan. *Risks* 7:24. doi: 10.3390/risks7010024

Nawaz, A., Su, X., and Nasir, I. M. (2021). BIM Adoption and Its Impact on Planning and Scheduling Influencing Mega Plan Projects-(CPEC-) Quantitative Approach. *Complexity* 2021:8818296.

Neneh, B. N. (2020). Entrepreneurial passion and entrepreneurial intention: the role of social support and entrepreneurial self-efficacy. *Stud. Higher Educat.* 2020, 1–17. doi: 10.1080/03075079.2020.1770716

Niewolny, K. L., and Whitter-Cummings, A. (2020). *Virginia Beginning Farmer & Rancher Coalition Program: Virginia Beginning Farmer Profiles*. Blacksburg: Virginia Cooperative Extension.

Nowiński, W., Haddoud, M. Y., Lančarič, D., Egerová, D., and Czeglédi, C. (2019). The impact of entrepreneurship education, entrepreneurial self-efficacy and gender on entrepreneurial intentions of university students in the Visegrad countries. *Stud. Higher Educat.* 44, 361–379. doi: 10.1080/03075079.2017.1365359

Nurlaela, S., Hariadi, S. S., and Raya, A. B. (2020). Self-Efficacy and Entrepreneurial Behavior of Horticultural Young Farmers in the Special Region of Yogyakarta Indonesia. *Int. J. Psychosoc. Rehabilit.* 2020:24.

Oparin, S., Chepachenko, N., and Yudenkî, M. (2017). The role of social institutions in the activity of entrepreneurs in the construction sector. *CBU Int. Conf. Proc.* 5, 337–342.

Paudel, B., Zhang, Y., Yan, J., Rai, R., Li, L., Wu, X., et al. (2020). Farmers' understanding of climate change in Nepal Himalayas: important determinants and implications for developing adaptation strategies. *Clim. Change* 158, 485–502. doi: 10.1007/s10584-019-02607-2

Peng, Y., Kong, R., and Turvey, C. G. (2015). *Impacts of Self-efficacy on Perceived Feasibility and Entrepreneurial Intentions: Empirical Evidence from China*. Italy: International Association of Agricultural Economists, doi: 10.22004/ag.econ.212619

Pereyra, M., Aboal, D., and Rovira, F. (2021). How effective are training and mentorship programs for entrepreneurs at promoting entrepreneurial activity? An impact evaluation. *SN Bus. Econ.* 1, 1–21.

Pérez, P. F. (2019). Pioneers and Challengers in the Global Plasma Protein Industry, 1915-2015. *Histor. Soc. Res.* 4, 75–95.

Permadi, D. B., Muin, N., Bisjoe, A. R., Purwanti, R., Hayati, N., Hapsari, E., et al. (2020). *Adoption of Tree Farming by Smallholders in Pati and Bulukumba, Indonesia. ACIAR Project FST/2015/040–Enhancing Community-Based Commercial Forestry in Indonesia*. Canberra: Australian Centre for International Agricultural Research.

Peterson, R. A., and Kim, Y. (2013). On the relationship between coefficient alpha and composite reliability. *J. Appl. Psychol.* 98, 194–198. doi: 10.1037/a0030767

Qobo, M., and Le Pere, G. (2018). The Role of China in Africa's Industrialization: The Challenge of Building Global Value Chains. *J. Contemp. China* 27, 208–223.

Roblek, V., Bach, M. P., Meško, M., and Bertoncel, T. (2020). Best practices of the social innovations in the framework of the e-government evolution. *Amfiteatru Econ.* 22, 275–302. doi: 10.24818/ea/2020/53/275

Şahin, F., Karadağ, H., and Tuncer, B. (2019). Big five personality traits, entrepreneurial self-efficacy and entrepreneurial intention: A configurational approach. *Int. J. Entrepr. Behav. Res.* 25, 1188–1211. doi: 10.1108/ijebr-07-2018-0466

Sarfraz, M., Shah, S. G. M., Ivascu, L., and Qureshi, M. A. A. (2020a). Explicating the impact of hierarchical CEO succession on small-medium enterprises' performance and cash holdings. *Int. J. Finan. Econ.* 2020, 1076–9307.

Sarfraz, M., Shehzad, K., and Farid, A. (2020b). Gauging the air quality of New York: a non-linear Nexus between COVID-19 and nitrogen dioxide emission. *Air Qual. Atmosph. Health* 13, 1135–1145. doi: 10.1007/s11869-020-00870-2

Schmitt, A., Rosing, K., Zhang, S. X., and Leatherbee, M. (2018). A dynamic model of entrepreneurial uncertainty and business opportunity identification: Exploration as a mediator and entrepreneurial self-efficacy as a moderator. *Entrepr. Theory Pract.* 42, 835–859. doi: 10.1177/1042258717721482

Schmutzler, J., Andonova, V., and Diaz-Serrano, L. (2019). How context shapes entrepreneurial self-efficacy as a driver of entrepreneurial intentions: A multilevel approach. *Entrep. Theory Pract.* 43, 880–920.

Seah, W. T. (2018). "Improving mathematics pedagogy through student/teacher valuing: Lessons from five continents," in *Invited Lectures from the 13th International Congress on Mathematical Education. ICME-13 Monographs*, eds G. Kaiser, H. Forgasz, M. Graven, A. Kuzniak, E. Simmt, and B. Xu (Cham: Springer).

Shaheen, N., and AL-Haddad, S. (2018). Entrepreneurial self-efficacy and entrepreneurial behavior. *Int. J. Devel. Sustainab.* 7, 2385–2402.

Shah, S. G. M., Sarfraz, M., and Ivascu, L. (2020). Assessing the interrelationship corporate environmental responsibility, innovative strategies, cognitive and hierarchical CEO: A stakeholder theory perspective. *Corpor. Soc. Responsibil. Environ. Manag.* 28, 457–473. doi: 10.1002/csr.2061

Sims, R. L., and Chinta, R. (2019). The mediating role of entrepreneurial ambition in the relationship between entrepreneurial efficacy and entrepreneurial drive for female nascent entrepreneurs. *Gend. Manag.* 41, 270–297.

Sinyolo, S., and Mudhara, M. (2018). The impact of entrepreneurial competencies on household food security among smallholder farmers in KwaZulu Natal, South Africa. *Ecol. Food Nutr.* 57, 71–93. doi: 10.1080/03670244.2017.1416361

Son, J. H., Jung, K. B., and Lee, N. Y. (2018). The impact of entrepreneurial self-efficacy on the entrepreneurial intention of preliminary social entrepreneurs and general entrepreneurs: The moderating effect of social support. *Asia Pacif. J. Bus. Ventur. Entrepr.* 13, 89–104.

St-Jean, É, and Tremblay, M. (2020). Mentoring for entrepreneurs: A boost or a crutch? Long-term effect of mentoring on self-efficacy. *Int. Small Bus. J.* 38, 424–448.

Šūmane, S., Kunda, I., Knickel, K., Strauss, A., Tisenkopfs, T., des Ios, et al. (2018). Local and farmers' knowledge matters! How integrating informal and formal knowledge enhances sustainable and resilient agriculture. *J. Rural Stud.* 59, 232–241. doi: 10.1016/j.jrurstud.2017.01.020

Van der Burg, S., Bogaardt, M.-J., and Wolfert, S. (2019). Ethics of smart farming: Current questions and directions for responsible innovation towards the future. *NJAS Wageningen J. Life Sci.* 90:100289. doi: 10.1016/j.njas.2019.01.001

van Esch, C., Luse, W., and Bonner, R. L. (2021). The impact of COVID-19 pandemic concerns and gender on mentor seeking behavior and self-efficacy. *Equal. Div. Inclus.* [Online ahead of print] doi: 10.1108/EDI-09-2020-0279

Wang, J.-H., Chang, C.-C., Yao, S.-N., and Liang, C. (2016). The contribution of self-efficacy to the relationship between personality traits and entrepreneurial intention. *Higher Educat.* 72, 209–224. doi: 10.1007/s10734-015-9946-y

Wardana, L. W., Narmaditya, B. S., Wibowo, A., Mahendra, A. M., Wibowo, N. A., Harwida, G., et al. (2020). The impact of entrepreneurship education and students' entrepreneurial mindset: the mediating role of attitude and self-efficacy. *Heliyon* 6:e04922. doi: 10.1016/j.heliyon.2020.e04922

Widyani, A. A. D., Sarmawa, I. W. G., and Dewi, I. G. A. M. (2017). The roles of knowledge sharing in mediating the effect of self-efficacy and self-leadership toward innovative behavior. *J. Manag. Entrepr* 19, 112–117.

Xialong, T., Gull, N., Iqbal, S., Asghar, M., Nawaz, A., Albashar, G., et al. (2021). Exploring & Validating the Effects of Mega Projects on Infrastructure Development influencing Sustainable Environment & Project Management. *Front. Psychol.* 12:1251. doi: 10.3389/fpsyg.2021.663199

Yoshida, S., Yagi, H., Kiminami, A., and Garrod, G. (2019). Farm diversification and sustainability of multifunctional peri-urban agriculture: Entrepreneurial attributes of advanced diversification in Japan. *Sustainability* 11:2887.

Zeb, N., ASajid, M., and Iqbal, Z. (2019). Impact of individual factors on women entrepreneurial intentions: With mediating role of innovation and interactive effect of entrepreneurial self-efficacy. *J. Res. Soc. Pakist.* 56:89.

Zulfiqar, F., and Thapa, G. B. (2018). Determinants and intensity of adoption of "better cotton" as an innovative cleaner production alternative. *J. Clean. Product.* 172, 3468–3478. doi: 10.1016/j.jclepro.2017.09.024

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The Relationship Between Social Media Digitalization and Coronavirus Disease 2019 Fear Among Service Sector Employees

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In the age of digitalization, social media has played a significant role in quickly spreading the news about current affairs. From December 2019 to now, coronavirus disease 2019 (COVID-19), with its several mutated shapes, has more transmissible potential catastrophe and has become a severe phenomenon issue worldwide. The international spread of the epidemic has created fear among people, especially employees working physically in different organizations. The present research aimed to measure the impact of social media on its users in the China. The social media users more often were influenced by shocking news instructively and destructively. The research analysis was based on service sector employees and data collected from 630 respondents via a structured questionnaire. This research was confirmed the negative impact of fear on social media on the performance of employees. This research was also confirmed the moderation impact of the COVID-19 vaccine on the relationship between social media fear and employee performance. This research recommends that the China Censor Board checked the news and its validity to reduce the fear of COVID-19 among employees. This research will become a roadmap for organizations and media controllers to understand the impact of social media during an intense situation. The telecommunication sector will reduce psychological disease and enhance the work capability of employees by controlling unnecessary and unapproved material about sensitive issues.

Keywords: COVID-19 vaccine, employee performance, social media, fear, China

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INTRODUCTION

The recent study initiatives, emphases of China media, and self-reporting social media are increasing fear and melancholy due to the outbreak of novel coronavirus disease 2019 (COVID-19) worldwide. Media plays an essential role in spreading awareness for some currently occurring issues, such as COVID-19, which is becoming the source of disease spread worldwide (Moghe et al., 2020). COVID-19 epidemic evolved from China, and after some days, this disease became severe grave in the social, economic, and health systems of the world. According to Kufel (2020), the role of social media on COVID-19 coverage is pretty unacceptable while talking about electronic media, such as television, that shows news about COVID-19. Still, news coverage and transmissions are

without solid proof from medical professionals. Social media users frequently use famous social media applications, such as WeChat, Weibo, Toutiao, Facebook, YouTube, and WhatsApp. There are no special programs arranged to inform, encourage, or motivate the morale of the public and protect them from mental stress in this global crisis. Everyone has become an expert about COVID-19, only to comment on their public posts instead of using this media platform to help miserable people. Many social media users used this platform only to spread fake news about COVID-19. Still, at the same time, there is thinking that television transmissions regularly use alarming and shocking words. Social media news disseminates most of the talks about death and dissatisfactions about life and hopes, as it sometimes seems that there is a jungle of deaths and more and more deaths are coming soon. The media is spreading fear and stress instead of encouraging (Sarfraz et al., 2018; Rehman et al., 2021).

Providing accurate information and aiding knowledge among social media of citizens is called upon to take responsibility. Frenkel et al. (2020) indicated that once the WHO complained that social media organizations have been spreading false information over COVID-19 worldwide; few social media groups used their platforms to spread incorrect data and tried to remove it. A recent study described the effect of media on the health of people (Mohsin et al., 2020b; Salamat et al., 2020; Naseem et al., 2021; Sarfraz et al., 2021). Muwahed (2020) stated that social media had affected the shocking crisis over some countries while many people have been greedy for buying foodstuff and household things because of the widespread fear of COVID-19. Merchant and Lurie (2020) investigated that social media is responsible for panic and creates a fear of shortage of foodstuff in the surrounding. A universal situation is leading in which social media organizations have taken steps to remove fake posts about COVID-19. Besides, Victor (2020) reported that people saw empty store posts on social media, spreading fear of food shortages. In addition, Kelvin and Rubino (2020) noted that social media put everyone at risk of having a ratio of one to another. They heard surprising news about why people posted on social media as soon as possible.

Furthermore, it has been distinguished that the publication of misleading information on social media networks, where almost all media channels are exposed to diseases, has harmful effects on general public health and mental health (Frenkel et al., 2020). Victor (2020) claimed that this is an age of digital information today. Chinese population cannot get facts about COVID-19, and social media users share fake news, information, photos, and videos. Similarly, the Indian government said the highest social media application corporations, such as WeChat, Weibo, Toutiao, YouTube, Facebook, Tiktok, WhatsApp, and Twitter, to break in their journey of publishing fake information because it spread anxiety and fear to the public. This fake news highly impacted the younger generations that use social media. The 21st century has seen a change in the way that the public embraces online communication technology. The new upgrading media terms became an essential source of public discussion, non-experiments, criticisms, health, disease, and treatment (Muwahed, 2020; Rothschild, 2020).

In the same way, Wongkoblap et al. (2017) noted that human beings are spending a lot of time on social media and have seen many infected panic attacks in several countries during the COVID-19 epidemic, spreading anxiety. Similarly, Jee (2020) indicated that everyone is a pseudo-professional who tries to raise his or her voice and transfer messages to almost all COVID-19. Respectively, Ittefaq et al. (2020) explained that we empowered social media to create fear around COVID-19 because we all distributed anxiety, fear news, and socialized among the public. Because Coronavirus has spread worldwide, there is misinformation about it. There is no difference between social media corporations to stop its spread. WeChat, Weibo, Toutiao, Facebook, Google, and Twitter said that they were removing misinformation about the Coronavirus as quickly as possible. It worked with the WHO and other government organizations to ensure that human beings have found correct facts. However, New York Times brings out, for example, dozens of movies, photos, and written posts shared on every social media platform that is believed to be cracking (Depoux et al., 2020). These posts are no longer limited to English. Many languages have started from Hindi and Urdu to Hebrew and Persian, reflecting the virus's spreading cycle as it has traveled worldwide (Dunnan et al., 2020). Security researchers also say that hackers set up worn-out websites that claimed to contain fake data on almost coronavirus. These sites were honestly virtual traps, intended to steal non-public information or break gadgets of people who came to them. Spreading false and malicious material about the Coronavirus has been a perfect reminder of the war of attrition fought by researchers and internet groups. Even if corporations have decided to protect this fact, they are frequently raided by liars and thieves on the internet. Ahmed et al. (2020) observed many ways to disseminate facts and information to the community today with the upgradation of social media.

Studies show that the fear of an illness and any resulting behavioral changes may be passed on through a virus (Asmundson and Taylor, 2020). There are historical instances of people fearing mass contagious illnesses based on media reports, such as when London had a massive plague in 1665. It was linked to stories in the newspapers, which forced officials to close the printing presses. Studies also have indicated that media coverage of past outbreaks of pandemic diseases has led to a rise in worry (Tausczik et al., 2012). Extensive research should be done on the mechanisms by which the media incite fear and other emotions in the face of a pandemic. Additional studies should be conducted to determine the specific factors that increase the likelihood of certain persons these symptoms. Emotion contagion is one area where a little study has been conducted.

This research aims to measure the impact of social media on the performance of employees of industries during COVID-19. This research also identifies the toxicities of speech freedom about the pandemic and curbing dissenting political views on social media. The commoner does not know about the facts and figures for a specific situation. When an individual speaks out in an extreme case, one presents their mental state and psychological effect on the reader. The pandemic phenomenon reflects health issues other than a pandemic, which reduces the performance levels of employees. This overreach is destined to

evoke an intense reaction and severe to alienate the general public from its telecommunication approach at a time when a unified stance is essential.

LITERATURE REVIEW

Employee Performance

As a dependent variable in this study, the performance of the workers is taken into consideration. It is the performance of workers in an industry that industrialists are most concerned about since the profit or loss of a sector is directly linked to the performance of employees. The outbreak of COVID-19 had a significant impact on employee performance in a variety of ways, such as lockdown, frightening news about the pandemic, limited working locations, and stringent operating procedures, among others. The basic rationale for selecting this variable is real, as the success of the industries and the performance of the workers are very complementary to one another. Because the economy is in such bad shape, the luckiest individuals are included among those working (Jamil et al., 2021). The performance of workers increases the productivity of the industry and the achievement of goals and objectives on time. As a result of the epidemic, human resource managers were pressed to continue with the recruitment, selection processes, employee engagement, and training and development initiatives (Jamil et al., 2021). In this catastrophic global lockdown scenario, the oil industry is humiliated for the first time as a barrel of oil drops to less than zero for the first time in its history. The management of safety performance and the management of safety information are inextricably linked to one another in many ways (Kim et al., 2021). Physical workplaces have been transformed into virtual workplaces, suitable for the services industry but not the manufacturing sector. After using Partial Least Squares Structural Equation Modeling (PLS-SEM) and the Input-Processes-Outcomes (IPO) framework, Bartsch et al. (2020) discovered that service workers were able to live virtually with little difficulty. Contrary to expectations, individual job autonomy and team cohesion had little impact on the work performance of services workers; this was unexpected and work-related.

COVID-19 Worry and Social Media Fear

In late December 2019, when China reported a mysterious illness in Wuhan city called COVID-19, some cases were registered due to this illness. The infection has spread around the world and has become a pandemic disease. The telecommunications institution plays an essential role in the awareness of people about the effects of the disease. Still, at the same time, media became a source of spreading fear and anxiety among their users. The social media platforms gave their users different instructions about preventing this virus, such as washing their hands, wearing the mask, and keeping distance among themselves (Ahmed et al., 2020; Lee, 2020), but at the same time, social media became a source of fear dissemination during COVID-19. According to Lee (2020), this news of COVID-19 became one of the deadliest public disastrous news in human history.

All developed and developing countries trying to cope with the epidemic and save the health of human beings should take essential preventive measures, such as lockdown, contact tracing patients, green health code, and quarantine (Khan and Naushad, 2020). Until now, the impact of this virus has been severe in emerging countries, such as China. There was a lack of medical setup, public health literacy to respond to the crisis (Jamil et al., 2021). In addition, the outbreaks spreading misinformation from social media among the people create fear and anxiety. The misinformation calamity for emerging economies is also tricky due to the lack of health infrastructure, lack of deontological expertise in health hospitals, lack of trusty media, and health knowledge among the public. The WHO rules on pandemics help people avoid this sudden condition (Jee, 2020; Lee, 2020). In **Figure 1**, the relationship and direction are influencing the scaling of variables (Jamil et al., 2021). The information about the COVID-19 is spreading greater than the virus itself, leading to full-size public panic worldwide (Frenkel et al., 2020). Social media, alternatively, is a realistic platform for spreading public health messages to the audience Ida et al. (2020). Brewer has published on BBC News (Emmott, 2020) that the general public has been shocked and horrified to hear all kinds of information about COVID-19, causing them to land in a state of depression (Dunnan et al., 2020).

Additionally, Pennycook et al. (2020) claims that panic is spreading among social media users. Simultaneously, in a conversation on social media (Ida et al., 2020; Mohsin et al., 2020a), people almost rely on social media to get information and facts about COVID-19. Some countries use news filters that are why social media presents some points but not all correct records. After the emergence of COVID-19 and the migration of countries beyond mainland China, people turned to social media to get more information about the virus. In just 24 h, according to Pennycook et al. (2020), there were 19 million mentions of the COVID-19 cases on social media and news sites worldwide.

Similarly, Shimizu (2020) stated that many nations were no longer aware of the spread of COVID-19 or failed to provide the information they needed. Because of this, people trusted information they could find on social media. Khan and Naushad (2020) contend that a global changing condition impacts in disclosure of fake news and misinformation about COVID-19, which is alleged to be the "beginning" of a virus based on misinformation lab theory contained in social media (Jamil et al., 2021). Accordingly, Frenkel et al. (2020) are confident that "media reporting has highlighted COVID-19 as an utterly exclusive threat as opposed to people that have caused panic and created tension." Victor (2020) described that social media plays three crucial roles in spreading information about COVID-19 in most countries (Jamil et al., 2021). Firstly, a factor about the occurrence of the virus was posted on social media. Secondly, facts about the epidemic appeared on social media as misinformation, fake news, and misleading. Thirdly, social media has caused widespread anxiety, fear, and depression worldwide during the outbreak of COVID-19.

It seems that pleasure, anger, and worry are all socially infectious types of emotion. Research has shown that when it comes to strangers, especially the spread of negative emotions

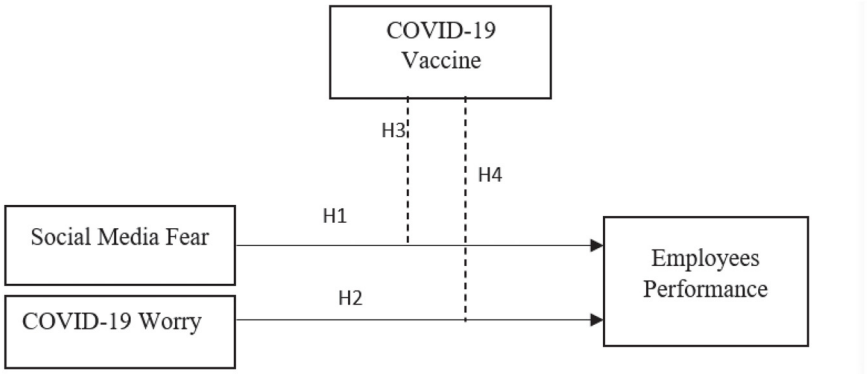

FIGURE 1 | Theoretical framework.

(Paukert et al., 2008). Individuals who have greater levels of emotion contagion tend to respond more strongly to distressing experiences (Trautmann et al., 2018). That so, those who are sensitive to the emotions of others may be more vulnerable to the COVID-19 epidemic.

Even though most research on emotion contagion has focused on human interactions, a recent study has shown that digital communication may be a conduit for emotional contagion (Coviello et al., 2014; Goldenberg and Gross, 2020). The fact that social media is very popular in the contemporary world and that many people get their news from social media emphasizes the significance of this. Since it has spread worldwide, this sickness has gotten a great deal of attention in the media. Previous research has shown that more media exposure will result in increased anxiety about COVID-19; however, this increase among concerns may be much more severe in individuals who are very susceptible to emotional contagion. Hence, we suggest the following hypothesis:

H1: Social media fear significantly influences employee performance.
H2: COVID-19 worry significantly influences employee performance.

Moderating Role of COVID-19 Vaccine

Workers are the foundation of any business, and the primary duty of any organization is to ensure that its workers are safe and secure, particularly during this difficult period of a pandemic outbreak. With the COVID-19 pandemic in full swing, it is clear that companies must take their responsibilities to safeguard workers seriously and that the widespread distribution of COVID-19 vaccinations is necessary to preserve their health even in the face of widespread vaccination reluctance. According to a recent study, businesses of all sizes must act responsibly to ensure that no harm is done, care for their employees, and allow the government to do its job in protecting people. Additionally, every company should make concentrated efforts to meet employee needs and desires cost-effectively to improve the performance of the company. Exposure of workers to COVID-19 may be reduced by providing safe and healthy working circumstances, such as appropriate protective equipment and training and personal hygiene practices, such as hand washing and coughing etiquettes. The first step is to gather current information about their situation (Jamil et al., 2021; Shah et al., 2021). A variety of approaches may be used to reduce direct human-to-human interaction throughout the job process. Ensure that employees are aware of the coronavirus and the immunization program by providing them with appropriate information distribution. Governments and corporate sectors must safeguard the health of their workers during this difficult period, but this crisis also presents a chance for our economy to reach a watershed moment.

The vaccine of COVID-19 is used as a moderator variable between the performance of the employee, COVID-19 worry, and social media. The vaccine is performing two rules at a time in this research. First, it will point out the psychological impact on the employees of industries who are afraid of COVID-19 due to media. Second, it will also measure the effectiveness of vaccines because the immune system of the human body is related to mental health. The accurate effect of the vaccine is not only dependent on the vaccine but also characterized the vaccinated person. The psychological factors, i.e., stress, depression, and loneliness, which are created by exaggerating spreading fear by media, may affect the immune system of respondents. The vaccine of COVID-19 is the best moderator variable that can elaborate the intensity of the relationship between the dependent and independent variables. The inflammatory markers of vaccines rise within hours due to Innate Immune Response in normal human beings, but its effect and reaction period are prolonged for stressed people. Again, the fake news of social media restricted the general public from accepting the vaccine of COVID-19. The useful information and encouraging vaccine material are rare on social media than negative and discoursing materials (Salali and Uysal, 2020; Madison et al., 2021; Murphy et al., 2021). Hence, we proposed the following hypothesis:

H3: COVID-19 vaccine moderates the relationship between social media fear and employee performance.
H4: COVID-19 vaccine moderates the relationship between COVID-19 fear and employee performance.

As per previous literature, most research is available on social media fear and COVID-19, but the performance of employees and vaccines are still undiscussed. In this section, the theoretical information is categorized for two purposes, i.e., an indication of previous research and direction and the current inclusion of this research work. The independent variable is explained in detail with cited references, but vaccine and employee performance have only declared the moderator and dependent variables due to unavailable literature.

METHODOLOGY

This study designed a questionnaire according to the hypotheses stated above. The participants in this study were experienced users of social media platforms in China. A self-administered questionnaire was used to collect data from respondents. The research analysis was based on service sector employees, and data were collected from 630 respondents via a structured questionnaire. A pilot study with 100 participants was carried out. Since providing recommendations, revisions were made to the final questionnaire to make it more understandable for the respondents of the study. To ensure the content validity of the measures, three academic management experts analyzed and made improvements in the items of constructs. The experts searched for spelling errors, grammatical errors, and ensured that the items were correct. The experts have proposed minor revisions to social media fear and employee performance items and advised that the original number of items be maintained. This study used an online community to invite social media users to complete the designated online questionnaire system. Online questionnaires have the following advantages (Tan and Teo, 2000): (1) sampling is not restricted to a single geological location, (2) lower cost, and (3) faster questionnaire responses. A total of 650 questionnaires were returned from respondents. There were 630 appropriate replies considered for the final analysis. Data were analyzed through MS Excel and Statistical Package for the Social Sciences (SPSS) software.

Measures

The study used items established from prior research to confirm the reliability and validity of the measures. All items are evaluated through five-point Likert-type scales where "1" denotes strongly disagree, "3" denotes neutral, and "5" denotes strongly agree. We used 10 items adopted from a prior study by Bartsch et al. (2020) to get responses about employee performance. COVID-19 worry and social media fear were measured with eight items adapted from the study of Pennycook et al. (2020). Finally, the COVID-19 vaccine was measured with seven items adapted from the prior study of Murphy et al. (2021).

RESULTS

Demographic Characteristics of Respondents

This study analyzed the data through the SPSS. Primary data were collected from 630 respondents, and demographic characteristics of the work position of respondents, such as age and gender, are illustrated in **Table 1**.

TABLE 1 | Profile of respondents.

Range	Frequency	Percent
Gender		
Male	190	56.7
Female	145	43.3
Total	335	100
Age		
21–30	149	44.4
31–40	103	30.7
41–50	80	23.8
51 years or above	3	0.89
Work position		
Executive	08	2.3
CEO	02	0.59
Manager	91	27.16
Senior manager	21	6.26
Office worker	69	20.59
Others	144	42.98

TABLE 2 | Reliability and validity.

Variables	Mean	*SD*	Cronbach's Alpha
Social media fear	3.690	0.341	0.745
COVID-19 worry	3.145	0.390	0.890
Employees performance	3.765	0.390	0.821
COVID-19 vaccine	3.431	0.545	0.789

TABLE 3 | Direct and indirect effects.

	Coeff.	*SD*	*T*-values	*P* values
CVD VC – > EP	0.054	0.031	3.540	0.000
SMF – > EP	0.243	0.054	4.189	0.000
CVDF – > EP	0.614	0.052	9.137	0.000
CVD VC* SMF – > EP	−0.023	0.031	2.093	0.000
CVD VC* CVDF – > EP	−0.202	0.039	6.140	0.000

Data collection for this study was performed using a questionnaire. In this study, we analyzed the impact of social media fear on the performance of employees through the moderating role of the COVID-19 vaccine. Before testing the structural model, the measurement model was analyzed in terms of construct reliability, convergent validity, and discriminant validity. According to our assessment of the reliability of the indicators, there are 25 indicators with outer loading greater than 0.70 (**Table 2**). A total of 10 indicators of social media fear were used, all showing a reliable factor loading, as indicated in **Table 3**. The COVID-19 vaccine is measured through eight items which also show factor loading greater than 0.70. The employee performance is measured through seven items, and all the outer loading greater than seven is significantly reliable.

Hypotheses show the influence of independent variables on employee performance. **Table 2** shows that the independent variable COVID-19 worry and social media fear have a negative impact on employee job performance with beta value is negative,

TABLE 4 | HTMT discriminant validity.

Sr no.		1	2	3	4
1	Social media fear				
2	COVID-19 worry	0.434			
3	COVID-19 vaccine	0.036	0.024		
4	Employee performance	0.305	0.170	0.064	

TABLE 5 | Regression analysis.

	R^2	R square adjusted
COVID-19 vaccine	0.867	0.856

TABLE 6 | Hypotheses results.

	Hypotheses	
H1	Social media fear significantly influences employee performance.	Supported
H2	COVID-19 worry significantly influences employee performance.	Supported
H3	COVID-19 vaccine moderates the relationship between social media fear and employee performance	Supported
H4	COVID-19 vaccine moderates the relationship between COVID-19 fear and employee performance	Supported

and *t*-value is 2.093. Social media fear significantly impacts the COVID-19 vaccine, with a beta value of − 0.202 and 6.140. This confirms that the independent variable included in the model has a positive and significant impact on employee performance. Based on the *t*-value independent variable has a positive and significant impact on employee performance at $p \leq 0.05$.

Table 4 tests the variables by employing the HTMT discrimination validity test, which measures the heterotrait-monotrait discriminant validity. The results presented that the values are very far from 1, not even near to 0.80. The values are confirmed that there is no multicollinearity in selected variables. **Table 5** contains the results of regression analysis and presents the values of R^2 and adjusted R^2. The linear regression results have measured the proportion of variations in selected dependent variables toward independent variables with 0.867. The decreasing trend of Adjusted R^2 indicated that the predictions would not improve more according to expectations.

Table 5 shows the moderation effect of the COVID-19 vaccine. First, we assessed the direct relationships before looking at the moderation effects. The results revealed a negative relationship between social media fear and employee performance ($\beta = -0.023$, $p < 0.00$) which gives positive support for H1 of our study. The moderation hypotheses of the COVID-19 vaccine in the path between social media fear and employee performance (H2) are tested using the two-stage continuous moderation analysis (Hair et al., 2017). The moderating effect of SMF*CV – > EP ($\beta = 0.243$, $p < 0.01$), indicating the moderating effects are statistically significant at the 0.01 level. This supports H2 of this study. **Table 6** presents the summary of **Table 3** with understandable and clear manners. The hypothetical approaches are strongly supported by the analytical process.

DISCUSSION

In this study, we used a large sample of social media users; we tested the theory that employees who are more sensitive to emotion contagion would experience more anguish and display symptoms during the COVID-19 pandemic in China. Individuals with heightened fear, or who are more affected by the emotions of others, were more likely to have greater degrees of fear, sorrow, anxiety, and stress, according to COVID-19 results. These details are covered in more detail in the section below.

Although the variations in sensitivity to COVID-19 worry and fear of social media were found to be small, generally, we observed that those with greater vulnerability to contagion were more likely to exhibit worry about the virus and maladaptive reactions (i.e., OCD symptoms). This result is consistent with other research, which showed that those with a greater capacity for emotional contagion tend to have a more pronounced stress reaction to stressful experiences (Trautmann et al., 2018; Sarfraz et al., 2020). Because of the current COVID-19 epidemic, the community as a whole is under stress. Those who are very sensitive to others' emotional states are likely to be more vulnerable to feelings of worry.

Additionally, we examined the potential that general social media usage and media consumption regarding COVID-19, in particular, might be significant in predicting the degree of anxiety around COVID-19. Additionally, we examined the possibility that the COVID-19 vaccine might serve as a moderator in these interactions. Consumption of media regarding COVID-19 was shown to predict the degree of anxiety associated with COVID-19 significantly, but this connection was not reduced by emotion contagion. One previous study discovered that the degree of emotion contagion moderated the stress response following exposure to a traumatic film. Still, this study was conducted in the laboratory and used a highly controlled stressor, whereas our measure of media exposure on COVID-19 was retrospective and uncontrolled. As a result, it is conceivable that a substantial moderating effect might have developed under more controlled circumstances.

As our further research showed, we discovered that the relationship between COVID-19 worry and fear of social media and employee performance was influenced by the COVID-19 vaccine, making it greater for an employee who was more susceptible to social media fear. The connection between social media fear and employee performance is likely exacerbated because of the increased susceptibility to infection with the virus that causes COVD-19. Despite this warning, it is important to remember that the study was based on the primary analysis of cross-sectional data, meaning no causal conclusions can be drawn. Further studies are also required to examine this in clinical populations.

STUDY LIMITATIONS

Study limitations must be considered while evaluating current findings. For our study, we first gathered all of our data online using a cross-sectional design, where subjects answered questions

at a particular moment in time. Consequently, our findings do not allow us to prove causality. This is because we cannot tell if media exposure raises anxiety or whether those with anxiety gravitate toward news and therefore spend more time on social media. To properly predict the potential effects of a global epidemic, more in-depth research might follow those who exhibit high and low degrees of fear to see how social media is used and the stress levels that develop in reaction to the danger.

Similarly, additional factors that explain the connections between observations are regarded as possible third variables. Unfortunately, we did not measure neuroticism in our survey, which is an interesting area for future study. Moreover, all the data were obtained via self-report surveys, and they may have been influenced by shared method variation since they rely on self-reporting. Future mixed-techniques studies, such as interviews, would diversify the measuring methods used. While the data were restricted to the sample of social media users, they were at last assembled. To validate these results, further research should be conducted in other samples, such as those working in other settings with fear who are especially susceptible to pandemic disease risks (Denis et al., 2020) and those with a higher proportion of male participants. Some of the findings from recent studies have had modest but statistically significant outcomes, and thus they need to be looked at again to see whether they have clinical relevance.

CONCLUSION

The study concludes that social media was responsible for spreading COVID-19 fear among people in China. Meanwhile, during this health crisis of the outbreak of COVID-19, trust between citizens and the state had declined, which is why official statements, news, and information provided by the Ministry of Health and government agencies met the needs of people. Therefore, they rely heavily on social media platforms to obtain information about viruses. The nature of social media panic among people depends on gender, age, and level of education. It can be seen that social media has played a crucial role in spreading the fear of the spread of COVID-19 in China and other countries. According to media experts and academics, we believe that we and Chinese comminutes now have an essential role in the future. We must educate media users about good things, reliable information, and a way of thinking critically since younger people are also getting a lot of information through the internet and then spreading it to their family and friends. A university is an ideal place to design courses and symposiums that can help students and teachers figure out how to find, search for and evaluate health information in someone's case during Epidemics.

The scope of the investigation varies, but those affecting the research process are important. There was a lack of literature on social media about COVID-19, so this study relied on novel research available but was very limited. In addition, conducting research required data, so data collection was another hurdle due to the lockdown period. Because of the data collection, we had difficulty finding participants who wanted to respond and participate.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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REFERENCES

Ahmed, T., Shahid Khan, M., Thitivesa, D., Siraphatthada, Y., and Phumdara, T. (2020). Impact of employees engagement and knowledge sharing on organizational performance: study of HR challenges in COVID-19 pandemic. *Hum. Syst. Manag.* 39, 589–601. doi: 10.3233/hsm-201052

Asmundson, G. J., and Taylor, S. (2020). How health anxiety influences responses to viral outbreaks like COVID-19: what all decision-makers, health authorities, and health care professionals need to know. *J. Anxiety Disord.* 71:102211. doi: 10.1016/j.janxdis.2020.102211

Bartsch, S., Weber, E., Büttgen, M., and Huber, A. (2020). Leadership matters in crisis-induced digital transformation: how to lead service employees effectively during the COVID-19 pandemic. *J. Serv. Manag.* 32, 71–85.

Coviello, L., Sohn, Y., Kramer, A. D., Marlow, C., Franceschetti, M., Christakis, N. A., et al. (2014). Detecting emotional contagion in massive social networks. *PLoS One* 9:e90315. doi: 10.1371/journal.pone.0090315

Depoux, A., Martin, S., Karafillakis, E., Bsd, R. P., Wilder-Smith, A., and Larson, H. (2020). The pandemic of social media panic travels faster than the COVID-19outbreak. *J. Travel Med.* 27:taaa031.

Denis, J. L., Potvin, L., Rochon, J., Fournier, P., and Gauvin, L. (2020). On redesigning public health in Québec: lessons learned from the pandemic. *Can. J. Pub. Health* 111, 912–920. doi: 10.17269/s41997-020-00419-x

Dunnan, L., Jamil, K., Abrar, U., Ali, S., Awan, F. H., and Ali, S. (2020). "Digital generators and consumers buying behavior," in *Proceedings of the 2020 3rd International Conference on Computing, Mathematics and Engineering Technologies (iCoMET)*, (Piscataway, NJ: IEEE), 1–5.

Emmott, R. (2020). *Russia Deploying Coronavirus Disinformation to Sow Panic in West, EU Document Says*. Canary Wharf: Reuters World News.

Frenkel, S., Alba, D., and Zhong, R. (2020). *Surge of Virus Misinformation Stumps Facebook and Twitter*. A. G. Sulzberger: The New York Times.

Goldenberg, A., and Gross, J. J. (2020). Digital emotion contagion. *Trends Cogn. Sci.* 24, 316–328. doi: 10.1016/j.tics.2020.01.009

Hair, E., Pitzer, L., Bennett, M., Halenar, M., Rath, J., Cantrell, J., et al. (2017). Harnessing youth and young adult culture: improving the reach and engagement of the truth® campaign. *J. Health Commun.* 22, 568–575. doi: 10.1080/10810730.2017.1325420

Ida, R., Saud, M., and Mashud, M. (2020). Persistence of social media on political activism and engagement among Indonesian & Pakistani youths. *J. Web Based Communities* 16, 378–395.

Ittefaq, M., Hussain, S. A., and Fatima, M. (2020). COVID-19 and social-politics of medical misinformation on social media in Pakistan. *Media Asia* 47, 75–80. doi: 10.1080/01296612.2020.1817264

Jamil, K., Hussain, Z., Gul, R. F., Shahzad, M. A., and Zubair, A. (2021). The effect of consumer self-confidence on information search and share intention. *Inf. Discov. Deliv*. doi: 10.1108/IDD-12-2020-0155 Online ahead of print,

Jee, Y. (2020). WHO international health regulations emergency committee for the COVID-19 outbreak. *Epidemiol. Health* 42:e2020013. doi: 10.4178/epih.e2020013

Kelvin, D. J., and Rubino, S. (2020). Fear of the novel coronavirus. *J. Infect. Dev. Ctries* 14, 1–2. doi: 10.3855/jidc.12496

Khan, N., and Naushad, M. (2020). *Effects of Corona Virus on the World Community*. NY, Rochester: SSRN.

Kim, S., Kim, P. B., and Lee, G. (2021). Predicting hospitality employees' safety performance behaviors in the COVID-19 pandemic. *Int. J. Hosp. Manag.* 93:102797. doi: 10.1016/j.ijhm.2020.102797

Kufel, T. (2020). ARIMA-based forecasting of the dynamics of confirmed Covid-19 cases for selected European countries. Equilibrium. *Q. J. Econ Econ. Policy* 15, 181–204. doi: 10.24136/eq.2020.009

Lee, A. (2020). Wuhan novel coronavirus (COVID-19): why global control is challenging? *Public Health* 179:A1.

Madison, A. A., Shrout, M. R., Renna, M. E., and Kiecolt-Glaser, J. K. (2021). Psychological and behavioral predictors of vaccine efficacy: considerations for COVID-19. *Perspect. Psychol. Sci.* 16, 191–203. doi: 10.1177/1745691621989243

Merchant, R. M., and Lurie, N. (2020). Social media and emergency preparedness in response to novel coronavirus. *JAMA*. 323, 2011–2012. doi: 10.1001/jama.2020.4469

Moghe, K., Kotecha, D., and Patil, M. (2020). COVID-19 and mental health: a study of its impact on students. *medRxiv* [Preprint]. doi: 10.1101/2020.08.05.20160499

Mohsin, M., Naseem, S., Zia-Ur-Rehman, M., Baig, S. A., and Salamat, S. (2020b). The crypto-trade volume, GDP, energy use, and environmental degradation sustainability: an analysis of the top 20 crypto-trader countries. *Int. J. Financ. Econ.* 1–17. doi: 10.1002/ijfe.2442

Mohsin, M., Naiwen, L., Zia-Ur-Rehman, M., Naseem, S., and Baig, S. A. (2020a). The volatility of bank stock prices and macroeconomic fundamentals in the Pakistani context: an application of GARCH and EGARCH models. *Oeconomia Copernicana* 11, 609–636. doi: 10.24136/oc.2020.025

Murphy, J., Vallières, F., Bentall, R. P., Shevlin, M., McBride, O., Hartman, T. K., et al. (2021). Psychological characteristics associated with COVID-19 vaccine hesitancy and resistance in Ireland and the United Kingdom. *Nature Commun.* 12:29.

Muwahed, J. (2020). *Coronavirus Pandemic goes Viral in the Age of Social Media, Sparking Anxiety*. Available online at: https://tinyurl.com/ybnms2se (accessed March 14, 2020).

Naseem, S., Mohsin, M., Hui, W., Liyan, G., and Penglai, K. (2021). The investor psychology and stock market behavior during the initial era of COVID-19: a study of China, Japan, and the United States. *Front. Psychol.* 12:626934. doi: 10.3389/fpsyg.2021.626934

Paukert, A. L., Pettit, J. W., and Amacker, A. (2008). The role of interdependence and perceived similarity in depressed affect contagion. *Behav. Ther.* 39, 277–285. doi: 10.1016/j.beth.2007.08.001

Pennycook, G., McPhetres, J., Zhang, Y., Lu, J. G., and Rand, D. G. (2020). Fighting COVID-19 misinformation on social media: experimental evidence for a scalable accuracy-nudge intervention. *Psychol. Sci.* 31, 770–780. doi: 10.1177/0956797620939054

Rehman, U., Shahnawaz, M. G., Khan, N. H., Kharshiing, K. D., Khursheed, M., Gupta, K., et al. (2021). Depression, anxiety and stress among Indians in times of Covid-19 lockdown. *Community Mental Health J.* 57, 42–48. doi: 10.1007/s10597-020-00664-x

Rothschild, N. (2020). *Coronavirus Panic Sells as Alarmist Information Flies on Social Media*. Available online at: https://www.axios.com/coronavirus-social-media-b56326b6-ab16-4c8a-bc86-e29b06e5ab2b.html (accessed March 3, 2020)

Salali, G. D., and Uysal, M. S. (2020). COVID-19 vaccine hesitancy is associated with beliefs on the origin of the novel coronavirus in the UK and Turkey. *Psychol. Med*. Online ahead of print,

Salamat, S., Lixia, N., Naseem, S., Mohsin, M., Zia-ur-Rehman, M., and Baig, S. A. (2020). Modeling cryptocurrencies volatility using GARCH models: a comparison based on Normal and Student's T-Error distribution. *Entrep. Sustain. Issues* 7, 1580–1596. doi: 10.9770/jesi.2020.7.3(11)

Sarfraz, M., He, B., and Shah, S. G. M. (2020). Elucidating the effectiveness of cognitive CEO on corporate environmental performance: the mediating role of corporate innovation. *Environ. Sci. Pollut. Res.* 27, 45938–45948. doi: 10.1007/s11356-020-10496-7

Sarfraz, M., Mohsin, M., Naseem, S., and Kumar, A. (2021). Modeling the relationship between carbon emissions and environmental sustainability during COVID-19: a new evidence from asymmetric ARDL cointegration approach. *Environ. Dev. Sustain.* Online ahead of print,

Sarfraz, M., Qun, W., Hui, L., and Abdullah, M. I. (2018). Environmental risk management strategies and the moderating role of corporate social responsibility in project financing decisions. *Sustainability* 10:2771. doi: 10.3390/su10082771

Shah, S. G. M., Sarfraz, M., and Ivascu, L. (2021). Assessing the interrelationship corporate environmental responsibility, innovative strategies, cognitive and hierarchical CEO: a stakeholder theory perspective. *Corp. Soc. Responsib. Environ. Manag.* 28, 457–473. doi: 10.1002/csr.2061

Shimizu, K. (2020). 2019-nCoV, fake news, and racism. *Lancet* 395, 685–686. doi: 10.1016/s0140-6736(20)30357-3

Tan, M., and Teo, T. S. H. (2000). Factors influencing the adoption of internet banking. *J. Assoc. Informat. Syst.* 1, 1–44.

Tausczik, Y., Faasse, K., Pennebaker, J. W., and Petrie, K. J. (2012). Public anxiety and information seeking following the H1N1 outbreak: blogs, newspaper articles, and Wikipedia visits. *Health Commun.* 27, 179–185. doi: 10.1080/10410236.2011.571759

Trautmann, S., Reineboth, M., Trikojat, K., Richter, J., Hagenaars, M. A., Kanske, P., et al. (2018). Susceptibility to others' emotions moderates immediate self-reported and biological stress responses to witnessing trauma. *Behav. Res. Ther.* 110, 55–63. doi: 10.1016/j.brat.2018.09.001

Victor, D. (2020). *Panic and Criticism Spread on Chinese Social Media Over Coronavirus*. Available online at: https://www.nytimes.com/2020/01/24/world/asia/china-social-media-coronavirus.html (accessed January24, 2020)

Wongkoblap, A., Vadillo, M. A., and Curcin, V. (2017). Researching mental health disorders in the era of social media: systematic review. *J. Med. Internet Res* 19:e228. doi: 10.2196/jmir.7215

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Energy Strategy for Sustainable Development of Rural Areas Based on the Analysis of Sustainable Digital Economy

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Technology has played a vital role in modifying the lifestyle of individuals and the emerging countries are progressing so fast as no one has ever thought before. With the progression of technology boosting, the pattern of energy resources consumption has also been the center of attention for researchers in this decade. China has been one of those countries that have adopted such energy strategies in its industrial regime. The economists and information technology (IT) working together have done wonders in digitalizing and sustaining the economies that will lead to sustainable development goals. This study has been an effort to understand the role of technology and the availability of affordable energy resources in obtaining a sustainable digital economy with the mediating role of sustainable development. The population of this study was IT professionals and economists. The survey data were collected from 285 respondents selected based on purposive sampling. The software adopted for data analysis was SmartPLS 3.3.3. This study showed that technology utilization had been an important predictor of sustainable development, contributing to a sustainable digital economy. Similarly, low operational cost also moderated the relationship of sustainable development and sustainable digital economy that has been the major focus of developing countries. Moreover, the strategy of cutting down the operation costs to bring it down to the level of affordability is a major challenge for the economies such as China that have been among the low production cost. Studies on the sustainable digital economy with respect to technological use are very limited. Hence, this study will find many advantages for economists and IT professionals in the future with respect to devising the strategies taking into account the sustainable development goals and the achievement of a sustainable digital economy.

Keywords: sustainable digital economy, sustainable development, Industry 4.0, blockchain, technological use

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INTRODUCTION

The rapid digitalization of economic systems has a major impact on the lives of people, governments, and markets. Many individuals are adapting to the digital economy, so authorities must devise regulations quickly as possible to take advantage of the benefits of the digital revolution. These regulations must include minimal risk associated with job displacement. Digital economic

development results from general technology utilization, which can convert into a change driver for increasing productivity throughout all the industries. Digital technology could lower the cost of economic and social activities for businesses, individuals, and governments by lowering the cost of information. The current technological revolution, such as all the revolutions, is hugely damaging and economies will face issues such as increased inequality, instability, and privacy issues. The technology transformation is very well begun and affects huge manufacturing, logistics, banking, and retailing. Digital transactions are fast-growing and in industrialized economies, they now account for 20% of all the transactions (Dahwan and Raju, 2021).

The transformation of jobs will be severely impacted by digitalization. According to a 2017 study by the McKinsey Global Institute, one-third of the United States workforce will likely undergo job reprofiling by 2020. Cellphones, robotics, and artificial intelligence are ushering in a new era of commerce. There is no going back now as the pace of digital technology is anticipated to pick up in the next years. Delivery of skills, migration of labor, and productivity will be under strain in developing countries. Less developed economies are swiftly adopting these innovations and assuming the lead in digital technology such as land registration of India, e-payments in Kenya, and e-commerce in China. Real emphasis will need to be paid to the possible marginalization of workers whose abilities have deteriorated and the prospect of increasing wealth concentration. In the next 5 years, four change drivers are likely to impact corporate growth: strong mobile connectivity, broad acceptance of big data analysis, artificial intelligence, and cloud technology (Androniceanu et al., 2020).

According to the World Economic Forum (WEF) study, people will perform only 58% of jobs in 2022, down from 71% in 2018. Machines will take care of the rest. The educational and skill development systems are lagging behind the rate of change. At the same time, the digital economy can accelerate labor market dynamics by creating new doors. It also renders old skills outdated. Firms must be more adaptable and flexible as a result of the transformation. Unless governments keep improving investment environments, investing in proper health and education, and support effective governance, the full benefits of the digital transformation will not be realized. Digitalization has not increased productivity or reduced inequality in countries where these fundamentals remain inadequate. Technology transformation and technology can generate social and economic growth (Dahwan and Raju, 2021).

The old commercial sector has moved to a digitalized one and the digital transformation of the economy is heavily reliant on big data and new technology. Digitalization is no longer a feature of software companies; in fact, the top most valuable corporate organizations of the world are in the digital sector (Bukht and Heeks, 2017; Oliveira et al., 2020). Various objectives are being enforced by society as important components that experts and decision-makers must consider. Sustainability, digitalization, entrepreneurship, and innovation are examples of these factors. Those elements have grown increasingly important, as specific concerns such as climate change have the potential to harm assets and infrastructures, reduce production, cause mass migration, and so on. Value creation in a sustainable manner is an important issue. It can directly contribute to the slowing of climate change.

Furthermore, it is in line with reducing adverse repercussions; as a result, specific manufacturing activities might be established to foster a circular economy (Ordieres-Meré et al., 2020). Our daily lives are impacted by digital technology, big data analytics, information and communication technologies, the Internet of Things (IoT), and other advances. Large volumes of data may now be easily obtained and analyzed and for this, thanks to the Industry 4.0 transition. All the levels of business functions are affected by digital technology, procedures, and skills. Digitalization impacts cultural, organizational, and operational change in an industry or ecosystem due to its smart strategic integration (Matthess and Kunkel, 2020). The deep transformation of business and society is how digital transformation is defined to fully use the changes, organizational activities, processes, competencies, and models.

Considering the advantages of a hybrid of digital technologies and their rapid effect across industries, societies are taking shifts in current and future strategies. In today's world, assessing and monitoring digital transformation might be critical. Smart and sustainable concepts are not interchangeable; yet, from a policy standpoint. The strategic level of the European Union is intended to contribute to the digital transformation toward sustainable development. This study aims to present an indicator-based understanding of the main elements of digitalization that promote long-term development. In the formulation of policy, it is also crucial to be able to support various sectorial and geographical development projects on various dimensions from various perspectives, depending on the situation. Climate change, digitalization, and sustainability are all the issues that need to be addressed. There are few conclusive scientific findings about the detailed role of digitalization in achieving sustainability in the literature on sustainable development, particularly in central Europe.

A distinct study gap has to be filled, especially in the investigated field, due to the low number of assessments focused on the interrelationships between digitalization and each dimension of sustainable development. Emission controls, waste disposal, sustainable production, transportation, and logistics and sustainable development are all the sectors where digital technology-driven methodologies and solutions may play a critical role (Balogun et al., 2020; Matthess and Kunkel, 2020; Feroz et al., 2021). Rural areas have been important battlegrounds for the implementation of energy transitions in recent years. They are important for the placement of renewable energy sources and have a lot of potential for generating major benefits for long-term rural development. The evaluations often emphasize the necessity for a rural development approach that is effectively tailored to local conditions and focus on the competitiveness of rural region to optimize the economic benefits of energy deployment for rural areas. Policy plan papers assert and envisage the good benefits of renewable energy-based rural development. Hence, it is less obvious how these are justified and achieved. It is also unclear how they connect to the current political-economic conditions of the energy transition.

According to international studies, many countries have not devised policies to combine rural development and energy (Benedek et al., 2018). The European Commission has proposed many provisions and tools to enhance the positive effects of renewable energy strategies deployment for rural development. These are in line with the belief that economic and climate crisis tendencies can be fixed through large-scale investments in renewable energy infrastructures. These include integrated climate and energy plans that take into account rural issues, laws for member states to use synergies from many stakeholders and sectors, provisions for empowering renewable energy communities and self-consumers, and support for renewable energy strategy through a variety of funding schemes. Renewable energy represents a fresh possibility for reviving rural communities and addressing the unequal growth of resources of peripheral regions. The conceptual and applied foundations of this synergistic connection and the definition of rural development in this perspective remain a mystery.

Resultantly, recommendations appear to adhere mostly to the idea of giving "fixes" to a constant mastery of nature and the market as the fundamental driver of progress. Market failures can have negative social and environmental implications that can go unrecognized. Respective assessments and published reports commonly trace on confirmed samples of mainly small renewable sources to provide proof for efficiencies. They typically refer to possible positive economic effects without being explicit about the necessary functionalities, prerequisites, and mechanisms for realizing these potentials and effects. Furthermore, the importance of market conditions and renewable energy support, which has evolved from guaranteed feed-in tariff programs to auction models, remains unchallenged (Clausen and Rudolph, 2020).

To identify the energy strategy for sustainable development in rural areas based on the analysis of the sustainable digital economy, this study was planned, which revolved around certain objectives as: (1) To identify the role of technology utilization in achieving sustainable development, (2) To analyze the role of affordable energy resources in achieving sustainable development, (3) To estimate the relationship between sustainable development and sustainable digital economy, (4) To evaluate the moderating and mediating roles of operational costs and sustainable development.

REVIEW OF LITERATURE

Role of Technology Utilization in Sustainable Development

The definition of sustainability has gained universal acceptance among outcome and power players worldwide (De Vente et al., 2016). The United Nations General Assembly supported sustainable development objectives, which were supported by the administrations of 100 countries. The United Nations' approval came after the Intergovernmental Panel on Climate Change of the world that completed a study called "National Future," which described social responsibility that fulfills current demands without jeopardizing previous generations' flexibility to satisfy by their own (McIntyre-Mills et al., 2021). Environmental sustainability aims to make the required changes so that conventional economic activity can continue in the future. Simultaneously, it is understood that substantial and permanent environmental deterioration should be avoided because it may jeopardize the ability of the planet to support such activities.

The problem of "whether technical advancement can minimize the influence of economic development substantially to eliminate the need for other sorts of innovation" is at the core of the matter over the possible effectiveness of sustainable growth (Umar et al., 2020). Changes in demographic growth and expenditure levels appear to be off the table, as governments have not reached a consensus on these topics (Korkmaz and Toraman, 2020). If an ecological impact is directly proportional to the number of people (population), material use per individual (consumption), and environmental consequences per component of resource utilized (technology), the only variable that can be changed is technology. Instead of limiting productivity expansion, corporate sustainability strategies aim to alter it (Lu et al., 2021). They are based on the concept that technology can enable us to continue growing in a definite environment by uncovering new resources or giving alternatives, if a specific resource looks to be growing out. However, technology will assist us in making the most efficient use of what we have.

Such operational technologies should be utilized, which consume less water, electricity, and raw materials, while reducing waste outputs (Dar et al., 2021). For example, it can be achieved through detection and separation machinery and process-integrated flue-gas cleaning and filter systems (Malovetskaya et al., 2020). Additionally, material cost inputs and procedures can be modified to employ solvent-free inks and paints and heavy metal-free pigments (Huo et al., 2020). End goods can be engineered to prevent environmental degradation during manufacturing and use. Waste flows can be repurposed rather than discharged inside the manufacturing process. Keeping in view the impact of technological utilization, the following hypothesis was devised and analyzed.

H_1: *Technological utilization plays a role in achieving sustainable development.*

Role of Affordable Energy Resources in Sustainable Development

The prevailing economic and environmental issues necessitate a rapid shift to low-carbon energy technologies (Kyriakopoulos, 2021). Alternative sources must supply 70–85% of the total energy production by 2050 and according to the United Nations Environment Program. To keep global warming to 1.5°C, annual investments in some of these energy sources and energy consumption must be added. Currently, the change is proceeding at a moderate speed than is necessary. Economic, social, and institutional obstacles have hampered the large-scale implementation of renewable energy technology. The current global pandemic [coronavirus disease 2019 (COVID-19)] has sent shockwaves worldwide (Galaz et al., 2021).

Consequently, policymakers must devise economic recovery strategies in order to create economic and energy facilities for a long-term future (Machiba, 2011). This is a once in a lifetime opportunity to achieve a period of economic and climatic goals. Given the link between emissions reduction and sustainable development objectives, developing countries began to incorporate renewable energy sources into their development goals (Wijaya et al., 2017). In terms of per gross domestic product (GDP), these investments have been made so much in these innovations in recent years than developed countries. The fiscal and financial difficulties caused by the epidemic could greatly inhibit associated with renewable energy expenditures (Li et al., 2021).

Alternative energy sources, especially biomass in the form of firewood for burning and hydroelectric for generating electricity, have traditionally been employed in underdeveloped nations (Bamwesigye et al., 2020). Renewable energy contributed to over 13.5% of the total electricity generation of the world in 2017, with non-organization for economic co-operation and development (OECD) economies accounting for roughly 72% of that proportion (Popkova and Sergi, 2021). Renewable energy is the most important source of energy in several emerging countries, responsible for more than half of overall energy resources. On the other hand, modern renewable energy is significantly less widely used in these countries (Maamoun et al., 2020). The heavy reliance of the global south on renewable energy resources and advanced renewable energy may be seen in the discrepancies in renewable energy and modern sustainable energy shares. The following hypothesis was formulated to check the significance.

H_2: *Affordable energy resources play a role in achieving sustainable development.*

Role of Sustainable Development in Sustainable Digital Economy

The construction industry includes a wide range of businesses, from small-scale, low-tech industries to large-scale global corporations that harvest and process minerals using cutting-edge technology. Materials, particularly mineral-derived fuels, are critical resources for civilization advancement (Zaharescu et al., 2020). The Industrial revolution 4.0 program integrates the functionality from the IoT and the cyber-physical system (CPS) into the industry and manufacturing environment, which is linked to the rapid advancement of digital technology and the slow but steady depletion of conventional manufacturing, economic, and social control mechanisms potential for growth and efficiency.

The spread of digital technology across all the technical and social strata has resulted in large-scale changes. These changes would eventually influence the mineral and natural resources sector and the science and technology continuum. Resultantly, an unprecedented growth among some technology solutions [e.g., blockchain, digital processing system (DPS) and building information modeling (BIM) communication technology resources, the industrial IoT, and digital twins], the need for technology solutions, and indeed the seamless transitions of a variety of processes [e.g., Scada systems, enterprise resource planning (ERP), and manufacturing execution system (MES) systems] can be observed (Bryukhovetskaya et al., 2020). The construction industry has just begun to digitalize its supply chain and implement a blockchain platform. Consequently, natural resource availability and decreased labor costs would no longer be the primary growth drivers; instead, social and technological innovation, including digital transformation technology based on normal technology, will be the primary growth drivers (Yu et al., 2021).

Only the application of advanced technology allows for the efficient development of commodities markets in digitalization. It is effective to construct a technological development system based on intelligence concepts and procedures (Singh et al., 2019). The integration of well-known and fresh scientific understanding (incremental and innovative field of science and technology progress) improves apparatus, innovation, and technological improvements. Sustainable development demands a major decrease in production costs, a shift to lean manufacturing techniques, and improvements in technology and organizational efficiency (Tseng et al., 2021). Digital technology is having an increasing impact on the development of the field of science and technology achievements in various areas due to websites and cross-functional and cross-integration (Adamovich et al., 2017). Based on the literature, the following hypothesis was devised and analyzed.

H_3: *Sustainable development leads to sustainable digital economy.*

Moderating Role of Lower Operational Cost Between Sustainable Development and Sustainable Digital Economy

On a daily basis, operating costs are linked with the upholding and administration of a business. Running costs include direct costs of goods sold and additional operating expenses such as rent, salaries, and other overhead costs and raw materials and maintenance costs, which are referred to as selling, general, and administration costs. Non-operating expenses connected to finance such as debt, acquisitions, or foreign exchange conversion are not included in operating costs. Companies must keep account of both the running and non-operating costs such as interest charges on a mortgage. These expenses are reflected separately in records of the company; members can view to figure out how costs are linked to revenue-generating activities and whether the company can be operated more efficiently.

In general, the leadership of a firm will strive to increase earnings for the company. Since profits are decided by both the amount of revenue earned and the amount spent to run, profit may be enhanced by both the growing revenue and cutting operating costs. Due to decreasing costs appearing to be a simpler and more accessible approach to rising earnings, managers will frequently choose this strategy (Quilici et al., 2021). Sustainability is receiving more public attention and triggering more debate. Furthermore, over the last decade and particularly in the last few years, expectations of company stakeholders have expanded to include more and more social and environmental aspects

even as the primary company target has remained financial performance, which is increasingly influenced by environmental and social responsibility. A number of studies have been done in this approach, assessing the impact of long-term corporate development on financial statements (Caiazza et al., 2021).

The primary goal of operational cost control is to identify and describe the cost and income variations. Horngren designed this diagnostic control system to assess if and how well a corporation is operating in comparison to its goals. Cost control, on the other hand, has a broader scope. The existing study discusses a number of cost-control specifics such as staff motivation and goal alignment and approach evaluation (Malmmose and Lydersen, 2021). Kaplan claims that "money invested inside the environment and in communities does not have to be for selfless reasons alone." The truthfulness of this claim may be true in the short-term. We believe that long-term revenue and stock price advantages are linked to corporate sustainability strategies. A number of studies have been conducted on this topic with the goal of determining the impact of company sustainability on financial performance (Avotra et al., 2021a). The major goal of the study is to uncover the moderating relationship between lower operational costs, sustainable development, and a sustainable digital economy to demonstrate how the cost-control tool may be utilized for long-term development by aligning goals of business and community objectives (Niță and Ștefeatefea, 2014). Keeping in view the literature on moderating role of low operational cost, the following hypothesis was developed.

H_4: *Lower operation cost moderates the role of sustainable development in sustainable digital economy.*

Mediating Role of Sustainable Development Among Technological Utilization and Sustainable Digital Economy

One of the major issues of the poor countries is obtaining and implementing the requisite technologies, which confront in achieving sustainable development. While financial resources play a role in gaining access to technology, this is not the only solution. The import/export, transfer, and use of technology for sustainable development are frequently hampered by legal and institutional frameworks. Quotas and tariffs can hamper the ability to import technologies. Subsidies may also encourage the adoption of technology that squander energy, water, or other resources. Furthermore, when choosing technologies, decision-makers should take cultural norms into account (He et al., 2021).

The United Nations Sustainable Development Goals (SDGs) (2015) are a set of 17 global targets with 169 targets. Actions to reduce poverty, increase education and healthcare, and enhance wealth and well-being while taking ecological sustainability into account are among them. In fact, the SDGs cover a wide range of topics such as welfare programs (e.g., education, health, and poverty), economic growth (e.g., production and employment, clean energy, industries, and infrastructure), environmental sustainability (e.g., ecosystem, water and sanitation, and climate change), and effective regulatory rules and governance (e.g., accountability and justice) (Berawi, 2017). Digital breakthroughs in energy, farming, healthcare, school, and transport are already revolutionizing how people access and use a variety of services and they are typically riding on the backs of digital financial rails. It provides a new opportunity for underprivileged communities such as women, children, refugees, exiles, handicapped persons, and individuals living in rural regions to alter their lives. Digital technology and related advances should hold promise for advancing the participation and advancement of vulnerable communities. Building an inclusive digital economy tackles critical development concerns by harnessing digital transformation to reach people in the last stretch and speed development toward the SDGs (Ramasubramanian et al., 2021). All the literature supported the mediating role of sustainable development among technology utilization and sustainable digital economy. The following hypothesis was developed and tested as a result.

H_5: *Sustainable development mediates the role of technological utilization and sustainable digital economy.*

Mediating Role of Sustainable Development Among Affordable Energy Resources and Sustainable Digital Economy

Over 1 billion people around the world lack access to power and countries with adequate electricity have the dual issue of fast rising energy consumption and environmental concerns. Nuclear power is a safe, low-carbon energy source that many nations are contemplating or incorporating into their energy mix as part of their attempts to reach the United Nations SDGs of ensuring universal accessibility, dependable, sustainable, and energy services. Keeping in focus the energy strategies, experts can utilize the [International Atomic Energy Agency (IAEA)] energy planning and modeling tools and pieces of advice to help them plan the energy future of their country, which may or may not involve nuclear power. These technologies assist countries in taking into account all the aspects of energy supply and demand, while sticking to long-term development objectives. Over 135 countries and 20 international organizations have already adopted the tools. Hence, sustainable development is associated with affordable energy resources.

On request, the IAEA provides advice and support to countries considering or creating a nuclear power project including building and managing a nuclear energy program in accordance with globally recognized safety standards and security requirements. The IAEA also aids countries new to nuclear technology in creating the necessary infrastructure to enable them to achieve long-term energy security. The IAEA provides technical assistance in all the parts of the nuclear fuel cycle and the life cycle of nuclear power plants and assistance with new revolutionary technologies (Lee et al., 2016). All these efforts are to align the sustainable development in the countries by providing them the affordable energy solutions. At various levels, incorporating inexpensive energy policies and measures into sustainable development strategies can help to overcome

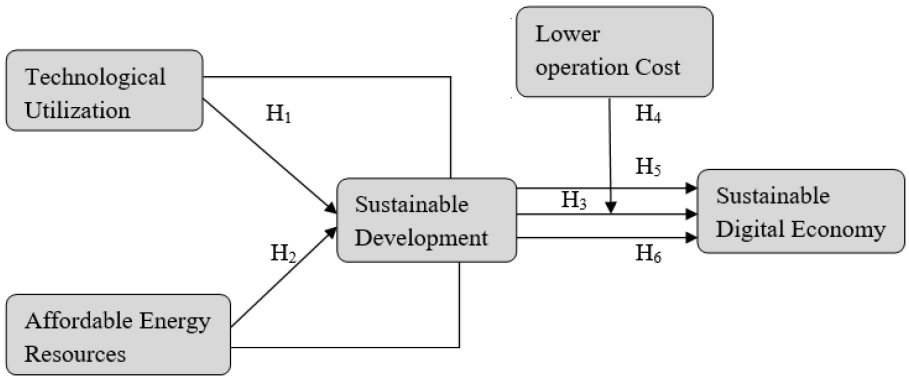

FIGURE 1 | Conceptual model.

current hurdles and open up the potential for affordable energy deployment in line with attaining the SDGs. Barriers to renewable energy deployment continue to obstruct sustainable growth.

Those barriers are intimately connected to personal and social rules and morals, which profoundly influence the attitudes and acknowledgment of affordable and renewable energy technology and information implementation effects by individual people, groups, and societies, in addition to business and economic obstacles (Ali et al., 2021). The intersection of sustainability and digital implications is getting momentum in the business and public sectors. Systematic and rigorous academic study has yet to emerge. An increasing number of social scientists are focusing on issues such as inclusion, management of natural resources, and societal grand challenges. Management scholars have yet to acknowledge the seriousness of climate change and sustainable development in their study. Our intellectual communities should not remain on the sidelines, given the scientific consensus on the urgency and gravity of the task of combating man-made climate change (Surya et al., 2021). The mediating role of sustainable development could be established between the role of affordable energy and sustainable digital economy by going through the literature, so the following hypothesis was developed and analyzed.

H_6: *Sustainable development mediates the role of affordable energy resources in sustainable digital economy.*

Based on these hypotheses, this study was designed and the following conceptual framework was designed (see **Figure 1**).

METHODOLOGY

Sampling and Instrument Development

This study is quantitative in nature and follows the postpositivist approach. This study has incorporated the quantitative techniques for data analysis with a deductive approach for verifying the theories developed in the literature review and demonstrated in the theoretical framework. The software used in this study was SmartPLS 3.3.3. Economists and information technology (IT) professionals of China were taken as the population for this study, since they are directly related to the sustainable digital economy. The sample size of 285 was achieved using purposive sampling because approaching all the firms, if near impossible. The demographic profile of the respondents is shown below in **Table 1**. The demographic profile was split into four categories, i.e., gender, age, education, and field of study. There were 43% males and 56% females from respondents. The highest respondents of this study were under 25 years of age, which was approximately 30% of the total sample size. The field of this study was categorized into IT professionals and economists. Almost 53% of respondents were economists and 47% were IT professionals. The rest of the details of the demographic analysis can be seen below.

TABLE 1 | Demographic analysis.

Demographic summary	Frequency	Percentage
Gender		
Male	160	56.14
Female	125	43.85
Age		
<25	89	31.22
25—0	57	20.00
31–40	53	18.60
41–50	12	4.21
>50	74	25.96
Education		
Bachelor	71	24.91
Masters	133	46.66
Doctorate	66	23.15
Others	15	5.26
Fields of study		
Economists	151	52.98
Information technology professionals	134	47.01

n = 285.

The instrument used in this study has been adapted from the past studies according to the need of this study (Khan et al., 2019). The questionnaire was designed on the Likert scale. There was a total of five variables in this study. There

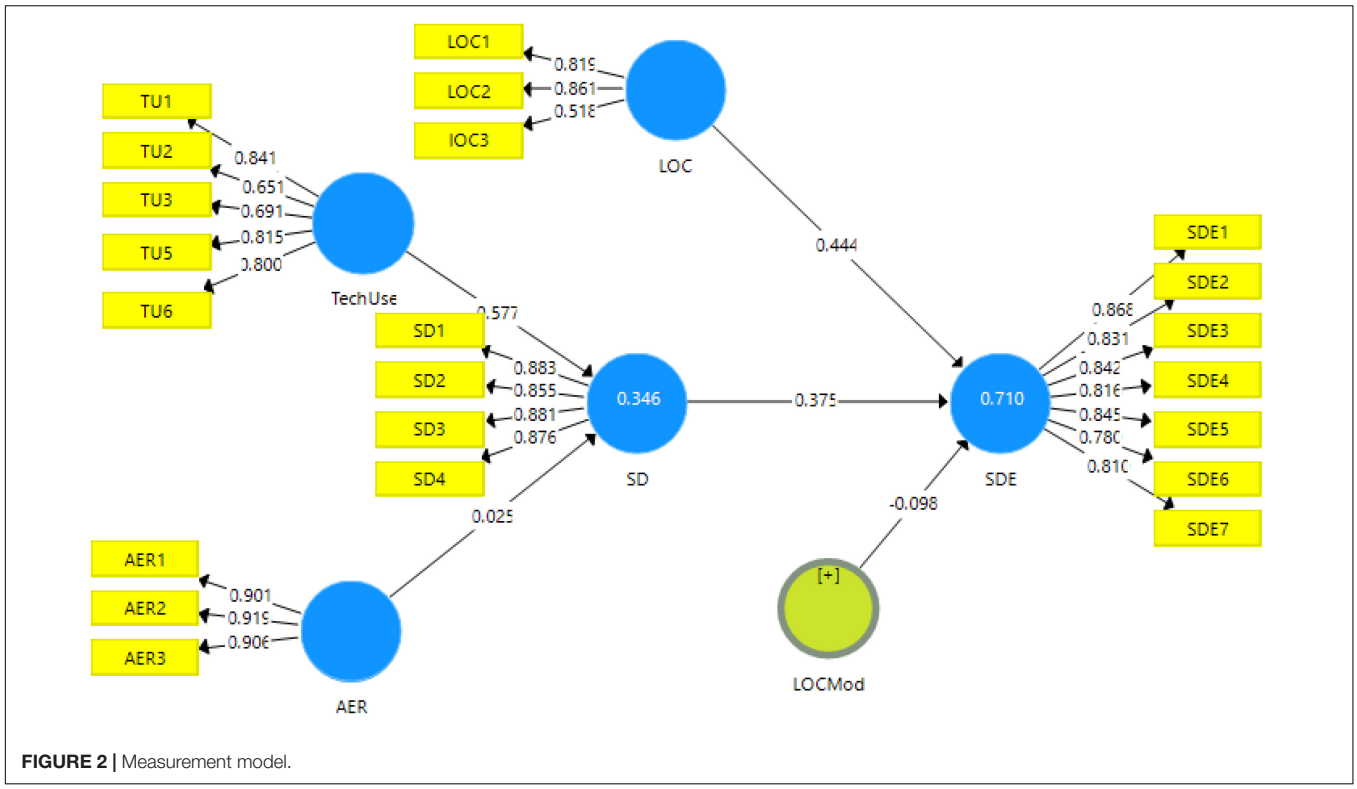

FIGURE 2 | Measurement model.

were two independent variables, i.e., affordable energy resources (3-item scale was adapted from Moşteanu et al., 2020) and technological use (5-item scale was adapted from Ciocoiu, 2011); one dependent variable sustainable digital economy (7-item scale); one moderator low operations cost (3-item scale was adapted from Moşteanu et al., 2020); and a mediating variable, i.e., sustainable development (4-item scale was adapted from Dantas et al., 2021). The results from the measurement model showed the alpha and composite reliabilities in the acceptable range, i.e., >0.70 (Avotra et al., 2021b). The measurement model can be seen in **Figure 2**.

DATA ANALYSIS

The results for reliabilities of the scale can be seen in **Table 2**. The highest value for the composite reliability is 0.938 and the lowest value for the composite reliability is 0.786, making all the variables reliable. All the values in this study were found reliable according to Avotra et al. (2021b). Furthermore, the factor loading of the items obtained in this study was all above 0.6 and the average variance extracted (AVE) also met the cut-off value mentioned in literature, i.e., 0.5 (Galaz et al., 2021).

Similarly, the validity of the scale was checked with factor loading and the AVE. Factor loadings have been set to be above 0.6 (Harlow and Duerr, 2013); however, values as low as 0.3 are also acceptable. The minimum value in this study for the factor loadings is 0.518, thus meeting the criteria. The results for the factor loadings and AVE can be seen in **Table 3**. The validity of the scale was also checked with AVE, which should be above 0.5.

TABLE 2 | Alpha reliability.

Constructs	Alpha reliability	Composite reliability
Technological use	0.835	0.874
Affordable energy resources	0.895	0.934
Sustainable development	0.897	0.928
Low operations cost	0.610	0.786
Sustainable digital economy	0.923	0.938

n = 285.

The lowest value in this study for AVE is 0.560 (lower operations cost), which is well above the cut-off value.

Another measure for validity is the Fornell and Larcker criterion, which has been applied in this study. This checks the correlations among the variables of this study. For the results to be significant, the value in each column should be greater than the rest of the values. This study meets these criteria of validity as well and the results can be seen in **Table 4**.

The structural model of structural equation modeling (SEM) analysis is shown in **Figure 3**. This phase of the analysis is used to check the main hypotheses of this study. The results showed the adjusted R^2 for sustainable digital economy showed a higher contribution to this framework than sustainable development; however, both have been proved to be the important variables in this study. With respect to hypotheses, H_2 and H_6, it did not find significant results showing any contribution of affordable energy resources in sustainable development and, hence, no role in a sustainable digital economy. On the other hand, technological use predicted

TABLE 3 | Convergent validity.

Constructs	Code	FD	AVE
Technological use			0.583
	TU1	0.841	
	TU2	0.651	
	TU3	0.691	
	TU4	0.815	
	TU5	0.800	
Affordable energy resources			0.826
	AER1	0.901	
	AER2	0.919	
	AER3	0.906	
Sustainable development			0.764
	SD1	0.883	
	SD2	0.855	
	SD3	0.881	
	SD4	0.876	
Low operation cost			0.560
	LOC1	0.819	
	LOC2	0.861	
	LOC3	0.518	
Sustainable digital economy			0.685
	SDE1	0.868	
	SDE2	0.831	
	SDE3	0.842	
	SDE4	0.816	
	SDE5	0.845	
	SDE6	0.780	
	SDE7	0.810	

n = 285.
FD, factor loadings; AVE, average variance extracted; AER, affordable energy resources; LOC, lower operations cost; SD, sustainable development; SDE, sustainable digital economy; TechUse, Technological use.

TABLE 4 | Fornell and Larcker criterion.

Variables	AER	LOC	SD	SDE	TechUse
AER	0.909				
LOC	0.381	0.789			
SD	0.275	0.761	0.874		
SDE	0.202	0.785	0.788	0.828	
TechUse	0.432	0.605	0.588	0.663	0.763

n = 285.
AER, affordable energy resources; LOC, lower operations cost; SD, sustainable development; SDE, sustainable digital economy; TechUse, Technological use.

sustainable development significantly (H_1: t-statistic = 11.164, p-value = 0.000), hence contributed to sustainable digital economy (H_5: t-statistic = 5.396, p-value = 0.000). The results can be seen in **Table 5**. Similarly, sustainable development also predicted the sustainable digital economy (H_3: t-statistic = 6.884, p-value = 0.000) and lower operations cost also moderated this relationship (H_4: t-statistic = 3.091, p-value = 0.002). Further elaborations of the results have been discussed in the next section of this study.

DISCUSSION

This study was based on several hypotheses to analyze energy strategy for sustainable development in rural areas based on the analysis of sustainable digital economy having a mediating role of sustainable development. Similarly, the other main relationship of this study was to find the moderating role of lower operational costs on the role of sustainable development and sustainable digital economy. A theoretical framework was designed and questionnaires were sent to the participants. The results mostly supported the hypotheses. The results were also in accordance with many researchers and some were of a different opinion. The possible reasoning for the obtained results is also discussed here. A total of 57% of the respondents were men and 43% were women. They all had different education levels ranging from higher secondary to doctorate level.

The cut-off value for reliability is said to be 0.7 (Avotra et al., 2021b). All the values in this study are above 0.70 ranging from 0.786 to more than 0.9 for alpha reliability and composite reliability. Hence, the data in this study are reliable. The maximum threshold stated in literature for factor loadings is 0.6. The minimum value in this study for the factor loadings is 0.518, thus meeting the criteria. The possible reason for getting these results was the authenticity and reliability of the data collected from the participants. Discriminant validity was also tested and found satisfactory for this study. This is also due to the authenticity of the data. For the other criterion, i.e., heterotrait-monotrait rati (HTMT) ratio, the researchers agree that the value should not exceed 0.9, i.e., all the values should be less. The results for this study meet this criterion hence, making the data valid for use. In the third phase of data analysis, the data were analyzed for structural model or path analysis using bootstrapping with SmartPLS 3.3.3.

This is usually the subsequent stage of the measurement model. The significance of the relationships is usually expressed in the form of path analysis, which either shows the direct effects or the indirect effects. The direct effects are the general linear regression; however, indirect effects indicate the mediating variables. The results showed the adjusted R^2 for the sustainable digital economy that showed a higher contribution to this framework than sustainable development; however, both have been proved to be the important variables in this study. This is due to the fact that sustainable development and sustainable digital economies are the ultimate goals of any devising strategies for the success of businesses, affordable energy strategies in this study.

With respect to the hypotheses, H_2 and H_6, results were not significant showing no contribution of affordable energy resources in sustainable development and, hence, no role playing in the sustainable digital economy. This could be possible due to a lack of study in the targeted area of this study. The respondents could have less knowledge about the role of affordable energy resources in sustainable development and sustainable digital economies. On the other hand, technological use predicted

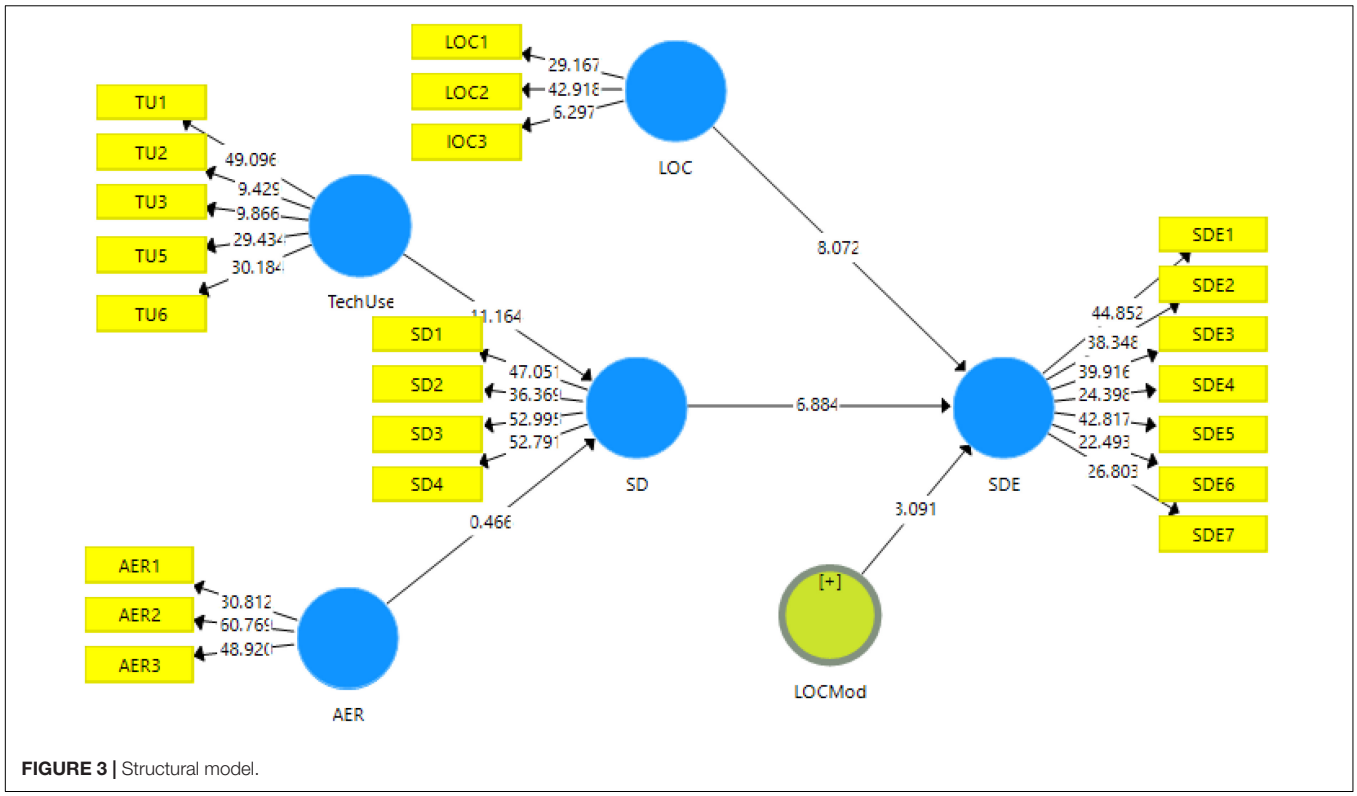

FIGURE 3 | Structural model.

TABLE 5 | Results for significance.

Paths	H	*t*-Stats	*p*-Value	Adjusted R^2	Results
TechUse → SD	H_1	11.164	0.000	0.342	Accepted
AER → SD	H_2	0.466	0.641		Rejected
SD → SDE	H_3	6.884	0.000	0.707	Accepted
LOCMod → SDE	H_4	3.091	0.002		Accepted
TU → SD → SDE	H_5	5.396	0.000		Accepted
AER → SD → SDE	H_6	0.465	0.642		Rejected

n = 285.
AER, affordable energy resources; LOC, lower operations cost; SD, sustainable development; SDE, sustainable digital economy; TechUse, Technological use.

sustainable development significantly (H_1) hence, contributing to a sustainable digital economy (H_5). These results were obtained due to the understanding of the respondents toward changing trends due to the utilization of technology in the modern world. Similarly, sustainable development also predicted the sustainable digital economy (H_3) and lower operations cost also moderated this relationship (H_4).

Such results could be obtained due to the fact that sustainable digital economy is directly related to sustainable development and lower operations costs play an important role in sustainable development. All the hypotheses were supported in this study, except for affordable energy resources significance toward sustainable development and sustainable digital economy. This happened due to the fact that respondents are not directly involved in managing affordable energy resources for sustainable development and sustainable digital economy.

CONCLUSION

Technology is surprising the world every now and then. These technologies are revolutionizing not only individuals, but economies as well, particularly for the emerging economy of China that is ruling the world with its lowest production costs. This study has also been a bridging step to fill the gap in the literature that addresses the role of technology in sustainable development. This, in turn, contributes to the sustainable digital economy. This study has found the significant moderating role of low operation cost that boosts the relationship of sustainable development and sustainable digital economy. The results of this study are supposed to be very helpful for the economists and IT developers in realizing the importance of their roles in the coming years. This study has several implications for the future researchers and policymakers who are interested in repeating this study with their available resources in different regions. These can be exploited well in finding new avenues for certain studies.

LIMITATIONS OF STUDY

This study had certain limitations, which could be further investigated and rectified. Most of them were associated with affordable energy resources such as low capacity of electricity generation, unreliability of the renewable energy resources, unreliability of efficiency levels of this kind of energy, lack of large upfront capital, lack of space to install the energy resources, lack

of funds for storage of such renewable energy, and uncertainty about the generation of pollution. Few other limitations could be considered in future such as precautions about data security, crime, and terrorism associated with the digital world, complexity of the processes, privacy concerns of the stakeholders, social disconnectivity, workload capacity, and manipulation of the digital media among users. In future, working on these variables things should also be triggered in mind.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Royal Holloway, University of London, United Kingdom.

AUTHOR CONTRIBUTIONS

ZW contributed to the conceived and designed the concept. YZ contributed to the literature review, data collection, and wrote the manuscript. Both authors have read and agreed to the published version of the manuscript.

REFERENCES

Adamovich, I., Baalrud, S. D., Bogaerts, A., Bruggeman, P. J., Cappelli, M., Colombo, V., et al. (2017). The 2017 plasma roadmap: low temperature plasma science and technology. *J. Phys. D. Appl. Phys.* 50:323001. doi: 10.1088/1361-6463/aa76f5

Ali, Q., Yaseen, M. R., Anwar, S., Makhdum, M. S. A., and Khan, M. T. I. (2021). The impact of tourism, renewable energy, and economic growth on ecological footprint and natural resources: a panel data analysis. *Resour. Policy* 74:102365. doi: 10.1016/j.resourpol.2021.102365

Androniceanu, A., Kinnunen, J., and Georgescu, I. (2020). E-Government clusters in the EU based on the gaussian mixture models. *Adm. Manag. Public* 35, 6–20. doi: 10.24818/amp/2020.35-01

Avotra, A. A. R. N., Chengang, Y., Sandra Marcelline, T. R., Asad, A., and Yingfei, Y. (2021a). Examining the impact of e-government on corporate social responsibility performance: the mediating effect of mandatory corporate social responsibility policy, corruption, and information and communication technologies development during the COVID era. *Front. Psychol.* 12:4221. doi: 10.3389/fpsyg.2021.737100

Avotra, A. A. R. N., Chengang, Y., Wei, X., Ming, J., and Marcelline, T. R. S. (2021b). Struggling with business corporate cynical impression? powerful methods of CSR to enhance corporate image and consumer purchase intention. *Front. Public Heal.* 9:1250. doi: 10.3389/fpubh.2021.726727

Balogun, A.-L., Marks, D., Sharma, R., Shekhar, H., Balmes, C., Maheng, D., et al. (2020). Assessing the potentials of digitalization as a tool for climate change adaptation and sustainable development in urban centres. *Sustain. Cities Soc.* 53:101888. doi: 10.1016/j.scs.2019.101888

Bamwesigye, D., Kupec, P., Chekuimo, G., Pavlis, J., Asamoah, O., Darkwah, S. A., et al. (2020). Charcoal and wood biomass utilization in Uganda: the socioeconomic and environmental dynamics and implications. *Sustainability* 12:8337. doi: 10.3390/su12208337

Benedek, J., Sebestyén, T.-T., and Bartók, B. (2018). Evaluation of renewable energy sources in peripheral areas and renewable energy-based rural development. *Renew. Sustain. Energy Rev.* 90, 516–535. doi: 10.1016/j.rser.2018.03.020

Berawi, M. (2017). The role of technology in achieving sustainable development goals. *Int. J. Technol.* 8:362. doi: 10.14716/ijtech.v8i3.9296

Bryukhovetskaya, S. V., Artamonova, K. A., Gibadullin, A. A., Ilminskaya, S. A., and Kurbonova, Z. M. (2020). "Management of digital technology development in the national economy," in *Proceedings of the IOP Conference Series: Earth and Environmental Science*, (Bristol: IOP Publishing). doi: 10.1088/1755-1315/421/4/042018

Bukht, R., and Heeks, R. (2017). *Defining, Conceptualising and Measuring the Digital Economy*. Oxford: University of Manchester. Development Informatics Working Paper no. 68. doi: 10.2139/ssrn.3431732

Caiazza, S., Galloppo, G., and Paimanova, V. (2021). The role of sustainability performance after merger and acquisition deals in short and long-term. *J. Clean. Prod.* 314:127982. doi: 10.1016/j.jclepro.2021.127982

Ciocoiu, C. N. (2011). Integrating digital economy and green economy: opportunities for sustainable development. *Theor. Empir. Res. Urban Manag.* 6, 33–43.

Clausen, L. T., and Rudolph, D. (2020). Renewable energy for sustainable rural development: synergies and mismatches. *Energy Policy* 138:111289. doi: 10.1016/j.enpol.2020.111289

Dahwan, A. A. A., and Raju, V. (2021). The role of e-readiness rank on the implementation of E-government in military institutions in yemen. *Ann. Rom. Soc. Cell Biol.* 25, 1029–1043.

Dantas, T. E. T., de-Souza, E. D., Destro, I. R., Hammes, G., Rodriguez, C. M. T., and Soares, S. R. (2021). How the combination of circular economy and industry 4.0 can contribute towards achieving the sustainable development goals. *Sustain. Prod. Consum.* 26, 213–227. doi: 10.1016/j.spc.2020.10.005

Dar, A. A., Pan, B., Qin, J., Zhu, Q., Lichtfouse, E., Usman, M., et al. (2021). Sustainable ferrate oxidation: reaction chemistry, mechanisms and removal of pollutants in wastewater. *Environ. Pollut.* 290:117957. doi: 10.1016/j.envpol.2021.117957

De Vente, J., Reed, M. S., Stringer, L. C., Valente, S., and Newig, J. (2016). How does the context and design of participatory decision making processes affect their outcomes? evidence from sustainable land management in global drylands. *Ecol. Soc.* 21:24. doi: 10.5751/ES-08053-210224

Feroz, A. K., Zo, H., and Chiravuri, A. (2021). Digital transformation and environmental sustainability: a review and research agenda. *Sustainability* 13:1530. doi: 10.3390/su13031530

Galaz, V., Centeno, M. A., Callahan, P. W., Causevic, A., Patterson, T., Brass, I., et al. (2021). Artificial intelligence, systemic risks, and sustainability. *Technol. Soc.* 67:101741. doi: 10.1016/j.techsoc.2021.101741

Harlow, L. L., and Duerr, S. R. (2013). "Multivariate analysis of variance," in *Handbook of Quantitative Methods for Educational Research*, ed. T. Teo (Rotterdam: SensePublishers), doi: 10.1007/978-94-6209-404-8_6

He, W., Zhang, Z., and Li, W. (2021). Information technology solutions, challenges, and suggestions for tackling the COVID-19 pandemic. *Int. J. Inf. Manage.* 57:102287. doi: 10.1016/j.ijinfomgt.2020.102287

Huo, C., Ahmed, D. A., Nawaz, A., Hameed, J., Albashar, G., Pan, B., et al. (2020). Groundwater contamination with the threat of COVID-19: Insights into CSR theory of Carroll's pyramid. *J. King Saud Univ. - Sci.* 33:101295. doi: 10.1016/j.jksus.2020.101295

Khan, S. A. R., Jian, C., Zhang, Y., Golpîra, H., Kumar, A., and Sharif, A. (2019). Environmental, social and economic growth indicators spur logistics performance: from the perspective of South Asian association for regional cooperation countries. *J. Clean. Prod.* 214, 1011–1023. doi: 10.1016/j.jclepro.2018.12.322

Korkmaz, G., and Toraman, Ç. (2020). Are we ready for the post-covid-19 educational practice? an investigation into what educators think as to online learning. *Int. J. Technol. Educ. Sci.* 4, 293–309. doi: 10.46328/ijtes.v4i4.110

Kyriakopoulos, G. L. (2021). "Should low carbon energy technologies be envisaged in the context of sustainable energy systems?," in *Low Carbon Energy*

Technologies in Sustainable Energy Systems, (Amsterdam: Elsevier), 357–389. doi: 10.1016/B978-0-12-822897-5.00015-8

Lee, S., Oh, S. W., and Nam, K. (2016). Transformational and transactional factors for the successful implementation of enterprise architecture in public sector. *Sustainability* 8:456. doi: 10.3390/su8050456

Li, W., Chien, F., Ngo, Q.-T., Nguyen, T.-D., Iqbal, S., and Bilal, A. R. (2021). Vertical financial disparity, energy prices and emission reduction: empirical insights from Pakistan. *J. Environ. Manage.* 294:112946. doi: 10.1016/j.jenvman.2021.112946

Lu, J., Liang, M., Zhang, C., Rong, D., Guan, H., Mazeikaite, K., et al. (2021). Assessment of corporate social responsibility by addressing sustainable development goals. *Corp. Soc. Responsib. Environ. Manag.* 28, 686–703. doi: 10.1002/csr.2081

Maamoun, N., Kennedy, R., Jin, X., and Urpelainen, J. (2020). Identifying coal-fired power plants for early retirement. *Renew. Sustain. Energy Rev.* 126:109833. doi: 10.1016/j.rser.2020.109833

Machiba, T. (2011). "Eco-innovation for enabling resource efficiency and green growth: development of an analytical framework and preliminary analysis of industry and policy practices," in *International Economics of Resource Efficiency*, (Berlin: Springer), 371–394. doi: 10.1007/978-3-7908-2601-2_19

Malmmose, M., and Lydersen, J. P. (2021). From centralized DRG costing to decentralized TDABC-assessing the feasibility of hospital cost accounting for decision-making in Denmark. *BMC Health Serv. Res.* 21:835. doi: 10.1186/s12913-021-06807-6804

Malovetskaya, E. V., Bolshakov, R. S., Dimov, A. V., and Byshlyago, A. A. (2020). "Planning of qualitative indexes of railroad operational work in polygon technologies," in *Proceedings of the IOP Conference Series: Materials Science and Engineering*, (Bristol: IOP Publishing), 12041. doi: 10.1088/1757-899X/760/1/012041

Matthess, M., and Kunkel, S. (2020). Structural change and digitalization in developing countries: conceptually linking the two transformations. *Technol. Soc.* 63:101428. doi: 10.1016/j.techsoc.2020.101428

McIntyre-Mills, J. J., Wirawan, R., Widianingsih, I., and Riswanda, R. (2021). "Social engagement to protect multispecies habitat: implications for re-generation and food security," in *From Polarisation to Multispecies Relationships*, (Berlin: Springer), 309–368. doi: 10.1007/978-981-33-6884-2_15

Moşteanu, N. R., Faccia, A., and Cavaliere, L. P. L. (2020). "Digitalization and green economy - changes of business perspectives," in *Proceedings of 4th International Conference on Cloud and Big Data Computing (ICCBDC)*, (Liverpool), doi: 10.1145/3416921.3416929

Niţă, C. G., and Ştefea, P. (2014). Cost control for business sustainability. *Proc. Soc. Behav. Sci.* 124, 307–311. doi: 10.1016/j.sbspro.2014.02.490

Oliveira, T. A., Oliver, M., and Ramalhinho, H. (2020). Challenges for connecting citizens and smart cities: ICT. E-Governance and blockchain. *Sustainability* 12:2926. doi: 10.3390/SU12072926

Ordieres-Meré, J., Remón, T., and Rubio, J. (2020). Digitalization: an opportunity for contributing to sustainability from knowledge creation. *Sustainability* 12:1460. doi: 10.3390/su12041460

Popkova, E. G., and Sergi, B. S. (2021). Energy efficiency in leading emerging and developed countries. *Energy* 221:119730. doi: 10.1016/j.energy.2020.119730

Quilici, P. J., Wolberg, H., and McConnell, N. (2021). Operating costs, fiscal impact, value analysis and guidance for the routine use of robotic technology in abdominal surgical procedures. *Surg. Endosc.* doi: 10.1007/s00464-021-08428-8428 Online ahead of print.

Ramasubramanian, G., Shaikh, A. A., and Sharma, R. (2021). Examining the impact of ICT on sustainable development: a data-driven narrative. *Proc. Annu. Hawaii Int. Conf. Syst. Sci.* 2020, 4394–4403. doi: 10.24251/HICSS.2021.534

Singh, J., Flaherty, K., Sohi, R. S., Deeter-Schmelz, D., Habel, J., Le Meunier-FitzHugh, K., et al. (2019). Sales profession and professionals in the age of digitization and artificial intelligence technologies: concepts, priorities, and questions. *J. Pers. Sell. Sales Manag.* 39, 2–22. doi: 10.1080/08853134.2018.1557525

Surya, B., Menne, F., Sabhan, H., Suriani, S., Abubakar, H., and Idris, M. (2021). Economic growth, increasing productivity of smes, and open innovation. *J. Open Innov. Technol. Mark. Complex.* 7, 1–37. doi: 10.3390/JOITMC7010020

Tseng, M.-L., Tran, T. P. T., Ha, H. M., Bui, T.-D., and Lim, M. K. (2021). Sustainable industrial and operation engineering trends and challenges Toward Industry 4.0: a data driven analysis. *J. Ind. Prod. Eng.* 38, 581–598. doi: 10.1080/21681015.2021.1950227

Umar, M., Ji, X., Kirikkaleli, D., and Xu, Q. (2020). COP21 roadmap: do innovation, financial development, and transportation infrastructure matter for environmental sustainability in China? *J. Environ. Manage.* 271:111026. doi: 10.1016/j.jenvman.2020.111026

Wijaya, A., Chrysolite, H., Ge, M., Wibowo, C. K., Pradana, A., Utami, A. F., et al. (2017). *How can Indonesia Achieve its Climate Change Mitigation Goal? An Analysis of Potential Emissions Reductions from Energy and Land-use Policies*. Washington, DC: World Resources Institute.

Yu, Y., Zhang, J. Z., Cao, Y., and Kazancoglu, Y. (2021). Intelligent transformation of the manufacturing industry for Industry 4.0: seizing financial benefits from supply chain relationship capital through enterprise green management. *Technol. Forecast. Soc. Change* 172:120999. doi: 10.1016/j.techfore.2021.120999

Zaharescu, D. G., Burghelea, C. I., Dontsova, K., Reinhard, C. T., Chorover, J., and Lybrand, R. (2020). *Biological Weathering in the Terrestrial System: an Evolutionary Perspective. Biogeochemical Cycles: Ecological Drivers and Environmental Impact*. Hoboken, NJ: Wiley. doi: 10.1002/9781119413332.ch1

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Role of Technological Knowledge and Entrepreneurial Orientation on Entrepreneurial Success: A Mediating Role of Psychological Capital

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This study pursues to build the conceptual model of entrepreneurial success (ES) that discusses the concept and phenomenon of ES and its perquisites and outcomes. This proposed mode anticipated that factors technological knowledge (TK), entrepreneurial orientation (EO), and psychological knowledge influence ES. This paper explains previous literature on perquisites, the phenomenon of TK, EO and psychological knowledge, and ES. This conceptual paper targets the scholarly works that provide support for the proposed model. A significant contribution of this paper is to propose an original relationship between prerequisites, phenomena, and consequences in ES. The proposed model shows a novel conceptualization of how these constructs may be connected to affect ES outcomes. This study enhances the literature by providing the theoretical literature of forerunners and outcomes for ES. In addition, this study has important implications for practitioners and entrepreneurs to generate success in entrepreneurial activities. Based on new insights, this study also developed and suggested new approaches and opportunities for future research.

Keywords: entrepreneurship, technological knowledge, entrepreneurial orientation, psychological capital, entrepreneurial success

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INTRODUCTION

Over the decades, the progressing digital trend involving the role of advanced innovations has coordinated the emerging demand for technological solutions. The rapid innovative advancement has profoundly changed the business dynamics, significantly shaping the business models through IT solutions. The developing technology paradigm has enhanced the potential of advanced technologies, thereby vigorously modifying entrepreneurial activities (Elia et al., 2020). The rigorous diffusion of the modernized invention (i.e., Information Communication Technology) has upheld the modern roads for incorporating novel innovations in entrepreneurial success (ES).

Indeed, this relentless convergence between entrepreneurship and digital technologies has advanced the new breed of entrepreneurs by successfully launching the new venture. Developing entrepreneurship has potentially been emerged as a prime feature increasing the firms' growth rate. The field of entrepreneurship supporting the new venture's success has become critical

for all organizations and individuals. Undoubtedly, every individual wants to be a successful entrepreneur but what makes the organization successful is still a mystery to many minds. Passion, conviction, resourcefulness, and willingness to innovate are strong determinants of succeeding as an entrepreneur.

The entrepreneurs' efforts play a strategic role in firms' success. The developing significance of venture start-ups has enhanced the business environment by empowering the business visionaries to relish the ventures' success. The study of the new venture's success has gained the great interest of entrepreneurs, fundamentally featuring growth in firms' performance, economic development, and value creation (Urbano et al., 2020). Entrepreneurs improve the firm's profits by generating benefits and gaining business success. Given the statement, the research shows that ES exclusively depends on firms' performance, financial satisfaction, community impact, employee fulfillment, and knowledge acquisition (Wach et al., 2020).

Over the years, business entrepreneurship has fundamentally evolved, bringing fruitful results for world economies. Perhaps, in recent years, the literature reveals that developing nations are focusing more on optimizing their entrepreneurial practices. The optimization structure fundamentally accelerates the nation's economic growth. The study shows that nations like Dutch and Hungarian have revealed a healthy economic and social environment where entrepreneurial activities have flourished tremendously (Meyer and De Jongh, 2018). Regardless of whether it is Germany, China, or Russia, every country is relishing the advantage of entrepreneurship. The ES determinants [e.g., technological knowledge (TK), entrepreneurial orientation (EO), and psychological capital (PsyCap)] regulating the world's economy make the firm grow through mergers and acquisitions, thus enabling the organizations to achieve long-term economic success (Sergi et al., 2019). Perhaps, understanding entrepreneurship, its processes, and perks compel the organizations in extending their entrepreneurial activities, ultimately gaining business success. Thus, it has become necessary for future researchers to inspect the critical success factors affecting the firms 'success (Gupta and Mirchandani, 2018).

Primarily, the technological developments modeled by strong learning capabilities enable the firms to achieve digital-centered ES. Technical knowledge refers to an individual's knowledge regarding the use of technical advances (i.e., tools, devices, applications). It explains the entrepreneurs' ability to raise innovative start-ups by commercializing the improvement of digital products (von Briel et al., 2018). Increasing TK guides the entrepreneurs to unleash the process of creative destruction, replacing the firms' traditional products with innovative offerings. The progressing digital innovations produce knowledge that unfolds the firms to discover profitable alteration of the business resources. The emerging TK develops innovative products and services, positioning the firm to successfully compete with the competitors, thereby increasing the firm's market share and overall success.

Entrepreneurship is the leading driver of business success, particularly integrating digital knowledge in firms' business processes. The technical information potentially adds to the firm's market value whereby establishing the modernized information network. In support, the study shows that the leading entrepreneurial ventures exploit the firms' TK, thereby exploring the strategic opportunities in gaining business success (Lindholm-Dahlstrand et al., 2019).

The technical knowledge facilities the entrepreneurial start-ups. It improves business methods (Geissinger et al., 2019), potentially elucidating the firms' innovations into business success (Tomy and Pardede, 2018). TK assists start-ups by incorporating digital information for achieving business success. The entrepreneurial venture having the highest knowledge proposition boosts the firms' productivity. Given the statement, technical knowledge improves the efficiency of business processes by reengineering the conventional business models, thereby supporting successful business operations.

In addition, technological innovation underpins knowledge information by developing EO as a significant concept in entrepreneurship. EO refers to firms' practices and activities driving the business innovation and market entry decisions (Covin and Wales, 2019). EO is a relevant phenomenon formulated around three entrepreneurial dimensions (i.e., technological innovations, pro-activeness, and risk-taking). EO innovation encourages the development of new products and services. At the same time, proactive behavior emphasizes seeking strategic opportunities with risk-taking behavior, demonstrating the individuals' willingness to adapt to changing business environments. The entrepreneurial dimensions enhance the firms' profitability and growth. These domains allow the firms to take advantage of strategic market opportunities, enabling the entrepreneurial venture to flourish for greatness. Perhaps, EO is a prime catalyst, recording the firms' success. In recent times, research shows that EO has emerged as a fundamental concept in the management literature (Covin and Wales, 2019). Traditionally, entrepreneurship was considered the prime driver of business success, but now modern attention has been paid to the EO by various researchers.

The goal of the entrepreneurs is to drive the business operations, thus gaining ES. Nonetheless, to achieve the entrepreneur objective, EO plays a strategic role in improving the firms' performance, thus gaining business success (Venkataraman, 2019). Consistently, the firms' performance plays a crucial role in achieving business success. Literature shows that considerable attention had paid to the EO concerning business performance. In support, the result appears that EO improves business performance (Cho and Lee, 2018), subsequently accomplishing business objectives (i.e., ES).

Moreover, the psychological measure included within the EO enables the entrepreneurs to drive successful entrepreneurial activities. In entrepreneurship, the theoretical basis of psychological capital (PsyCap) refers to the individuals' attitude toward entrepreneurial activities. PsyCap is a vital trait critically affecting the employees' work behavior. PsyCap refers to an individual positive mental ability to perform the work task, ultimately gaining business success (Zhang et al., 2020). A healthy environment improves individuals' capability to work and motivates them to achieve a higher degree of success.

Given the statement, PsyCap positively influences individual well-being. In other words, PsyCap focuses on individual personal and professional development by improving their work performance (Tsai et al., 2020). The study illustrates that the PsyCap constructs (e.g., human, physical, tangible, and intangible resources) allow entrepreneurs to take advantage of the market opportunities (Ephrem et al., 2021), potentially making the firm stand out. Significantly, PsyCap drives the firm performance by building a critical relationship with ES (Paul and Tresita, 2018).

However, despite the increasing relevance of the research subject, little discussion has been recorded in the existing literature concerning the relationship of TK, EO, and PsyCap with ES. The study illustrates that entrepreneurial research influencing the knowledge environment has ignored the role of digital technology in ES (Elia et al., 2020). Similarly, the existing literature shows that little empirical research on EO (Rigtering et al., 2019) and physical capital had been dedicated to achieving business success (Paul and Tresita, 2018).

However, this study bridges the gap by identifying the number of the relevant determinants influencing the firms' success. It potentially draws a simplified web of interrelated determinants affecting ES. The complexity explains that little research has been found on these variables, thus making the organization miss the strategic entrepreneurial opportunities.

Perhaps, this existing crevice has restrained the understanding of interdependencies between the components, driving the firm's success. Hence, in entrepreneurship, there is a critical need for conceptualizing the following terms into entrepreneurial literature. In this regard, for getting considerable research understanding, TK, EO, and PsyCap need to be formally comprehended.

Altogether, this paper builds a theoretical foundation for understanding the role of TK in driving the firms' success. From a theoretical perspective, the article determines the view of EO in the frame of ES. Furthermore, this research aims to examine the relationship of TK and EO with PsyCap. In this attempt to bridge the academic gap, the study questions the effect of firms' digital innovation (i.e., TK) and EO under the mediating role of PsyCap on a firm's success.

However, this study is essentially needed as it provides detailed information to the entrepreneurial community, thus making them aware of the impact of the determinants on firms' success. This dominant approach of integrating the magnitude number of factors affecting ES increases the novelty of the proposed model. The study incorporates a novel theoretical model by systematically presenting the latest knowledge on the determinants of business success. The proposed model for the first time illustrates the mediating role of PsyCap under this context. Fundamentally, these changes make the suggested model to be different from the previous approaches.

In recent years, the COVID-19 pandemic has appeared like a disaster impacting the world economies (Parnell et al., 2020). The COVID-19 has devastatingly affected entrepreneurial operations, thus decreasing the overall firms' success rate. Accordingly, literature shows that the pandemic has made entrepreneurs suffer badly. Entrepreneurs strategically benefit from market opportunities by working for society's welfare. Indeed, this pandemic has made entrepreneurs deal with ongoing critical situations (Nasar et al., 2021), thus limiting business progress. Significantly, this paper provides the academic scholars with a clear understanding of how to contribute to the firm's success, thereby overcoming the border of limitations. The technological aspect discussed in the study encourages the participating actors (i.e., stakeholder, management) to understand the role of technical knowledge.

Entrepreneurship is a phenomenon that drives economic growth while contributing to the firms' success. It accelerates employment opportunities, innovation, thus stimulating the firms' competitiveness (Crudu, 2019). Entrepreneurship reduces the risk and uncertainty, thereby enhancing the organizations' productivity level. On the other hand, the disadvantaged entrepreneurs appear to harm society, thus decreasing the firms' success rate.

LITERATURE REVIEW

The increasing knowledge potential has received fundamental consideration in entrepreneurial research where its extended application had crossed the boundaries, driving technological advancement in entrepreneurship. Primarily, Section "Literature Review" presents significant reflections of various papers while proposing a modernized business model. The following section sheds light on the fundamental concepts, thus explaining some leading definitions in the light of the latest academic studies. The literature review aims to develop connections between the variables. Subsequently, the inherit section provides a comprehensive insight into the following terms; TK, ES, EO, and PsyCap. Indeed, all these variables are presented in the same sequence as illustrated above.

Technological Knowledge and Entrepreneurial Success

Knowledge frontiers play an integral role in entrepreneurs' life, centrally driving entrepreneurial activities. The knowledge boundary offers the venue to the venture capitalist, translating the firms' strategic activities into ES. In today's world of increasing competition, the organization aims to conquer the competition, thereby winning an advantage. Presently, the competitive environment has compelled businesses to innovate for generating novel digital competencies. In line with the statement, the study explains that TK has potentially collaborated with the market dynamic, thus translating entrepreneurial efforts into firms' success (Dong, 2019).

Undoubtedly, the 21st-century advanced insurgencies have transformed the conventional business models, advancing the firms' processes to incorporating modernized technological developments (for example, internet web, artificial intelligence, cloud computing). The advanced infrastructure develops superior value propositions by generating a high level of knowledge, technologically benefiting the firm (Camisón-Haba et al., 2019). Business success largely depends on the technological progression enabling the enterprise to seek

sustainable growth (Sivam et al., 2019). In particular, the adaption of state-of-the-art- technologies (i.e., internet). (Omotosho, 2020) has suggested new ways of advancing business activities by recording an increase in firms' success (Makiwa and Steyn, 2018).

Technological knowledge is a significant player in stimulating entrepreneurial progress. In recent years, entrepreneurs have valued the role of technical knowledge in accelerating business operations by winning strategic business opportunities. The recognition of entrepreneurial opportunities is an essential step in integrating technological computations in firms' business operations. The extended range of entrepreneurial opportunities encourages entrepreneurs to produce and share technical information in this digital age. The successful applications of technologies enhance the organization's resources, fundamentally improving the firms' capabilities in gaining business success (Colomo-Palacios et al., 2018). The successful application of digital technologies allows entrepreneurs to leverage new market opportunities, allowing the firm to translate innovation into enhanced business knowledge (Rippa and Secundo, 2019). Given the articulation, the study states that due to the growing recognition of digitization, the organizations (i.e., entrepreneurial ventures) are rapidly transforming their practices, thereby gaining business success (Kuratko and Morris, 2018).

In particular, TK facilitates the firms' performance, attaining organizational success in the shape of potential developments and business expansions (Bai et al., 2018). Technical knowledge constitutes the central requirement of the firm to innovate, encouraging the development of digital products. The digitalization proposed by the businesses forms a vital component in enhancing business knowledge, boosting entrepreneurial performance. Similarly, the research shows that TK enhances the business process, thus enhancing performance effectiveness (Akpan et al., 2020). Performance is a strong determinant of firm success. Given the statement, TK helps the firm in improving business performance, subsequently ensuring ES.

Indeed, the recent study states that the power of TK forms the basis of organizational activities, eventually manifesting the firms' market position (Jakobsen et al., 2019). Entrepreneurs are increasingly adapting specialized methods for increasing the firms' productivity. The generation of firms' TK assists the entrepreneurs in enhancing the firms' operations, thus increasing the firm's productivity. Fundamentally, the inherited digital revolution has established a strong knowledge foundation, empowering entrepreneurs to expand their technical competencies, thus gaining business success. Hence, the literature found a positive relationship between TK and ES. Based on the theoretical support, this study proposed:

P1: Technological Knowledge is more positively related to ES.

Entrepreneurial Orientation and Entrepreneurial Success

Today's competitive environment has led businesses to face market uncertainties resulting in entrepreneurial failures. However, due to the increasing market vulnerability, it has become vital for emerging entrepreneurial organizations to sustain in this competitive environment of volatility. In such circumstances, EO has received substantial consideration while developing a cumulative relationship with business success.

The changing business environment has enforced EO to empower the firms to rapidly evolve business processes for succeeding in the world of fierce competition. The constructive effect of EO allows the entrepreneurs to embrace strategies in adjusting to the changing business environment. Business success in a highly violate environment views the EO as an integral factor driving the firms' performance.

Entrepreneurial orientation is a prime concept encouraging firms to exhibit effective business performance under profoundly uncertain environments. EO is a strategic process that ensures the implementation of new business procedures. Indeed, the EO phenomenon makes firms meet the demands of the turbulent business environment. The EO leads the firms to adjust to changing business environments while rebuilding the conventional business processes through devising novel openings to maintain benefit. Given the articulation, the study states that EO enhances business performance (Covin and Wales, 2019), thereby gaining superior economic development.

Firms' performance is a critical factor in driving business success. Literature suggests that the importance of business success not only depends on the firms' tangible resources instead focuses on the development of human and technological skills. Hence, to fulfill the purpose, firms are rigorously adapting EO tendencies for achieving firms' sustainability and growth (Erken et al., 2018). The findings suggest that entrepreneurs and managers should improve EO tendencies (i.e., innovativeness, pro-activeness, and risk-taking), thus gaining business success (Al-Samarraie et al., 2019).

Entrepreneurial orientation involves positive psychological traits (e.g., courage, risk-taking, pro-activeness), alleviating entrepreneurial performance. Firms' performance is an essential predictor of ES. Following the statement, the study shows that EO positively influences the firm's financial performance (Cho and Lee, 2018). The study illustrates that EO positively affects a firm's innovation performance (Shaher and Ali, 2020). Further, the empirical evidence depicting the firm's success found a significant relationship between EO and business performance (Cuevas-Vargas et al., 2019).

Indeed, EO alleviates the firms' performance (Basco et al., 2019). The study shows that EO persuasively understands the market conditions, thus enhancing the organization's performance (Khan et al., 2020). Significantly, the research shows that EO is a prime determinant of firms' performance (Kittikunchotiwut, 2020). Hence, the findings have confirmed that EO owns the capability of enhancing the firms' performance, thereby making the business ventures successful (Zaman et al., 2019).

In entrepreneurship, the concept of EO is at its boom, significantly advancing the business expansion (i.e., social and economic). In particular, research shows EO encourages the firms

to acknowledge new technologies, innovation, and opportunities, thereby leading the organization to experience a successful entrepreneurial venture (Zaremohzzabieh et al., 2019). EO makes the organization act entrepreneurially, making the firms pursue new opportunities, significantly contributing toward business success.

Entrepreneurial orientation is a significant precedent in achieving business growth. As a result, firms are potentially adaptation the EO approach for promoting business success. Consistency, the literature suggests that firms' practicing the entrepreneurial orientation experience an increase in business growth. Indeed, the literature proposes that EO is a strategic tool determining ES (Bernoster et al., 2020). Based on the theoretical support, this study proposed:

P2: Entrepreneurial orientation is more positively related to ES.

Technological Knowledge and Psychological Capital

The expanding market competition and the emerging globalization have developed information knowledge as a strategic source of obtaining a competitive advantage. The firm's psychological resource largely depends upon the creation of TK. PsyCap is a valuable concept that uses knowledge for enhancing the firms' operations. Technical knowledge develops a critical resource for boosting the firms' productivity. PsyCap forms a significant root in achieving positive outcomes (e.g., stat-of- the art knowledge). The emerging professional knowledge creates value for the firms' resources, making the businesses generate new products. PsyCap plays an instrumental role in enhancing the firms' innovation process. TK encourages firms to implement and generate new ideas. PsyCap in entrepreneurial ventures enhanced the individual mental capabilities, thus facilitating the utilization of digital applications. From the psychological perspective, the PsyCap polishes the skill set of the employees, thereby promoting technological progression and firms' innovation.

Moreover, PsyCap is a unique concept, extending the role of human resources. The core competitiveness of digital knowledge enables the employees to construct their competency around the dimension of PsyCap (i.e., creativity), thus learning new technologies (Arasli et al., 2020). Good knowledge management not only improves the employees' self-consciousness but records a triple down effect on individuals' mental state, enhancing the individual's PsyCap (Shen et al., 2019).

Perhaps, in this era of digitization, technological innovation is a prime factor contributing to firms' long-term development. Digital knowledge enables individuals to alter their work behavior while optimally utilization the firms' technologies. The advancement in digital technologies influences employees' innovative behavior while promoting the creation of modern ideas. In conclusion, the research states that individuals' behavior is positively associated with PsyCap (e.g., self-efficacy, risk-taking, resilience) (Sameer, 2018).

P3: Technological Knowledge is more positively related to PsyCap.

Entrepreneurial Orientation and Psychological Capital

In entrepreneurship, understanding the role of human capital has become significantly essential in explaining the fundamental relationship of EO with PsyCap. This inherent relationship between the intellectual capital and entrepreneurs' psychological wellness compels the businesses to enhance business performance. Entrepreneurial ventures do not operate on entrepreneurs' wisdom only, but it also needs an individual's psychological strength to overcome business uncertainties.

In recent years, the rapid development of innovation has enhanced the firms' entrepreneurial activities while making the PsyCap play a significant role in economic development (Jiang et al., 2019). The study shows that venture capitalist plays an integral role in improving the firms' innovative performance (Gu et al., 2018). As a result, entrepreneurs' psychological state is a crucial component determining their performance. The characteristics of the entrepreneur (e.g., self-efficacy, pro-activeness, innovativeness, creativity) affect the firms' performance. In support, the study shows that entrepreneurial competencies enhance the effect of personality traits (i.e., innovation, affection) on firms' PsyCap (Hasan et al., 2019).

Indeed, this research topic is of great significance that suggests the need to realize the influence of EO on personality traits (i.e., PsyCap). Individuals having good psychological well-being are most likely to become successful entrepreneurs (Bailey et al., 2018). Perhaps, the dominant traits (e.g., self-confidence, optimum, and innovations) maximize the entrepreneurs' knowledge while making the firm continually innovate, thus relishing the business earnings.

P4: Entrepreneurial Orientation is more positively related to the PsyCap.

Psychological Capital and Entrepreneurial Success

The research argues that emerging psychological driver among entrepreneurs has compounding effects on ES (Bignotti and Le Roux, 2018). Successful entrepreneurial ventures provide a role model for future venture capitals to look up, get inspired, and initiate a new start-up journey in the violate business environment. Venture capitalists are the individuals that invest in the firms' start-ups. Venture capitalists not only invest in the firm but also contributes additional resources for gaining superior performance. As a result, the study suggests that entrepreneurial enterprises need to innovate business activities to achieve higher business returns (Wang et al., 2019). In such circumstances, PsyCap provides valuable resources for entrepreneurs to succeed.

Psychological capital exhibiting positive organizational behavior refers to the individuals' mental state, constructed across four attributes: hope, optimism, self-efficacy, and resilience. The promising result showed that the psychological element in entrepreneurial characteristics stimulates the firms' performance (Gupta and Mirchandani, 2018), thereby increasing the entrepreneurs' likelihood to succeed. In various literature, PsyCap is an essential determinant of the firm success. PsyCap

enhances entrepreneurial competencies, thus boosting the firms' productivity. In particular, examining the effect of PsyCap, the study reports that entrepreneurs high on resilience are most likely to succeed in their entrepreneurship (Baluku et al., 2018). Similarly, individuals high on PsyCap tend to exhibit positive behaviors (e.g., innovation, creativity), leading the entrepreneurs to experience a successful entrepreneurial journey. Meaning, that entrepreneurs' stronger PsyCap controls the behavior of individuals toward achieving goals, thereby making the behavior control lead toward organization success (Zaremohzzabieh et al., 2019).

Moreover, revealing the increasing importance of PsyCap in entrepreneurship, research shows that PsyCap significantly influences business performance. The literature states that PsyCap resources harness the investment, thereby enhancing ES in the shape of constant growth (Baluku et al., 2018). The PsyCap strengthens the organizational strategic competencies, thus establishing a positive relationship between ES and PsyCap (Paul and Tresita, 2018). Consequently, the above finding provides a deep insight into the relationship between PsyCap and firms' success.

P5: Psychological Capital is more positively related to ES.

The Mediating Role of Psychological Capital

The rapidly changing business environment has extended the need for advanced technological developments. In the growing age of digitalization, entrepreneurial skills alone cannot drive business operations. In this context, digital knowledge enhances the skills needed for solving the firm's problem. Technical knowledge assists entrepreneurs in the decision-making process, thereby encouraging creative thinking. The progressing significance of digital knowledge has made it critical to understand the role of technological advancements in entrepreneurship. In recent years, organizations have realized the crucial ability of technologies in improving the firms' performance with rapid technological changes (Lei et al., 2020). The organization's technical capability largely depends upon the generation of innovative information, processes, and products. All these elements drive the firms' operations, leading the firm to attain ES. Together, knowledge and capability constitute the enterprise's ability to perform (Santoro et al., 2019). The careful swift of knowledge creation to knowledge diffusion enhances the entrepreneurs' capability to achieve business success. Indeed, the organization's technological capabilities boost the firms' economic performance.

The progression of digital technologies extensively facilitates knowledge development. The technical knowledge provides the firms a deeper understanding of evolving technologies, essentially gaining ES. The ES largely depends upon firms' technical ability, allowing the firms to take advantage of the strategic market opportunities (Chen et al., 2018). The proactive behavior of PsyCap allows the entrepreneurial venture to gain market sustainability (Palazzeschi et al., 2018). Consequently, PsyCap has been fundamentally recognized as the potential force driving the firms' technological capability (Lei et al., 2019), thereby stimulating a successful entrepreneurial journey.

Technological innovation is crucial for sustaining long-term ES. Radical innovation (i.e., technological innovation) refers to the knowledge that empowers the firm to develop innovative products, eventually achieving economic development (Nguyen et al., 2019). Radical innovation (i.e., technology) significantly improves the development of TK (i.e., radical innovation), subsequently sustaining entrepreneurial growth. The literature stresses the role of technical knowledge innovation influencing the individuals' PsyCap. The research records that PsyCap fosters the firms' innovation, thereby making critical contributions to the firm's productivity (Gawke et al., 2019).

The firms' innovation ensures the development of a solid knowledge foundation, recording an improvement in the firm's performance. In support, the research indicates that TK causes PsyCap to influence the organization's knowledge production (Tsai et al., 2020) through interpreting employees' innovative behavior into the firm's success. Fundamentally, the entrepreneurial concept has a deep root in psychology. Entrepreneurs' prime objective is to drive market opportunities, leading the new enterprises to increase their business value. In particular, a study shows that an increase in PsyCap influences EO, subsequently improving the business performance (Moghimi Esfandabadi et al., 2015).

Psychological capital facilitates entrepreneurial innovation leading to sustainable performance. In particular, results explain that the core competence of PsyCap promotes firms' growth and performance (Montani et al., 2020). Researchers suggest that organizations' PsyCap attributes drive the firm performance, thus gaining business success (Muldoon et al., 2019). Significantly, EO strengthens the PsyCap leading to firm success. Successful organization formation largely depends upon the sustainability of the entrepreneurial venture. EO plays its part in enhancing the firms' performance, thus contributing toward organization economic development. The psychological aspect of entrepreneurship strengthens the organization's performance, thereby achieving business success. PsyCap fundamentally mediates the relationship between EO and firms' performance. The finding indicates that firms with higher EO exhibit high performance by enhancing entrepreneurial traits (i.e., innovativeness, reactiveness, and aggressiveness) (Javed et al., 2018). Given the explanation, PsyCap refers to the individual's mental state that enables them to exhibit motivated behavior, fostering the innovation process, thereby boosting firms' overall performance. Perhaps, a clear understanding of PsyCap allows the firm to improve its performance, thus driving business growth. PsyCap influencing individual behavior, in turn, fosters the organizations' performance. In support, the study shows that PsyCap empowers entrepreneurs to have confidence in firms' performance, thus achieving business success (Zhang et al., 2020).

Perhaps, EO is a unique concept ensuring the adaption of psychological factors (e.g., risk, self-efficacy, resilience, controlled behavior), thus gaining economic sustainability. In conclusion, the study indicates that PsyCap constructs (i.e., risk, innovation, and proactive behavior) provide the firm with

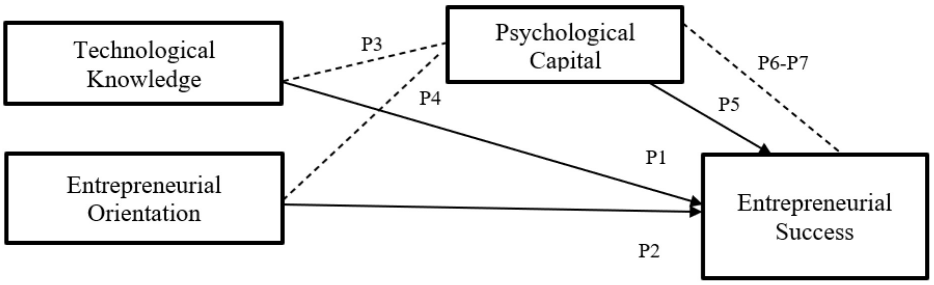

FIGURE 1 | Proposed conceptual framework.

open opportunities, thus increasing the entrepreneurs ability to successfully run the business (Herlinawati et al., 2019).

P6: Technological Knowledge is more positively related to ES with PsyCap.

P7: Entrepreneurial Orientation is more positively related to ES with PsyCap.

Figure 1 shows the proposed conceptual framework.

DISCUSSION

Entrepreneurial success is still the focus of research; this paper provides a new vision into the literature by providing a well-organized conceptual model of ES. This model has theoretically discussed the concept of ES with its perquisites and outcomes. This proposed model looks into the ES process, fundamentally incorporating the sections vital for achieving ES. The framework of this model cooperates where all the constructs are connected and reciprocally affect one another. However, each factor is a positive effect on others. The model's prerequisites explain the factors that influence the ES process in extension TK, EO, and PsyCap.

Successful entrepreneurship ensures accelerating the firms' TK (Belitski et al., 2021). Previous studies indicate that the relationship between TK and ES has been the subject of interest in the literature (Wach et al., 2020). Whereas there is consent that TK is an important factor for ES (Gupta and Mirchandani, 2018). Therefore, the previous studies also confirmed that EO plays a significant role in the ES (Kittikunchotiwut, 2020). This study suggested that TK significantly affects PsyCap; it can enhance the technological learning of capital resources to utilization in the job. This suggestion is similar to the existing literature (Shen et al., 2019).

Accordingly, the EO enables the firms to achieve fruitful results, thus driving the project's success (Martens et al., 2018). Based on the previous literature and theories, this study suggests that EO significantly affects PsyCap, enhancing the use of capital resources in an entrepreneurial context (Hasan et al., 2019). The PsyCap in entrepreneurship plays a significant role in accelerating the firms' operations, thus determining long-term business success. The potential psychological ability enhances the individuals' commitment to the organizations' goals, leading to a higher organizational performance which is significant for achieving the firm's long-term success. Undoubtedly, positive PsyCap influence the firms' performance (Hasan et al., 2020), thus preserving the business's long-term progress. In particular, the literature shows that PsyCap has increasingly gained popularity, propelling organizations to enhance their output, thus accomplishing business success. The psychological components (e.g., resilience, efficacy, optimism) yield the organizations to foster their productivity, thereby ensuring firms' long-term achievement (Lee and Yang, 2019). Consequently, the dimension of PsyCap makes the organizations achieve excellence (Larsson and Thulin, 2019), promoting business success. The study also suggests that PsyCap significantly affects ES, consistent with previous studies (Paul and Tresita, 2018).

This study also suggests the mediating effect of PsyCap between TK and ES. This suggestion is consistent with previous literature (Lei et al., 2020). Further, this study proposed the mediating effect of PsyCap between EO and ES. Previous studies suggest that a connection between these constructs can increase ES (Herlinawati et al., 2019).

CONCLUSION

Entrepreneurship is a prime contributor integrating the novel phenomenon (e.g., PsyCap, TK, EO) into a firm's business practices. It encourages the world economies to accelerate organizational development. Essentially, entrepreneurship is a significant marvel that drives the firms' success. This paper develops a theoretical roadmap for future researchers' by joining the factors that fundamentally contribute toward ES.

Entrepreneurship research broadens the research scope by fully exploring the role of TK on firms' success. The study advances the research on the phenomenon of tech knowledge, EO, and PsyCap affecting the firms' progress. The finding suggests technology knowledge and EO achieve business excellence, thus ensuring firms long-term progress. Moreover, the study also records a positive relationship between PsyCap and corporate success. Indeed, these positive results encourage the organizations to involve in entrepreneurship, thus gaining business success.

Implications and Future Research

The results based on theoretical discussion and conclusion also bring implications for practice and increase the broad future

directions for other researchers. A significant contribution of this paper is to propose an original relationship between prerequisites, phenomena, and consequences in ES. The proposed model shows a novel conceptualization of how these constructs may affect ES outcomes. This study enhances the literature by providing the theoretical literature of forerunners and outcomes for ES. In addition, this study is important implications for practitioners, entrepreneurs. This paper and the proposed model have various practical implications. Entrepreneurs should enhance their technical knowledge to increase their PsyCap to achieve ES. Moreover, EO can increase PsyCap to help ES. This research also gives entrepreneurs broad insights into decision-making and controls in place to generate success in various entrepreneurial activities.

This article represents the theoretical approach to understanding ES and its phenomenon. Therefore, more researchers need to understand how firms can be more dynamic based on their specific situations. This study demonstrated that a conceptual framework based on social cognitive theory; does not have sufficient consistency for the achievement of this subject. There is a need to move toward new ways and approaches to understand ES with TK, EO, and PsyCap.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

REFERENCES

Akpan, I. J., Udoh, E. A. P., and Adebisi, B. (2020). Small business awareness and adoption of state-of-the-art technologies in emerging and developing markets, and lessons from the COVID-19 pandemic. *J. Small Bus. Entrepreneurship* 1–18.

Al-Samarraie, H., Eldenfria, A., Dodoo, J. E., Alzahrani, A. I., and Alalwan, N. (2019). Packaging design elements and consumers' decision to buy from the Web: a cause and effect decision-making model. *Color Res. Appl.* 44, 993–1005.

Arasli, H., Arici, H. E., and Kole, E. (2020). Constructive leadership and employee innovative behaviors: a serial mediation model. *Sustainability* 12:2592. doi: 10.3390/su12072592

Bai, W., Holmström-Lind, C., and Johanson, M. (2018). Leveraging networks, capabilities and opportunities for international success: a study on returnee entrepreneurial ventures. *Scand. J. Manag.* 34, 51–62. doi: 10.1016/j.scaman.2017.12.001

Bailey, C. A., Jones, K. T., and Rosenbaugh, J. M. (2018). Managing exploratory projects like a venture capitalist: how large enterprises use internal venture capital structures to manage the creation of new offerings. *IEEE Eng. Manag. Rev.* 47, 144–149. doi: 10.1109/emr.2018.2890241

Baluku, M. M., Kikooma, J. F., Bantu, E., and Otto, K. (2018). Psychological capital and entrepreneurial outcomes: the moderating role of social competences of owners of micro-enterprises in East Africa. *J. Glob. Entrepreneurship Res.* 8, 1–23.

Basco, R., Calabrò, A., and Campopiano, G. (2019). Transgenerational entrepreneurship around the world: implications for family business research and practice. *J. Fam. Bus. Strategy* 10:100249. doi: 10.1016/j.jfbs.2018.03.004

Belitski, M., Caiazza, R., and Lehmann, E. E. (2021). Knowledge frontiers and boundaries in entrepreneurship research. *Small Bus. Econ.* 56, 521–531. doi: 10.1007/s11187-019-00187-0

Bernoster, I., Mukerjee, J., and Thurik, R. (2020). The role of affect in entrepreneurial orientation. *Small Bus. Econ.* 54, 235–256. doi: 10.1007/s11187-018-0116-3

Bignotti, A., and Le Roux, I. (2018). Discovering the entrepreneurial endowment of the youth. *Afr. J. Econ. Manag. Stud.* 19, 14–33. doi: 10.1108/ajems-02-2016-0020

Camisón-Haba, S., Clemente-Almendros, J. A., and Gonzalez-Cruz, T. (2019).). How technology-based firms become also highly innovative firms? The role of knowledge, technological and managerial capabilities, and entrepreneurs' background. *J. Innov. Knowl.* 4, 162–170. doi: 10.1016/j.jik.2018.12.001

Chen, M., Yang, Z., Dou, W., and Wang, F. (2018). Flying or dying? Organizational change, customer participation, and innovation ambidexterity in emerging economies. *Asia Pacific J. Manag.* 35, 97–119. doi: 10.1007/s10490-017-9520-5

Cho, Y. H., and Lee, J.-H. (2018). Entrepreneurial orientation, entrepreneurial education and performance. *Asia Pacific J. Innov. Entrepreneurship* 12, 124–134. doi: 10.1108/apjie-05-2018-0028

Colomo-Palacios, R., Fernandes, E., Soto-Acosta, P., and Larrucea, X. (2018). A case analysis of enabling continuous software deployment through knowledge management. *Int. J. Informat. Manag.* 40, 186–189. doi: 10.1016/j.ijinfomgt.2017.11.005

Covin, J. G., and Wales, W. J. (2019). *Crafting High-Impact Entrepreneurial Orientation Research: Some Suggested Guidelines*. Los Angeles, CA: SAGE Publications Sage CA.

Crudu, R. (2019). The role of innovative entrepreneurship in the economic development of EU member countries. *J. Entrepreneurship Manag. Innov.* 1, 35–60. doi: 10.7341/20191512

Cuevas-Vargas, H., Parga-Montoya, N., and Fernández-Escobedo, R. (2019). Effects of entrepreneurial orientation on business performance: the mediating role of customer satisfaction—A formative–Reflective model analysis. *SAGE Open* 9:2158244019859088.

Dong, J. Q. (2019). Moving a mountain with a teaspoon: toward a theory of digital entrepreneurship in the regulatory environment. *Technol. Forecast. Soc. Change* 146, 923–930. doi: 10.1016/j.techfore.2018.07.050

Elia, G., Margherita, A., and Passiante, G. (2020). Digital entrepreneurship ecosystem: how digital technologies and collective intelligence are reshaping the entrepreneurial process. *Technol. Forecast. Soc. Change* 150:119791. doi: 10.1016/j.techfore.2019.119791

Ephrem, A. N., Nguezet, P. M. D., Charmant, I. K., Murimbika, M., Awotide, B. A., Tahirou, A., et al. (2021). Entrepreneurial motivation, psychological capital, and business success of young entrepreneurs in the DRC. *Sustainability* 13:4087. doi: 10.3390/su13084087

Erken, H., Donselaar, P., and Thurik, R. (2018). Total factor productivity and the role of entrepreneurship. *J. Technol. Trans.* 43, 1493–1521. doi: 10.1007/s10961-016-9504-5

Gawke, J. C., Gorgievski, M. J., and Bakker, A. B. (2019). Measuring intrapreneurship at the individual level: development and validation of the Employee Intrapreneurship Scale (EIS). *Eur. Manag. J.* 37, 806–817. doi: 10.1016/j.emj.2019.03.001

Geissinger, A., Laurell, C., Sandström, C., Eriksson, K., and Nykvist, R. (2019). Digital entrepreneurship and field conditions for institutional change–Investigating the enabling role of cities. *Technolo. Forecast. Soc. Change* 146, 877–886. doi: 10.1016/j.techfore.2018.06.019

Gu, W., Qian, X., and Lu, J. (2018). Venture capital and entrepreneurship: a conceptual model and research suggestions. *Int. Entrepreneurship Manag. J.* 14, 35–50. doi: 10.1007/s11365-017-0463-6

Gupta, N., and Mirchandani, A. (2018). Investigating entrepreneurial success factors of women-owned SMEs in UAE. *Manag. Decis.* 56, 219–232. doi: 10.1108/md-04-2017-0411

Hasan, M., Guampe, F. A., and Maruf, M. I. (2019). Entrepreneurship learning, positive psychological capital and entrepreneur competence of students: a research study. *Entrepreneurship Sustain. Issues* 7, 425–437. doi: 10.9770/jesi.2019.7.1(30)

Hasan, M., Musa, C. I., Arismunandar, A., Azis, M., and Tahir, T. (2020). Positive psychological capital, market orientation, and business performance of family

business in the culinary sector: a research study. *Econ. Sociol.* 13, 97–112. doi: 10.14254/2071-789X.2020/13-3/7

Herlinawati, E., Ahman, E., and Machmud, A. (2019). The effect of entrepreneurial orientation on SMEs business performance in indonesia. *J. Entrepreneurship Educ.* 22, 1–15. doi: 10.1504/ijev.2020.10031180

Jakobsen, S., Lauvås, T. A., and Steinmo, M. (2019). Collaborative dynamics in environmental R&D alliances. *J. Clean. Prod.* 212, 950–959.

Javed, A., Yasir, M., and Majid, A. (2018). Psychological factors and entrepreneurial orientation: could education and supportive environment moderate this relationship? *Pak. J. Commer. Soc. Sci.* 12, 571–597. doi: 10.1186/s12913-016-1423-5

Jiang, N., Yang, Y., Yang, B., and Huang, W. (2019). Venture capital and corporate innovation input from the perspective of syndicated investment. *Buletin Ekonomi Moneter Dan Perbankan* 22, 29–46. doi: 10.21098/bemp.v22i1.1036

Khan, S., Bhatti, S. H., Zaman, U., and Hussain, M. (2020). Breaking down the success barrier: the mediating role of absorptive capacity in linking entrepreneurial orientation to IT project success. *Pak. J. Commer. Soc, Sci.* 14, 529–550.

Kittikunchotiwut, P. (2020). The roles of organizational learning capability and firm innovation in the relationship between entrepreneurial orientation and firm performance. *J. Asian Finance Econ. Bus.* 7, 651–661. doi: 10.13106/jafeb.2020.vol7.no10.651

Kuratko, D. F., and Morris, M. H. (2018). Corporate entrepreneurship: a critical challenge for educators and researchers. *Entrepreneurship Educ. Pedagogy* 1, 42–60. doi: 10.1111/jocn.13196

Larsson, J. P., and Thulin, P. (2019). Independent by necessity? The life satisfaction of necessity and opportunity entrepreneurs in 70 countries. *Small Bus. Econ.* 53, 921–934. doi: 10.1007/s11187-018-0110-9

Lee, Y.-L., and Yang, D.-J. (2019). Potential contributions of psychological capital to the research field of marketing. *Front. Psychol.* 10:2111. doi: 10.3389/fpsyg.2019.02111

Lei, H., Leaungkhamma, L., and Le, P. B. (2020). How transformational leadership facilitates innovation capability: the mediating role of employees' psychological capital. *Leadersh. Organ. Dev. J.* 41, 481–499. doi: 10.1108/lodj-06-2019-0245

Lei, H., Nguyen, T. T., and Le, P. B. (2019). How knowledge sharing connects interpersonal trust and innovation capability: the moderating effect of leadership support. *Chin. Manag. Studi.* 13, 276–298. doi: 10.1108/cms-06-2018-0554

Lindholm-Dahlstrand, Å, Andersson, M., and Carlsson, B. (2019). Entrepreneurial experimentation: a key function in systems of innovation. *Small Bus. Econ.* 53, 591–610. doi: 10.1007/s11187-018-0072-y

Makiwa, P., and Steyn, R. (2018). "An investigation of the government-related factors that inhibit small to medium enterprises' adoption and effective use of information and communication technology in developing countries: the case of Zimbabwe," in *International Development Informatics Association Conference*, Cham: Springer, 3–16. doi: 10.1007/978-3-030-11235-6_1

Martens, C. D. P., Machado, F. J., Martens, M. L., Quevedo-Silva, F., and de Freitas, H. M. R. (2018). Linking entrepreneurial orientation to project success. *Int. J. Project Manag.* 36, 255–266. doi: 10.1016/j.ijproman.2017.10.005

Meyer, N., and De Jongh, J. (2018). The importance of entrepreneurship as a contributing factor to economic growth and development: the case of selected European Countries. *J. Econ. Behav. Stud.* 10, 287–299. doi: 10.22610/jebs.v10i4(J).2428

Moghimi Esfandabadi, H., Abdolvahab, S., Akbari, M. T., and Esfandabadi, A. M. (2015). Investigating the effect of entrepreneurial orientation and psychological capital on the performance. *Case Stud. J. ISSN* 4, 47–57.

Montani, F., Vandenberghe, C., Khedhaouria, A., and Courcy, F. (2020). Examining the inverted U-shaped relationship between workload and innovative work behavior: the role of work engagement and mindfulness. *Hum. Relat.* 73, 59–93. doi: 10.1177/0018726718819055

Muldoon, J., Bendickson, J. S., and Matherne, C. F. (2019). Micro-foundations of resources, capabilities and international firm performance: a look at LMX. *Small Bus. Inst. J.* 15, 49–68.

Nasar, A., Akram, M., Safdar, M. R., and Akbar, M. S. (2021). A qualitative assessment of entrepreneurship amidst COVID-19 pandemic in Pakistan. *Asia Pac. Manag. Rev.* 1–8. doi: 10.1016/j.apmrv.2021.08.001

Nguyen, M. A. T., Lei, H., Vu, K. D., and Le, P. B. (2019). The role of cognitive proximity on supply chain collaboration for radical and incremental innovation: a study of a transition economy. *J. Bus. Ind. Mark.* 34, 591–604.

Omotosho, B. J. (2020). Small scale craft workers and the use of social media platforms for business performance in southwest Nigeria. *J. Small Bus. Entrepreneurship* 1–16. doi: 10.1080/08276331.2020.1764732

Palazzeschi, L., Bucci, O., and Di Fabio, A. (2018). High entrepreneurship, leadership, and professionalism (HELP): a new resource for workers in the 21st century. *Front. Psychol.* 9:1480. doi: 10.3389/fpsyg.2018.01480

Parnell, D., Widdop, P., Bond, A., and Wilson, R. (2020). COVID-19, networks and sport. *Manag. Sport Leisure* 1–7. doi: 10.1080/23750472.2020.1750100

Paul, V., and Tresita, M. (2018). Exploring the relationship between psychological capital and entrepreneurial success. *Int. J. Pure Appl. Math.* 119, 2987–2999.

Rigtering, J. P. C. C., Weitzel, G. U. U., and Muehlfeld, K. K. (2019). Increasing quantity without compromising quality: how managerial framing affects intrapreneurship. *J. Bus. Ventur.* 34, 224–241. doi: 10.1016/j.jbusvent.2018.11.002

Rippa, P., and Secundo, G. (2019). Digital academic entrepreneurship: the potential of digital technologies on academic entrepreneurship. *Technol. Forecast. Soc. Change* 146, 900–911. doi: 10.1016/j.jacr.2010.01.018

Sameer, Y. M. (2018). Innovative behavior and psychological capital: does positivity make any difference? *J. Econ. Manag.* 32, 75–101. doi: 10.22367/jem.2018.32.06

Santoro, G., Thrassou, A., Bresciani, S., and Del Giudice, M. (2019). Do knowledge management and dynamic capabilities affect ambidextrous entrepreneurial intensity and firms' performance? *IEEE Trans. Eng. Manag.* 68, 378–386. doi: 10.1109/tem.2019.2907874

Sergi, B. S., Popkova, E. G., Bogoviz, A. V., and Ragulina, J. V. (2019). "Chapter 1 entrepreneurship and economic growth: the experience of developed and developing countries," in *Entrepreneurship and Development in the 21st Century*, eds B. S. Sergi and C. C. Scanlon (Bingley: Emerald Publishing Limited), 3–32. doi: 10.1108/978-1-78973-233-720191002

Shaher, A., and Ali, K. (2020). The effect of entrepreneurial orientation on innovation performance: the mediation role of learning orientation on Kuwait SME. *Manag. Sci. Lett.* 10, 3811–3820.

Shen, C., Yang, J., He, P., and Wu, Y. J. (2019). How does abusive supervision restrict employees' feedback-seeking behavior? *J. Manag. Psychol.* 34, 546–559. doi: 10.1108/jmp-10-2018-0480

Sivam, A., Dieguez, T., Ferreira, L. P., and Silva, F. J. G. (2019). Key settings for successful open innovation arena. *J. Comput. Des. Eng.* 6, 507–515.

Tomy, S., and Pardede, E. (2018). From uncertainties to successful start ups: a data analytic approach to predict success in technological entrepreneurship. *Sustainability* 10:602. doi: 10.3390/su10030602

Tsai, F.-S., Leonard, K. M., and Srivastava, S. (2020). Editorial: the role of psychological capital in entrepreneurial contexts. *Front. Psychol.* 11:582133. doi: 10.3389/fpsyg.2020.582133

Urbano, D., Audretsch, D., Aparicio, S., and Noguera, M. (2020). Does entrepreneurial activity matter for economic growth in developing countries? The role of the institutional environment. *Int. Entrepreneurship Manag. J.* 16, 1065–1099. doi: 10.1371/journal.pone.0247609

Venkataraman, S. (2019). "The distinctive domain of entrepreneurship research," in *Seminal Ideas for the Next Twenty-Five Years of Advances*, Vol. 21, eds J. A. Katz and A. C. Corbett (Bingley: Emerald Publishing Limited), 5–22. doi: 10.1108/s1074-754020190000021009

von Briel, F., Davidsson, P., and Recker, J. (2018). Digital technologies as external enablers of new venture creation in the IT hardware sector. *Entrepreneurship Theory Pract.* 42, 47–69. doi: 10.1177/1042258717732779

Wach, D., Stephan, U., Marjan, J. G., and Wegge, J. (2020). Entrepreneurs' achieved success: developing a multi-faceted measure. *Int. Entrepreneurship Manag. J.* 16, 1123–1151. doi: 10.1007/s11365-018-0532-5

Wang, L., Zhou, F., An, Y., and Yang, J. (2019). Corporate venture capital: technological innovation or value creation? A comparative study of CVC-and IVC-invested Chinese listed companies. *Asian J. Technol. Innov.* 27, 257–279. doi: 10.1016/j.biotechadv.2020.107639

Zaman, U., Nawaz, S., Tariq, S., and Humayoun, A. A. (2019). Linking transformational leadership and "multi-dimensions" of project success:

moderating effects of project flexibility and project visibility using PLS-SEM. *Int. J. Manag. Proj. Bus.* 13, 103–127.

Zaremohzzabieh, Z., Ahrari, S., Krauss, S. E., Samah, A. A., Meng, L. K., and Ariffin, Z. (2019). Predicting social entrepreneurial intention: a meta-analytic path analysis based on the theory of planned behavior. *J. Busi. Res.* 96, 264–276.

Zhang, C., Mao, D., and Wang, M. (2020). Role of venture capital in enterprise innovation under psychological capital and heterogeneity of entrepreneur capital. *Front. Psychol.* 11:1704. doi: 10.3389/fpsyg.2020.01704

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The Impact of Psychological Factors on Women Entrepreneurial Inclination: Mediating Role of Self-Leadership

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The worth of women's entrepreneurship is accepted globally, but there is less focus on it in developing countries, and societal expectations mean women often lack the confidence to start their own business. The core purpose of this research is to investigate the influence of personality traits on women's inclination toward entrepreneurship. The personality traits are measured through the dimensions of openness, neuroticism, extraversion, conscientiousness, and agreeableness. Further, the study introduced the mediator of self-leadership on personality traits and entrepreneurial intentions of women. The study is quantitative in nature and used a questionnaire survey to collect the data by convenience sampling technique. The data was collected in the context of Pakistan, and Smart PLS was chosen for further analysis. The findings revealed the significance of the relationship between personality traits and entrepreneurial intention. Furthermore, the study also highlighted the significance of self-leadership as a mediator and proposed significant relationships. The study suggested that personality issues should be considered and used from a business perspective, and self-leadership is important for women. The study provides room for policymakers and institutes to inform educational policies to motivate women entrepreneurs for the future.

Keywords: psychology factors, women entrepreneur, entrepreneurial intention, personality, self-leadership

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INTRODUCTION

Currently, environmental change and urbanization patterns have prompted a developing discussion about balancing the standard of life through economic production in the future. Furthermore, entrepreneurship has become an essential issue; however, little research has explored entrepreneurship in this context (Bazkiaei et al., 2020). Additionally, numerous scientists (Antoncic and Hisrich, 2001) have noticed that a few factors like age, gender, and work insight—as individual factors—or family, companions, and education—as natural factors—have been found to impact entrepreneurial intentions. Research has also acknowledged the gender gap in business ventures and the significance of enterprising action for the economy (Boz and Ergeneli, 2014; Abdullah et al., 2018).

Specifically, in women, individual factors such as personality-related elements significantly affect women's entrepreneurial intention. A few significant investigations have shown that psychological and character-related components are determinants of entrepreneurship's aims (Tan et al., 2020). A complete understanding of the impacts of significant psychological elements on the attitude of women toward entrepreneurial aim would benefit national entrepreneurial education; however, few researchers have analyzed this topic (Antoncic et al., 2018; Bazkiaei et al., 2020; Palmer et al., 2021).

Some researchers have found that entrepreneurs carry some exceptional inborn elements, with those studies detecting a high level of heritability regarding entrepreneurial practices (Rauch and Frese, 2007; Nicolaou et al., 2008; Nicolaou and Shane, 2009; Duong et al., 2020; Elnadi and Gheith, 2021). Moreover, prior research suggests that business can be improved by analyzing the impact of personality characteristics in this regard.

In developing countries like Pakistan, the profile of women's entrepreneurship has become an intriguing issue (Yousaf et al., 2021). Investigating the role of women in business, plus the obstructions and difficulties they confront, and the way they challenge the norms of being business visionaries, has been a key focus of the literature (Hussain et al., 2021; Khurshid et al., 2021). One of the main issues is a personality conflict that impacts women entrepreneurs in business. As with men, women entrepreneurs have different personalities; some may be suited to entrepreneurship, while others are not (Anwar et al., 2020). The problem may not arise due to good or bad personalities; instead, it may arise due to the conflict between different attitudes, irritability, cynicism, and arrogance, all of which contribute to negativity. A negative attitude may cause a disturbance in communication, creating a communication gap that may result in undesirable situations (Palmer et al., 2021). For example, a negative-minded person always sees all decisions negatively, and for this reason, others may not like to work with that person (Wang et al., 2016).

Similarly, issues may also arise due to competitive versus cooperative differences. This mentality can intentionally damage others' professional lives, resulting in a loss of communication between the workers and hindering the business (Hueso et al., 2020). In this conflict, sometimes the stress becomes unbearable, causing workers to leave their jobs. The effectiveness of work entirely depends on teamwork. When this kind of negative mentality disrupts the team's rhythm, the whole team suffers as does the work's progression. Therefore, a person with a negative attitude can affect the morale of a group. Given the fundamental significance of business, the interplay between women entrepreneurs' personality signifies a significant gap in the research (Boz and Ergeneli, 2014). The present study attempts to fill this gap.

This research, firstly, aims to examine the impact of the five factors model of personality traits on women's entrepreneurial intention. Second, this research investigates the impact of the five factors model of personality traits on self-leadership. Third, this study examines the impact of self-leadership on women's entrepreneurial intention. Lastly, this study investigates the mediating role of self-leadership between the five factors model of personality traits and women's entrepreneurial intention. The study contributes theoretical knowledge regarding women's entrepreneurship in developed and developing countries, especially in Pakistan. Theoretical research assists in this examination, through character attributes that comprise the five components of the five-factor personality model (extraversion, openness, neuroticism, conscientiousness, and agreeableness). Further, the self-leadership theory contributes by examining the self-leadership, which is described as an individual's apparent capacity to perform tasks and accomplish objectives that bring about ideal results. Enterprising intention refers to one's self-recognized conviction and foundation for setting up a new business, increasing the value of a current association, or deliberately intending to do so in the future. This study follows the reaming structure.

The introduction section explains the objective and significance of study; the second part is literature review that explains the theoretical and hypotheses development with previous studies. The third part is the methodology that contains information on the population, sample, and data collection procedures. Moreover, the fourth section is the analysis, results, and discussion. The final section, the conclusion, includes the theoretical and practical implications, and limitations of the study, along with suggestions for future research.

LITERATURE REVIEW

Women Entrepreneurial Intention

Entrepreneurial intention is necessary for financial development and is a significant component in lifting countries from poverty (Tomy and Pardede, 2020). Entrepreneurs are the main driver for financial development, work creation, and decreasing destitution in non-industrial countries. Entrepreneurship is a method to quicken economic development, and fast industrialization has been accomplished through this approach (Baluku et al., 2020; Nakara et al., 2020). Moreover, small businesses have been perceived as feeders administrating large scope ventures (Oladipo and Fabayo, 2012; Hu et al., 2018).

Siwadi and Mhangami (2011) revealed that women entrepreneurs are significant performers and supporters of financial development. They are becoming progressively more noticeable in the neighborhood economies of business-generating areas. Improving females' financial and political strength has become a more prominent consideration in the last 30 years (Akinola Adeoye and Tella, 2013). Women's entrepreneurship contributes widely through insights and the investment of a lot of energy and capital assets to their networks, plus they produce jobs and create extra work for providers and other side project business linkages (Polas et al., 2021). Women-owned organizations have expanded in recent years (Sajjad et al., 2020), and a developing measure of exploration shows that developing countries have neglected to address gender obstructions to critical economic development (Athanne, 2011). Nonetheless, the study discovered that men have a higher inclination for

business behavior than females (Salahuddin et al., 2021). Women entrepreneurs have not had equal opportunities regarding their access to conditions and resources that encourage entrepreneurship, and at present, these boundaries confronting women in business have not been viably addressed (Athanne, 2011).

Therefore, Pakistan has a worthwhile opportunity in this context, as solving gender inequalities could create significant monetary development for the nation and women might want to attempt to start a business venture (Khalil et al., 2021; Noor et al., 2021).

Personality Traits

The Five-Factor Model (FFM) of personality is a generally accepted personality model (Hofstee et al., 1992; Ariani, 2013). Zhao and Seibert (2006) demonstrated that the model's development permits researchers to sort out different personality attributes into a useful schema to distinguish reliable connections. The FFM structure includes the five components of extraversion, openness, neuroticism, conscientiousness, and agreeableness. Research has confirmed that identity measures are substantial indicators of differences in employment criteria (Goldberg, 1993; Weisberg et al., 2011). Numerous dissimilar cognitive capacity measures and personality measures usually do not negatively impede workers (Hogan et al., 1996) and actually can upgrade decision-making processes. A recent examination demonstrated that personality measurements are related to work execution (Rosse et al., 1998; Dingemanse et al., 2010). The five identity measurements are: (1) neuroticism, a normal personality dimension indicating the general tendency to experience negative effects such as fear, sadness, embarrassment, anger, guilt, and disgust; (2) extraversion, including traits such as sociability, assertiveness, activity, and talkativeness, whereby extraverts are energetic and optimistic (Barrick et al., 1993); (3) openness to experience, which includes active imagination, aesthetic sensitivity, and attentiveness to inner feelings, a preference for variety, intellectual curiosity, and independence of judgment (Barrick et al., 1993); (4) agreeableness, whereby an agreeable person is fundamentally altruistic, sympathetic to others, and eager to help them, and in return, believes that others will be equally helpful (Barrick et al., 1993); and (5) conscientiousness, which refers to self-control and the active planning, organizing, and carrying out tasks (Barrick et al., 1993).

Personality Traits and Women's Entrepreneurial Intention

A person's entrepreneurial intention could be affected by situational factors, such as the job's characteristics, the organization, and co-workers (Strümpfer et al., 1998; Sahinidis et al., 2020) plus dispositional factors. Dispositional variables can be depicted as identity attributes, needs, demeanor, inclination, and thought processes that result in a propensity to respond to circumstances in a foreordained (inclined) way. Entrepreneurial intention is impacted by suitability, the requirement for accomplishment, regard toward oneself, locus of control, emotional demeanor, and association (Wu et al., 2019; Tan et al., 2021). Modern analysts have questioned the usefulness of personality measures in anticipating occupation-related criteria, in light of doubtful study results (Guion and Gottier, 1965; Ahmed et al., 2020) and are concerned that most personality measures are replicated. Personality traits are a multi-dimensional construct that demonstrate how well workers perform their undertakings, the actions they select, and the skill they demonstrate in tackling issues (Luc, 2020; Shah et al., 2020).

Moreover, it demonstrates the degree to which they finish actions, how they use their accessible assets, and the time and vitality they spend on their tasks (Neneh, 2020). Extraversion is described as a characteristic in which an individual is sociable, expressive, talkative, self-confident, bold, active, energetic, and determined. Entrepreneurs have a strong belief in having the ability to control their environmental outcomes. Extraversion has a positive effect on women's entrepreneurial intention (Matlay, 2008). Moreover, past studies have demonstrated that openness is identified with effectively adjusting to change (Yap et al., 2012). Entrepreneurship involves one's ability to investigate new ideas, utilize their imagination to tackle new issues, and apply creative ways to devise items, services, and business procedures. This characteristic also has a positive effect on women's entrepreneurial intention (Zhao and Seibert, 2006). Conscientiousness comprises the particular characteristics of capability, request, loyalty, accomplishment endeavoring, self-restraint, and thought. According to these combinations, this characteristic also positively affects women's entrepreneurial intention (Costa and McCrae, 1992).

Further, neuroticism comprises the particular qualities of tension, irate aggression, sorrow, reluctance, lack of caution, and weakness, which negatively affect women's entrepreneurial intention (Costa and McCrae, 1992). Entrepreneurs normally work with low access to legitimate protection and a low margin for error in finance because they have restricted assets, and they are inclined to be serious, self-focused, and show low degrees of agreeableness (Zhao and Seibert, 2006; Postigo et al., 2021). In Pakistan, the examination has demonstrated that business visionaries or individuals with entrepreneurial intention regularly score highly on extraversion, openness, and conscientiousness, while relatively lower on neuroticism and agreeableness (Liang et al., 2015; Li et al., 2020). In this study, personality traits are used to examine women's entrepreneurial intention. Therefore, the following hypotheses were formulated:

H1: Extraversion significantly influences women's entrepreneurial intention.

H2: Openness significantly influences women's entrepreneurial intention.

H3: Conscientiousness significantly influences women's entrepreneurial intention.

H4: Neuroticism significantly influences women's entrepreneurial intention.

H5: Agreeableness significantly influences women's entrepreneurial intention.

Relationship Between Personality Traits and Self-Leadership

Self-leadership has a wide range of theoretical sources. It works inside the structure of social, cognitive, self-regulation, motivation, self-management, self-influence, and self-efficacy theories. It coordinates these theories into comprehensive behavior and psychological strategies (Neck and Houghton, 2006). Self-leadership improves individual adequacy through explicit behavior and intelligent systems (Andressen et al., 2012).

Manz (1986) indicated that self-leadership is a thorough self-impact point of view that concerns driving oneself toward performance to start a business. It involves directing oneself to accomplish work that should be done but is not generally pressing. Self-leadership is characterized as a set of methodologies that address what could be done (objectives and standards) and why it is to be done (Manz and Neck, 1991). Self-leadership procedures might be separated into three general classes: behavioral focused strategies, natural reward strategies, and constructive thought pattern strategies (Neck and Houghton, 2006; Sarfraz et al., 2021).

Although self-leadership is conceptualized as intellectual conduct by Manz (1986), a few scholars (Houghton et al., 2004) have questioned whether self-leadership is a unique and recognizable idea, as for certain personality qualities, self-leadership may be a simple repackaging of individual characteristics clarified by prior and moderately stable personality traits. For example, Markham and Markham (1995) contend that one of the major hindrances of the self-authority hypothesis is its uniqueness compared to more conventional perspectives on comparable psychological sets. Similarly, Guzzo (1998) has asked whether self-leadership is distinguishable from other existing psychological constructs; for example, the personality measurement of conscientiousness. Markham and Markham further propose that it is conceivable that different parts of self-leadership merely reorganize past personality attributes. While some studies have endeavored to thoughtfully separate the self-initiative measurements from related psychological ideas (Neck et al., 1998; Houghton et al., 2003; Ho and Nesbit, 2018; Wu et al., 2019), the uniqueness of self-leadership and its measurements remain a topic for future study. Along these lines, the motivation behind the current examination is to experimentally research the degree to which self-administration speaks to a remarkable and important grouping of behavior and intellectual methodologies comparative with the impact of personality (Castellano et al., 2021). All in all, this investigation will analyze the degree to which self-leadership components are separate from personality factors and the idea of the connections between extraversion, openness, neuroticism, conscientiousness, and agreeableness variables. Therefore, the following hypotheses were formulated:

H6: Extraversion significantly influences self-leadership.

H7: Openness significantly influences self-leadership.

H8: Conscientiousness significantly influences self-leadership.

H9: Neuroticism significantly influences self-leadership.

H10: Agreeableness significantly influences self-leadership.

Relationship Between Self-Leadership and Women's Entrepreneurial Intention

The role of traditional leadership is still undergoing some changes globally (Rasdi et al., 2020). Leadership not only affects followers but also influences individuals in the firm. It helps to increase the individuals' contribution to the organization (Khalid et al., 2020). Modern companies expect greater innovativeness, development, fast and adaptable activities, cooperation, and quick adaptability in an individual's behavior. They also anticipate that their workers should show and enhance their authoritative capacities. In this structure, the executives or managers influenced by self-leadership also influenced the workers to develop their self-management skills for the organizations' decision-making. Therefore, self-leadership ends up being very significant (Houghton et al., 2014). It improves individual capability through explicit social and psychological procedures (Andressen et al., 2012). Self-leadership techniques might be partitioned into three general classes: behavior-focused strategies, natural reward strategies, and constructive thought pattern strategies (Neck and Houghton, 2006).

The behavior-focused strategies incorporate self-perception, self-objective setting, self-reward, self-curing, and self-punishment. Self-perception helps collect accurate information about an individual's practices, observations, or feelings and subsequent self-improvement. Additionally, it distinguishes practices that should be expanded or diminished and develops mindfulness about the reasons for those practices. In this way, people can efficiently oversee or assess themselves and eliminate or transform negative practices (Manz and Sims, 1980). Natural reward strategies depend on practices that underline the positive parts of a task to be finished. Natural reward strategies occur gradually and intrinsically, particularly when individuals manage various issues. Individuals attempt to handle the issues by driving circumstances instead of disregarding those issues while utilizing these strategies (Amundsen and Martinsen, 2015). Constructive thought pattern strategies include improving innovative thoughts or patterns to thoughts and making a propensity out of them that would impact an individual's action (Anderson and Prussia, 1997; DiLiello and Houghton, 2006).

H11: Self-leadership significantly influences women's entrepreneurial intention.

The Mediating Role of Self-Leadership Between Personality Traits and Women's Entrepreneurial Intention

This inner force is established in self-leadership skills (Pratoom and Savatsomboon, 2012); self-leadership addresses a blend of practices, perspectives, and thoughts that can drive oneself across testing and challenging conditions (Prussia et al., 1998; Houghton and Neck, 2002). Self-pioneers are bound to see themselves as skilled to perform at a more elevated level (Houghton et al., 2012), just as they apply themselves to

accomplish the self-inspiration and self-direction expected to complete tasks desirably (Manz, 1992). Norris (2008) indicated that in conditions where representatives see support for driving themselves, self-leadership aptitudes might help amplify individual and expert qualities and execution.

Pratoom and Savatsomboon (2012) also recommended that when a society encourages risk-taking, the advancement of values, and supports learning by doing, self-leadership and the individual's natural inspiration are emphatically influenced, therefore encouraging individual development. In this regard, the perception of a workplace that helps group creativity, risk-taking, and proactiveness, may encourage representatives who have self-leadership abilities to show inventive behavior.

When entrepreneurs are in the workplace, self-leadership aptitudes may add to the transformation of entrepreneurial intention into a day-by-day measure, either to make opportunities out of the ideal creative practices in the work environment or to eliminate components that block an individual's entrepreneurial intention. In this way, self-leadership abilities give self-adequacy, inward motivation, self-impact, and mindfulness (Neck and Manz, 1996; Houghton and Jinkerson, 2007).

It might consequently be assumed that the perception of personality traits impacts the utilization of general self-leadership abilities, which influences women's entrepreneurial intention. Investigating the mediating function of self-leadership adds to our knowledge regarding the idea of connections among personality traits, self-leadership, and women's entrepreneurial intention. Appropriately, the accompanying hypotheses are constructed:

H12: Extraversion and women's entrepreneurial intention are significantly mediated by self-leadership.

H13: Openness and women's entrepreneurial intention are significantly mediated by self-leadership.

H14: Conscientiousness and women's entrepreneurial intention are significantly mediated by self-leadership.

H15: Neuroticism and women's entrepreneurial intention are significantly mediated by self-leadership.

H16: Agreeableness and women's entrepreneurial intention are significantly mediated by self-leadership.

There is a developing collection of literature about self-leadership and its significance in the work environment, but few studies have satisfactorily analyzed the interceding function of self-leadership. According to Marques-Quinteiro and Curral's (2012) research, mediation investigation supports the theory that self-leadership abilities bolster the connection between learning objective orientation and work role innovation, and partially intervene in the connection between characteristic inspiration and work role innovation. Another study found that self-leadership does not mediate between culture and collective individuals' innovation (Pratoom and Savatsomboon, 2012). Also, to the best of the author's knowledge, there has been no literature exploring self-leadership as a full or partial mediator of the connection between personality traits and women's entrepreneurial intention. Baron and Kenny (1986) demonstrated that partial mediation is the most constant model in mindset research. Consequently, the partial mediation model is reasonable if the hypothesis and examination are vague about the intervention type.

Though, as per James et al. (2004), if hypothesis and exploration are lacking to theorize full or partial intervention, testing for full intervention is suggested since the full intervention model is the most appropriate mediation model. James et al. (2004) also demonstrates that full mediation should be an important or standard model in assessing mediation. In the current examination, personality traits have also been proposed to impact women's entrepreneurial behavior through self-leadership skills. Consequently, the proposed theory was tried with a full mediation and contrasted with a fractional mediation model that incorporated the leading constructs' potential direct impact.

Theoretical Provision

Big Five Personality Traits Theory

Initially, the big five personality traits theory was developed and established by Fiske (1949). Later, this theory was expanded by some other researchers (Smith, 1967; Goldberg, 1981; McCrae and Costa, 1987). The five factors in the theory are extraversion, agreeableness, openness, conscientiousness, and neuroticism.

The general concept in normative social sciences is that women and men are more similar than different, but there are some exceptions. Therefore, Weisberg et al. (2011) studied the big five traits specifically in terms of personality and gender differences. The study found that women tend to score higher on extraversion, agreeableness, and neuroticism as compared to men. According to Weisberg et al. (2011) some personality traits are extensively separate in both women and men. This theory contributes in this current study to understanding the big five personality traits in women with entrepreneurial intention.

Self-Leadership Theory

Self-leadership is the practice of behavioral understanding, who you are, finding your preferred experiences, and intentionally directing yourself toward desired goals. The term was first developed from organizational management studies by Manz and Gioia (1983). Later, it was defined as "*comprehensive self-influence perception that directing oneself toward desired achievement by the naturally motivating tasks, also, management of oneself to do work that must be done but it is not motivating naturally*" (Manz, 1986). Moreover, this concept is based on the perception that self-leadership is a precondition for effective team leadership (Sims and Manz, 1991). In fact, more self-directing, self-leading individuals are more productive in their work role (Bendell et al., 2019).

In this study, a conceptual framework based on the big five personality traits theory and self-leadership combines to explain women's entrepreneurial intention. The big five personality traits theory is used to understand the big five personality traits as they relate to women with entrepreneurial intentions. Meanwhile, the

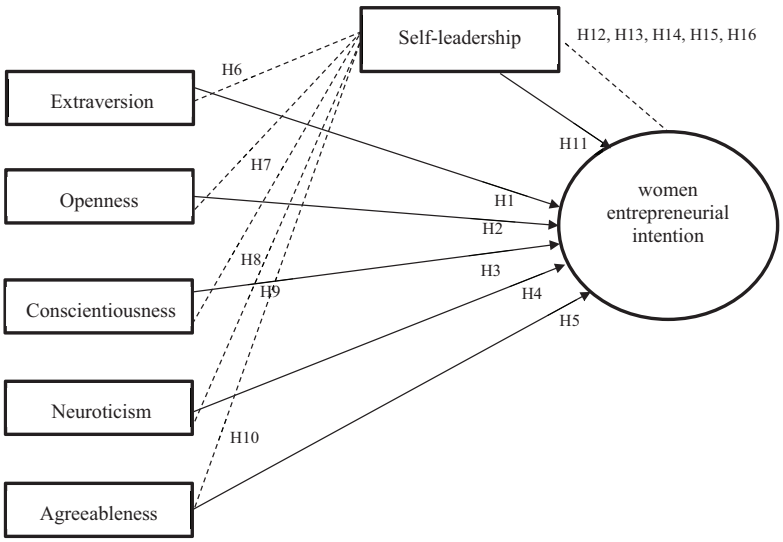

FIGURE 1 | Conceptual model.

self-leadership theory supports the notion that women use self-leadership practices to motivate themselves toward their desired goals. However, **Figure 1** shows the graphical representation of the constructs.

METHODOLOGY

Data Collection

In this study, a survey form was used to investigate personality traits and women's entrepreneurial intention. The survey form analyzed women entrepreneurs' different personalities that affect business activities.

The quantitative approach was used in this study (Zechmeister et al., 1997). The target population of this study is female students in Pakistan. This institution also includes different education departments, so the researcher can get varieties of answers and different opinions on the nature of business. Data was collected from 350 female students, Kinnaird College for Women University, Lahore College for the Women University of Lahore, in Pakistan. Questionnaires were distributed to respondents but only 280 were received, of which 30 questionnaires were not adequately filled. The response rate is 65%. After that, 250 questionnaires were used in the analysis. The convenience sampling method was used to collect the data from female students. Data were collected electronically. The survey includes two categories of questions. One is demographic, and the other is personality traits, self-leadership, and women's entrepreneurial intention.

Measurement Scale

The quantitative data was designed in a questionnaire format. The respondents must answer all questions to assist progress in this quantitative data—an adapted questionnaire used as a research instrument to collect data for the research. The measurement of personality traits questionnaire was adapted by Farrukh et al. (2019). The measurement of women entrepreneurial intention constructs was adapted by Liñán and Chen (2009). In this study, the self-leadership questionnaire was adapted by Crossen (2015). Moreover, 5 Likert scales were used to measure the questionnaire. According to these questions, the researcher analyzed the different attitudes of women toward business activities.

RESULTS AND DISCUSSION

This study used partial least square and structural equation modeling for data analysis in Smart PLS (Hair et al., 2016). Smart PLS is an advanced tool for data analysis in measuring and assessing the model (**Figures 2**, **3**). A total of 250 questionnaires were used in this study and considered satisfactory for the measurement and SEM (Reinartz et al., 2009).

Demographics

Furthermore, 22.2% of students were 18–25 years of age, 26.5% of students were between the age of 26–35 years, 24.5% of students were in the age of 36–45 years, 26.8% of students were in the age of 46–55 years. Moreover, 25.9% of students had high school education, 21.9% of students had diploma education, 27.1% of students had a bachelor's degree, 25.2% of students had higher education degree.

Table 1 shows the construct reliability and validity. The first step in reflex measurement is the internal consistency of the latent variable. We used alpha (α), compound reliability (CR), and Cronbach's rho-A proposed by Hair et al. (2016) for internal consistency assessment. The thresholds for α, CR, and rho should be >0.70. The value of α, rho-A, and CR is greater than 0.70 and is considered satisfactory. In addition, this table also indicates the validity of convergence (AVE). The breakpoint

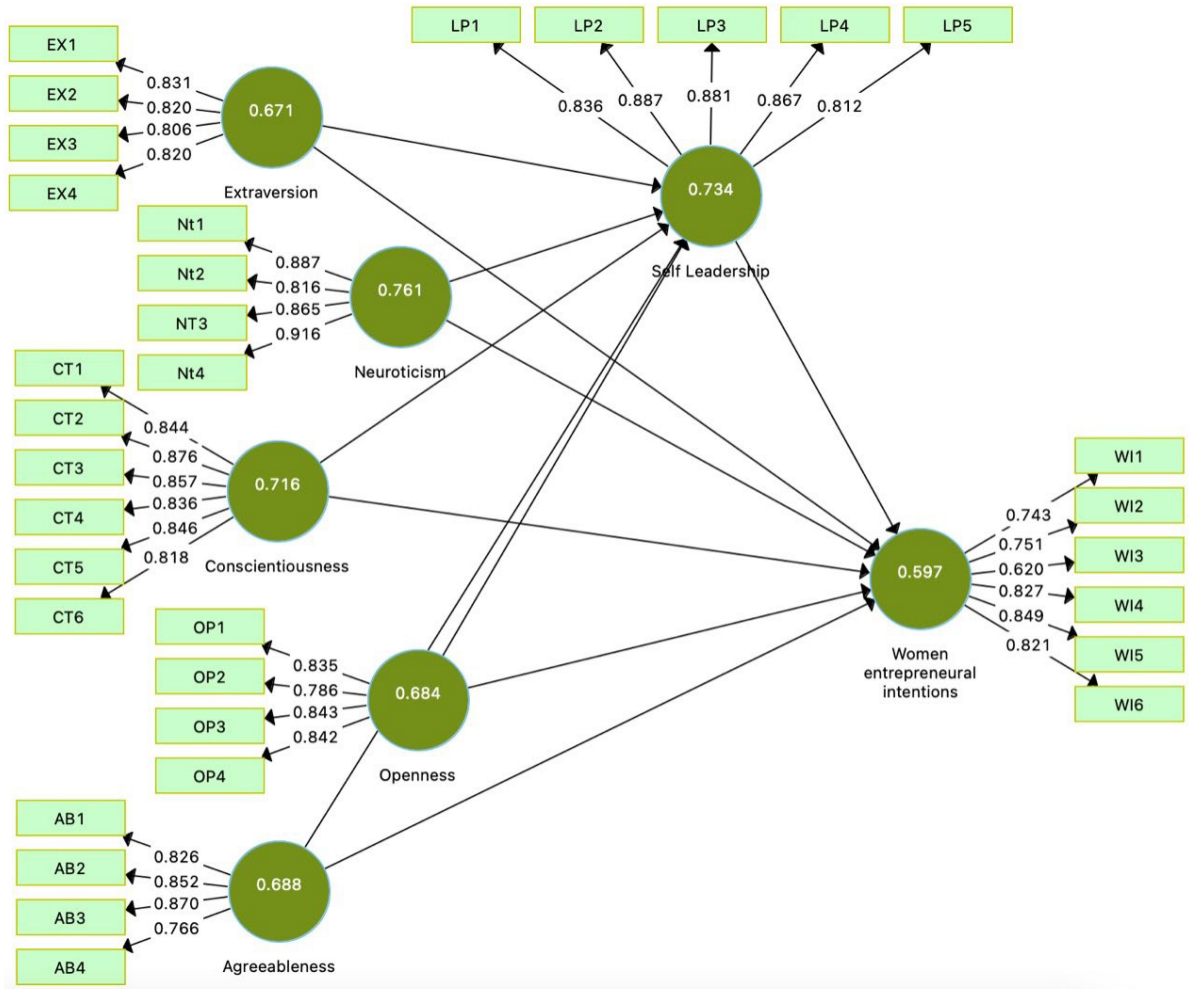

FIGURE 2 | Measurement model.

is >0.50 value. The AVE values ranged from 0.597 to 0.761, which was considered good. In conclusion, this study did not find any internal consistency and convergence validity issues in the framework.

Tables 2, **3** show the discriminative validity of potential structures. Two methods can be used to assess discriminant validity: the Fornell and Larcker criteria proposed by Fornell and Larcker (1981) that is based on external load value, and the proposed Heterotrait-monotrait ratio (HTMT) ratio by Henseler et al. (2015). In contrast, HTMT is based on correlation values. The Fornell and Larcker criteria are considered an old method of evaluating discriminatory effectiveness, with a certain degree of sensitivity. The Fornell and Larcker method is the square root of the AVE value. All diagonal values of Fornell and Larcker methods should be greater than the rest of the relevant values (horizontal and vertical).

On the other hand, HTMT has two thresholds based on free and conservative methods. This study uses a simple method to evaluate the discriminatory effects of the HTMT method. According to this method, the HTMT value should be <0.85 (Henseler et al., 2015). This study did not show discriminatory effectiveness.

Quality Criteria

Table 4 indicates the quality criteria, which include the R^2, Adjusted R^2, Q^2, and F^2. This study measures the coefficient of determination by R^2 value. Therefore, it shows the variance of dependent variables in the study because of predictor variables (Hair et al., 2014). The accepted criteria of R^2 is 0–1, according to the value in this study that ensures the model's predictive validity.

Further, the effect size is measured by (f^2) that indicate the continuous relationship between constructs with multiple regression model (Cohen, 1988). The (f^2) value range (≥0.02 is small; ≥0.15 is medium; ≥0.35 is large), according to the value of this study's significant effect size between construct.

Other quality criteria of model (Q^2) ensure the predictive relevance that indicates the predictive relevance in the structural model by the Stone–Geisser criterion. The accepted value of Q^2 should not be more than 0 (Hair et al., 2013). According to the value of this study, the model confirms the predictive relevance.

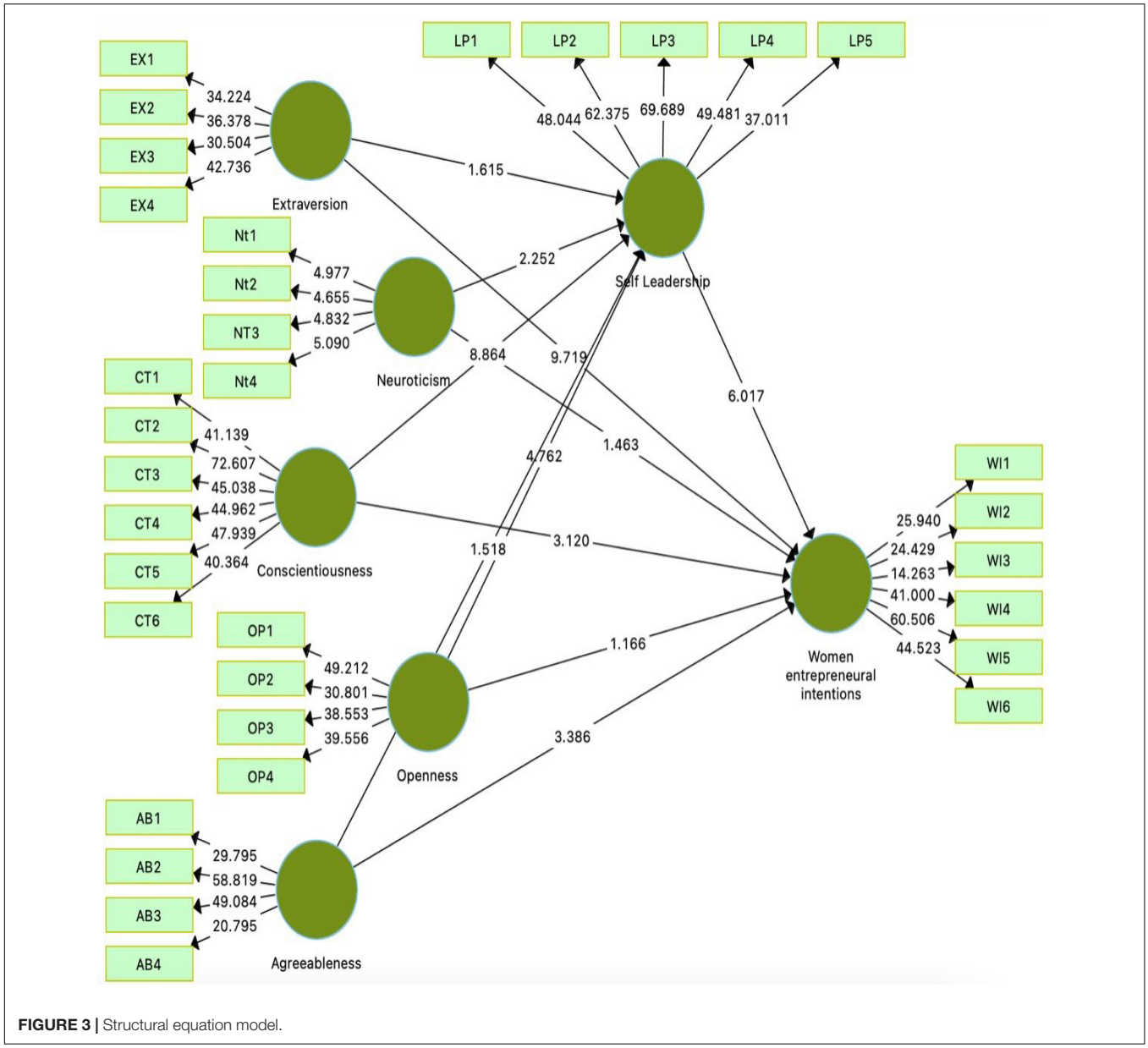

FIGURE 3 | Structural equation model.

Table 5 shows the direct and indirect effects of exogenous structures on endogenous structures. In this study, statistics show that while the results (beta = 0.394, t = 9.174, P = 0.000) indicate a significant impact between extraversion and women entrepreneurial intention. Therefore, H1 is accepted. Therefore, the H2 is rejected because the results (beta = 0.074, t = 1.129, P = 0.260) show an insignificant association between openness and women entrepreneurial intention. The study's results found (beta = 0.224, t = 3.235, P = 0.001) that there is a significant impact of conscientiousness on women entrepreneurial intention. H3 is accepted. This finding is similar with (Zhao and Seibert, 2006).

Neuroticism and women entrepreneurial intention have an insignificant relationship (beta = −0.055, t = 1.549, P = 0.122). H4 is rejected. Further, there is a significant relationship between agreeableness and women entrepreneurial intention (beta = 0.135, t = 3.406, P = 0.001) H5 is accepted.

TABLE 1 | Construct reliability and validity.

	Cronbach's alpha	rho_A	Composite reliability	Average variance extracted (AVE)
Agreeableness	0.850	0.871	0.898	0.688
Conscientiousness	0.921	0.923	0.938	0.716
Extraversion	0.837	0.837	0.891	0.671
Leadership	0.909	0.911	0.932	0.734
Neuroticism	0.846	0.850	0.896	0.684
Openness	0.902	0.997	0.927	0.761
Women entrepreneurial intention	0.863	0.878	0.898	0.597

TABLE 2 | Fornell–Larcker criterion.

	Agreeableness	Conscientiousness	Extraversion	Leadership	Neuroticism	Openness	Women intention
Agreeableness	0.829						
Conscientiousness	0.433	0.846					
Extraversion	0.366	0.453	0.819				
Self-leadership	0.399	0.768	0.431	0.857			
Neuroticism	0.354	0.779	0.397	0.708	0.827		
Openness	0.039	0.068	0.066	−0.036	0.035	0.872	
Women entrepreneurial intention	0.481	0.655	0.655	0.678	0.538	−0.024	0.772

TABLE 3 | Heterotrait–monotrait ratio (HTMT).

	Agreeableness	Conscientiousness	Extraversion	Leadership	Neuroticism	Openness
Agreeableness						
Conscientiousness	0.479					
Extraversion	0.429	0.513				
Leadership	0.433	0.838	0.493			
Neuroticism	0.401	0.880	0.470	0.807		
Openness	0.047	0.087	0.089	0.056	0.078	
Women entrepreneurial intention	0.567	0.712	0.776	0.737	0.607	0.041

TABLE 4 | Quality criteria.

	R^2	R^{2Adj}	Q^2	F^2
Self-leadership	0.638	0.633	0.461	
Women intentions	0.657	0.651	0.382	
Agreeableness → women entrepreneurial intentions				0.041
Conscientiousness → women entrepreneurial intentions				0.041
Extraversion → women entrepreneurial intentions				0.335
Neuroticism → women entrepreneurial intentions				0.109
Openness → women entrepreneurial intentions				0.106
Self-leadership → women entrepreneurial intentions				0.117
Agreeableness → self-leadership				0.108
Conscientiousness → self-leadership				0.249
Extraversion → self-leadership				0.113
Neuroticism → self-leadership				0.021
Openness → self-leadership				0.075

Extraversion has an insignificant impact on self-leadership (beta = 0.080, t = 1.674, P = 0.095). H6 is rejected according to the results of this study. While, openness has a significant influence on self-leadership because results indicated (beta = 0.263, t = 4.820, P = 0.000), which shows significance as t-values are less than 1.96. H7 is, therefore, accepted. The study's results (beta = 0.507, t = 8.777, P = 0.000) show a significant relationship between conscientiousness and self-leadership; H8 is accepted. The study findings found that neuroticism and self-leadership have a significant relationship (beta = −0.088, t = 2.213, P = 0.027). H9 is accepted. The results (beta = 0.061, t = 1.468, P = 0.143) indicate an insignificant impact of agreeableness on self-leadership. H10 is rejected. There is a significant impact of self-leadership on women entrepreneurial intention (beta = 0.332 t = 5.887, P = 0.000). H11 is accepted. The results of this study are consistent with (Houghton et al., 2004).

Self-leadership has an insignificant mediating relation between extraversion and women entrepreneurial intention (beta = 0.027, t = 1.551, P = 0.122) because some other factors are more influential with self-leadership. H12 is rejected.

While, openness has a significant relation to women entrepreneurial intention with a mediating role of self-leadership (beta = 0.088, t = 3.518, P = 0.000); H13 is accepted. Conscientiousness has a significant relation to women entrepreneurial intention with a mediating role of self-leadership (beta = 0.168, t = 5.199, P = 0.000); H14 is accepted.

Therefore, neuroticism has a significant relation to women entrepreneurial intention with mediating effect of self-leadership (beta = −0.029, t = 2.054, P = 0.040); H15 is accepted. Furthermore, people with high neuroticism are more likely to experience depressive cognition leading to irrational belief patterns, reducing women entrepreneurial intention (Kirschenbaum, 1987; Pyszczynski and Greenberg, 1987; Cantor and Zirkel, 1990).

Self-leadership has an insignificant mediating relation between agreeableness and women entrepreneurial intention

TABLE 5 | Direct and indirect effects.

Hypotheses	Beta	*T*-value	*P*-values
Agreeableness → self-leadership	0.061	1.468	0.143
Agreeableness → women entrepreneurial intentions	0.135	3.406	0.001
Conscientiousness → self-leadership	0.507	8.777	0.000
Conscientiousness → women entrepreneurial intentions	0.224	3.235	0.001
Extraversion → self-leadership	0.080	1.674	0.095
Extraversion → women entrepreneurial intentions	0.394	9.174	0.000
Neuroticism → self-leadership	−0.088	2.213	0.027
Neuroticism → women entrepreneurial intentions	−0.055	1.549	0.122
Openness → self-leadership	0.263	4.820	0.000
Openness → women entrepreneurial intentions	0.074	1.129	0.260
Self-leadership → women entrepreneurial intentions	0.332	5.887	0.000
Neuroticism → self-leadership → women entrepreneurial intentions	−0.029	2.054	0.040
Openness → self-leadership → women entrepreneurial intentions	0.088	3.518	0.000
Agreeableness → self-leadership → women entrepreneurial intentions	0.020	1.412	0.159
Extraversion → self-leadership → women entrepreneurial intentions	0.027	1.551	0.122
Conscientiousness → self-leadership → women entrepreneurial intentions	0.168	5.199	0.000

(beta = 0.020, t = 1.412, P = 0.159); H16 is rejected. These findings are consistent with previous research (Zhao and Seibert, 2006; Karimi et al., 2017).

CONCLUSION

The study's results conclude that extraversion, openness, and conscientiousness significantly influence women entrepreneurial intention. The findings also indicate that neuroticism and agreeableness are insignificantly associated with women entrepreneurial intention. Moreover, the study found that extraversion, openness, and conscientiousness significantly influence self-leadership while agreeableness has an insignificant relationship with self-leadership. In this study, neuroticism has a positive association with self-leadership. People with high neuroticism personalities are more likely to experience irrational belief patterns, resulting in reduced nervous consequences. Self-leadership is also significantly associated with women entrepreneurial intention. Further, the study shows that self-leadership significantly mediate the personality traits and women entrepreneurial intention.

Study Practical Implications

This study gives the theoretical knowledge in literature in the context of women entrepreneurship. It contributes to the significance of the personality traits that affect women's entrepreneurial intention. In the context of women entrepreneurs, women need to adopt a good workplace in the organization. The explanation behind this is to help the female working easily in business activities with new personalities. They should select only just the people who are strong on doing the work. There should be leaders with an open mind, and they ought not to be conservative. The enterprise could hold an intellectualizing meeting occasionally to know and comprehend each other very well. At times, a skilled worker could be a guide to an inexperienced one. In this situation, perhaps the organization can enlist more expert and experienced employees in their enterprises. The study will also assist in making the correct blend of old age and youth.

Further, self-leadership is considered a significant factor in entrepreneurial intention. The study helps women understand their personality traits according to business perspective and develop self-leadership skills according to their personality traits. Personality traits are natural factors, but self-leadership is not natural. It can be enhanced through actual practices. This factor will help women in enhancing confidence and assessing themselves from a business perspective. Self-leadership can help women in decision-making related to business activities. Furthermore, the study helps policymakers and institutions support women in developing these skills for innovative ideas.

Recommendations

In this study, the five factors are extraversion, openness, neuroticism, conscientiousness, and agreeableness in women. Besides, these are a few suggestions for the organization with the goal that they can beat the issues. Government and policymakers should focus on individual personality issues and make strategies to help women deal with critical situations. They should offer some seminars to females for grooming their personalities from a business perspective. Educational institutions should teach subjects to females for personality issues and self-leadership in the perspective of business intention. They should adopt some practices for the development of entrepreneurial intention in females. Government and societies should create an open culture for females to think for themselves confidently and decide. The development of self-leadership in females enhance the decision-making form and help them to control their behavior in terms of environmental changes.

Limitations and Future Research

The study focused on women entrepreneurs, and it should be conducted in future comparisons with men and women. It will

be a better understanding of not just women but also men entrepreneurs. Furthermore, the study used self-leadership with personality traits in women entrepreneurial intention. It should be examined by other motivational factors with personality traits. This study is based on the big five personality traits theory and self-leadership theory, and it should be based on other motivational theories with personality traits. This study used a quantitative method to measure the factors. In future research, the advanced methodology should use these variables. Aside from this, the researchers also propose that different analysts do a similar examination on various working environments, for example, medical clinics, universities, and banks, on more members to draw nearer to accurate and precise information on the connection between their character and entrepreneurial intention.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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REFERENCES

Abdullah, M. I., Sarfraz, M., Arif, A., and Azam, A. (2018). An extension of the theory of planned behavior towards brand equity and premium price. *Pol. J. Manag. Stud.* 18, 20–32. doi: 10.17512/pjms.2018.18.1.02

Ahmed, M. A., Khattak, M. S., and Anwar, M. (2020). Personality traits and entrepreneurial intention: the mediating role of risk aversion. *J. Public Aff.* e2275.

Akinola Adeoye, O., and Tella, O. (2013). Cultural adherence and the nexus between women empowerment and millennium development goals in Africa. *Glob. Adv. Res. J. Arts Humanit.* 2, 103–110.

Amundsen, S., and Martinsen, ØL. (2015). Linking empowering leadership to job satisfaction, work effort, and creativity: the role of self-leadership and psychological empowerment. *J. Leadersh. Organ. Stud.* 22, 304–323. doi: 10.1177/1548051814565819

Anderson, J. S., and Prussia, G. E. (1997). The self-leadership questionnaire: preliminary assessment of construct validity. *J. Leadersh. Stud.* 4, 119–143. doi: 10.1177/107179199700400212

Andressen, P., Konradt, U., and Neck, C. P. (2012). The relation between self-leadership and transformational leadership: competing models and the moderating role of virtuality. *J. Leadersh. Organ. Stud.* 19, 68–82. doi: 10.1177/1548051811425047

Antoncic, B., and Hisrich, R. D. (2001). Intrapreneurship: construct refinement and cross-cultural validation. *J. Bus. Ventur.* 16, 495–527.

Antoncic, J. A., Antoncic, B., Gantar, M., Hisrich, R. D., Marks, L. J., Bachkirov, A. A., et al. (2018). Risk-taking propensity and entrepreneurship: the role of power distance. *J. Enterp. Cult.* 26, 1–26. doi: 10.1142/s0218495818500012

Anwar, I., Saleem, I., Islam, K. M. B., Thoudam, P., and Khan, R. (2020). Entrepreneurial intention among female university students: examining the moderating role of entrepreneurial education. *J. Int. Bus. Entrep. Dev.* 12, 217–234. doi: 10.1371/journal.pone.0256420

Ariani, D. W. (2013). Personality and learning motivation. *Eur. J. Bus. Manag.* 5, 26–38.

Athanne, S. (2011). *Entrepreneurship in Kenya. Nairobi*. Available online at: Iiste.Org/Journals/Index. Php/EJBM/Article/Download/33856/34806 (accessed May 11, 2017).

Baluku, M. M., Kikooma, J. F., Otto, K., and König, C. J. (2020). Positive psychological attributes and entrepreneurial intention and action: the moderating role of perceived family support. *Front. Psychol.* 11:3461. doi: 10.3389/fpsyg.2020.546745

Baron, R. M., and Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J. Pers. Soc. Psychol.* 51, 1173–1182. doi: 10.1037/0022-3514.51.6.1173

Barrick, M. R., Mount, M. K., and Strauss, J. P. (1993). Conscientiousness and performance of sales representatives: test of the mediating effects of goal setting. *J. Appl. Psychol.* 78, 715–722. doi: 10.1037/0021-9010.78.5.715

Bazkiaei, H. A., Heng, L. H., Khan, N. U., Saufi, R. B. A., and Kasim, R. S. R. (2020). Do entrepreneurial education and Big-Five personality traits predict entrepreneurial intention among universities students? *Cogent Bus. Manag.* 7:1801217. doi: 10.1080/23311975.2020.1801217

Bendell, B. L., Sullivan, D. M., and Marvel, M. R. (2019). A gender-aware study of self-leadership strategies among high-growth entrepreneurs. *J. Small Bus. Manag.* 57, 110–130. doi: 10.1111/jsbm.12490

Boz, A., and Ergeneli, A. (2014). Women entrepreneurs' personality characteristics and parents' parenting style profile in Turkey. *Procedia Soc. Behav. Sci.* 109, 92–97.

Cantor, N., and Zirkel, S. (1990). "Personality, cognition, and purposive behavior," in *Handbook of Personality: Theory and Research*, ed. L. A. Pervin (New York, NY: Guilford Press).

Castellano, S., Chandavimol, K., Khelladi, I., and Orhan, M. A. (2021). Impact of self-leadership and shared leadership on the performance of virtual R&D teams. *J. Bus. Res.* 128, 578–586. doi: 10.1016/j.jbusres.2020.12.030

Cohen, J. (1988). *Statistical Power Analysis Jbr the Behavioral Sciences*. Hillsdale, NJ: Lawrence Erlbaum Associates, 18–74.

Costa, P. T., and McCrae, R. R. (1992). Normal personality assessment in clinical practice: the NEO personality inventory. *Psychol. Assess.* 4, 5–13. doi: 10.1037/1040-3590.4.1.5

Crossen, L. S. J. (2015). *Self–Leadership, Leadership Styles, and Employee Engagement: Testing Moderation Models*. Christchurch: University of Canterbury.

DiLiello, T. C., and Houghton, J. D. (2006). Maximizing organizational leadership capacity for the future: toward a model of self-leadership, innovation and creativity. *J. Manag. Psychol.* 21, 319–337.

Dingemanse, N. J., Kazem, A. J. N., Réale, D., and Wright, J. (2010). Behavioural reaction norms: animal personality meets individual plasticity. *Trends Ecol. Evol.* 25, 81–89. doi: 10.1016/j.tree.2009.07.013

Duong, C., Nguyen, H., Ngo, T., Nguyen, V., and Nguyen, T. (2020). The impact of individual and environmental characteristics on students' entrepreneurial intention. *Manag. Sci. Lett.* 10, 599–608. doi: 10.1186/s12913-016-1423-5

Elnadi, M., and Gheith, M. H. (2021). Entrepreneurial ecosystem, entrepreneurial self-efficacy, and entrepreneurial intention in higher education: evidence from Saudi Arabia. *Int. J. Manag. Educ.* 19:100458. doi: 10.1016/j.ijme.2021.100458

Farrukh, M., Sajid, M., Zreen, A., and Khalid, R. (2019). Knowledge sharing in higher education institutes: an empirical investigation of individual characteristics. *J. Appl. Res. High. Educ.* 12, 311–329.

Fiske, D. W. (1949). Consistency of the factorial structures of personality ratings from different sources. *J. Abnorm. Soc. Psychol.* 44, 329–344. doi: 10.1037/h0057198

Fornell, C., and Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Am. Mark. Assoc.* 18, 39–50. doi: 10.1177/002224378101800104

Goldberg, L. R. (1981). Language and individual differences: the search for universals in personality lexicons. *Rev. Pers. Soc. Psychol.* 2, 141–165.

Goldberg, L. R. (1993). The structure of phenotypic personality traits. *Am. Psychol.* 48, 26–34. doi: 10.1037/0003-066X.48.12.1302

Guion, R. M., and Gottier, R. F. (1965). Validity of personality measures in personnel selection. *Pers. Psychol.* 18, 135–164. doi: 10.1111/j.1744-6570.1965.tb00273.x

Guzzo, R. A. (1998). Leadership, self-management, and levels of analysis. *Monogr. Organ. Behav. Ind. Relat.* 24, 213–220.

Hair, F. Jr., Sarstedt, M., Hopkins, L., and Kuppelwieser, V. (2014). Partial least squares structural equation modeling (PLS-SEM): an emerging tool in business research. *Eur. Bus. Rev.* 26, 106–121. doi: 10.1108/EBR-10-2013-0128

Hair, J. F. Jr., Hult, G. T. M., Ringle, C., and Sarstedt, M. (2016). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Thousand Oaks, CA: Sage Publications.

Hair, J. F., Ringle, C. M., and Sarstedt, M. (2013). Partial least squares structural equation modeling: rigorous applications, better results and higher acceptance. *Long Range Plann.* 46, 1–12. doi: 10.1016/j.lrp.2013.01.001

Henseler, J., Ringle, C. M., and Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J. Acad. Mark. Sci.* 43, 115–135. doi: 10.1007/s11747-014-0403-8

Ho, J., and Nesbit, P. L. (2018). Personality and work outcomes: a moderated mediation model of self-leadership and gender. *Int. J. Manag. Excell.* 10:1292. doi: 10.17722/ijme.v10i2.416

Hofstee, W. K., De Raad, B., and Goldberg, L. R. (1992). Integration of the big five and circumplex approaches to trait structure. *J. Pers. Soc. Psychol.* 63, 146–163. doi: 10.1037//0022-3514.63.1.146

Hogan, R., Hogan, J., and Roberts, B. W. (1996). Personality measurement and employment decisions: questions and answers. *Am. Psychol.* 51, 469–477.

Houghton, J. D., Bonham, T. W., Neck, C. P., and Singh, K. (2004). The relationship between self-leadership and personality. *J. Manag. Psychol.* 19, 427–441.

Houghton, J. D., Carnes, A., and Ellison, C. N. (2014). A cross-cultural examination of self-leadership: testing for measurement invariance across four cultures. *J. Leadersh. Organ. Stud.* 21, 414–430.

Houghton, J. D., and Jinkerson, D. L. (2007). Constructive thought strategies and job satisfaction: a preliminary examination. *J. Bus. Psychol.* 22, 45–53. doi: 10.1007/s10869-007-9046-9

Houghton, J. D., and Neck, C. P. (2002). The revised self-leadership questionnaire: testing a hierarchical factor structure for self-leadership. *J. Manag. Psychol.* 17, 672–691. doi: 10.1108/02683940210450484

Houghton, J. D., Neck, C. P., and Manz, C. C. (2003). "Self-leadership and superleadership," in *Shared Leadership: Reframing the Hows and Whys of Leadership*, eds C. Pearce and J. Conger (Thousand Oaks, CA: SAGE Publications Inc), 123–140. doi: 10.4135/9781452229539.n6

Houghton, J. D., Wu, J., Godwin, J. L., Neck, C. P., and Manz, C. C. (2012). Effective stress management: a model of emotional intelligence, self-leadership, and student stress coping. *J. Manage. Educ.* 36, 220–238. doi: 10.1080/00223980109603713

Hu, R., Wang, L., Zhang, W., and Bin, P. (2018). Creativity, proactive personality, and entrepreneurial intention: the role of entrepreneurial alertness. *Front. Psychol.* 9:951. doi: 10.3389/fpsyg.2018.00951

Hueso, J. A., Jaén, I., and Liñán, F. (2020). From personal values to entrepreneurial intention: a systematic literature review. *Int. J. Entrep. Behav. Res.* 27, 205–230.

Hussain, T., Zia-Ur-Rehman, M., and Abbas, S. (2021). Role of entrepreneurial knowledge and personal attitude in developing entrepreneurial intentions in business graduates: a case of Pakistan. *J. Glob. Entrepr. Res.* 1–11.

James, L. R., McIntyre, M. D., Glisson, C. A., Bowler, J. L., and Mitchell, T. R. (2004). The conditional reasoning measurement system for aggression: an overview. *Hum. Perform.* 17, 271–295. doi: 10.1207/s15327043hup1703_2

Karimi, S., Biekmans, J. A. H., Mahdei, K. N., Lans, T., Mohammed, C., and Mulder, M. (2017). Testing the relationship between personality characteristics, contextual factors and entrepreneurial intentions in a developing country. *Int. J. Psychol.* 52, 227–240. doi: 10.1002/ijop

Khalid, R., Ali, W., Mahmood, S., and Alasan, I. I. (2020). Enviromental factors and involvement of women in entrepreneurship through self-leadership behavior. *PalArchs J. Archaeol. Egypt Egyptol.* 17, 12857–12880.

Khalil, M., Khawaja, K. F., and Sarfraz, M. (2021). The adoption of blockchain technology in the financial sector during the era of fourth industrial revolution: a moderated mediated model. *Qual. Quant.* 1–18.

Khurshid, J., Khurshid, N., and Khan, M. I. (2021). Impact of social identity on women entrepreneurial intention/behavior: mediating role of attitude towards behavior and moderating role of personal network. *Elem. Educ. Online* 20, 903–915.

Kirschenbaum, D. S. (1987). Self-regulatory failure: a review with clinical implications. *Clin. Psychol. Rev.* 7, 77–104. doi: 10.1016/0272-7358(87)90005-5

Li, C., Murad, M., Shahzad, F., Khan, M. A. S., and Ashraf, S. F. (2020). Dark tetrad personality traits and counterproductive work behavior among doctors in Pakistan. *Int. J. Health Plan. Manag.* 35, 1173–1192. doi: 10.1002/hpm.3025

Liang, C.-T., Chia, T.-L., and Liang, C. (2015). Effect of personality differences in shaping entrepreneurial intention. *Int. J. Bus. Soc. Sci.* 6, 166–176. doi: 10.1037/apl0000451

Liñán, F., and Chen, Y. (2009). Development and cross-cultural application of a specific instrument to measure entrepreneurial intentions. *Entrep. Theory Pract.* 33, 593–617. doi: 10.1111/j.1540-6520.2009.00318.x

Luc, P. T. (2020). The influence of personality traits on social entrepreneurial intention among owners of civil society organisations in Vietnam. *Int. J. Entrep. Small Bus.* 40, 291–308.

Manz, C. C. (1986). Self-leadership: toward an expanded theory of self-influence processes in organizations. *Acad. Manag. Rev.* 11, 585–600. doi: 10.2307/258312

Manz, C. C. (1992). Self-leading work teams: moving beyond self-management myths. *Hum. Relat.* 45, 1119–1140.

Manz, C. C., and Gioia, D. A. (1983). The interrelationship of power and control. *Hum. Relat.* 36, 459–475. doi: 10.1177/001872678303600504

Manz, C. C., and Neck, C. P. (1991). Inner leadership: creating productive thought patterns. *Acad. Manag. Perspect.* 5, 87–95. doi: 10.5465/ame.1991.4274477

Manz, C. C., and Sims, H. P. Jr. (1980). Self-management as a substitute for leadership: a social learning theory perspective. *Acad. Manag. Rev.* 5, 361–367. doi: 10.2307/257111

Markham, S. E., and Markham, I. S. (1995). Self-management and self-leadership reexamined: a levels-of-analysis perspective. *Leadersh. Q.* 6, 343.359. doi: 10.1016/1048-9843(95)90013-6

Marques-Quinteiro, P., and Curral, L. A. (2012). Goal orientation and work role performance: predicting adaptive and proactive work role performance through self-leadership strategies. *J. Psychol.* 146, 559–577. doi: 10.1080/00223980.2012.656157

Matlay, H. (2008). The impact of entrepreneurship education on entrepreneurial outcomes. *J. Small Bus. Enterp. Dev.* 15, 382–396.

McCrae, R. R., and Costa, P. T. (1987). Validation of the five-factor model of personality across instruments and observers. *J. Pers. Soc. Psychol.* 52, 81–90. doi: 10.1037//0022-3514.52.1.81

Nakara, W. A., Laouiti, R., Chavez, R., and Gharbi, S. (2020). An economic view of entrepreneurial intention. *Int. J. Entrep. Behav. Res.* 26, 1807–1826. doi: 10.3390/ijerph18137021

Neck, C. P., Ashcraft, R. F., and VanSandt, C. V. (1998). Employee self-leadership: enhancing the effectiveness of nonprofits. *Int. J. Organ. Theory Behav.* 1, 521–551. doi: 10.1108/ijotb-01-04-1998-b006

Neck, C. P., and Houghton, J. D. (2006). Two decades of self-leadership theory and research: past developments, present trends, and future possibilities. *J. Manag. Psychol.* 21, 270–295. doi: 10.1108/02683940610663097

Neck, C. P., and Manz, C. C. (1996). Thought self-leadership: the impact of mental strategies training on employee cognition, behavior, and affect. *J. Organ. Behav.* 17, 445–467. doi: 10.1002/(SICI)1099-1379(199609)17:5<445::AID-JOB770>3.0.CO;2-N

Neneh, B. N. (2020). Entrepreneurial passion and entrepreneurial intention: the role of social support and entrepreneurial self-efficacy. *Stud. High. Educ.* 1–17. doi: 10.1080/03075079.2020.1770716

Nicolaou, N., and Shane, S. (2009). Can genetic factors influence the likelihood of engaging in entrepreneurial activity? *J. Bus. Ventur.* 24, 1–22. doi: 10.1016/j.jbusvent.2007.11.003

Nicolaou, N., Shane, S., Cherkas, L., Hunkin, J., and Spector, T. D. (2008). Is the tendency to engage in entrepreneurship genetic? *Manag. Sci.* 54, 167–179. doi: 10.1287/mnsc.1070.0761

Noor, S., Isa, F. M., and Nor, L. M. (2021). Women empowerment through women entrepreneurship: a comparison between women entrepreneurs and fulltime housewife in Pakistan. *Iran. J. Manag. Stud.* 14, 347–363.

Norris, S. E. (2008). An examination of self-leadership. *Emerg. Leadersh. Journeys* 1, 43–61.

Oladipo, S. O., and Fabayo, J. O. (2012). Global recession, oil sector and economic growth in Nigeria. *Asian Trans. Basic Appl. Sci.* 1, 29–41. doi: 10.1186/s12992-020-00581-4

Palmer, C., Fasbender, U., Kraus, S., Birkner, S., and Kailer, N. (2021). A chip off the old block? The role of dominance and parental entrepreneurship for entrepreneurial intention. *Rev. Manag. Sci.* 15, 287–307. doi: 10.1007/s11846-019-00342-7

Polas, M. R. H., Raju, V., Muhibbullah, M., and Tabash, M. I. (2021). Rural women characteristics and sustainable entrepreneurial intention: a road to economic growth in Bangladesh. *J. Enterp. Commun. People Places Glob. Econ.* [Epub ahead of print].

Postigo, Á, Cuesta, M., García-Cueto, E., Prieto-Díez, F., and Muñiz, J. (2021). General versus specific personality traits for predicting entrepreneurship. *Pers. Individ. Differ.* 182:111094. doi: 10.1016/j.paid.2021.111094

Pratoom, K., and Savatsomboon, G. (2012). Explaining factors affecting individual innovation: the case of producer group members in Thailand. *Asia Pac. J. Manag.* 29, 1063–1087.

Prussia, G. E., Anderson, J. S., and Manz, C. C. (1998). Self-leadership and performance outcomes: the mediating influence of self-efficacy. *J. Organ. Behav.* 19, 523–538.

Pyszczynski, T., and Greenberg, J. (1987). Self-regulatory perseveration and the depressive self-focusing style: a self-awareness theory of reactive depression. *Psychol. Bull.* 102, 122–138. doi: 10.1037/0033-2909.102.1.122

Rasdi, R. M., Hamzah, S. R., and Yean, T. F. (2020). Exploring self-leadership development of Malaysian women entrepreneurs. *Adv. Dev. Hum. Resour.* 22, 189–200. doi: 10.1177/1523422320907048

Rauch, A., and Frese, M. (2007). Let's put the person back into entrepreneurship research: a meta-analysis on the relationship between business owners' personality traits, business creation, and success. *Eur. J. Work Organ. Psychol.* 16, 353–385. doi: 10.1080/13594320701595438

Reinartz, W., Haenlein, M., and Henseler, J. (2009). An empirical comparison of the efficacy of covariance-based and variance-based SEM. *Int. J. Res. Mark.* 26, 332–344. doi: 10.1016/j.ijresmar.2009.08.001

Rosse, J. G., Stecher, M. D., Miller, J. L., and Levin, R. A. (1998). The impact of response distortion on preemployment personality testing and hiring decisions. *J. Appl. Psychol.* 83, 634–644. doi: 10.1037/0021-9010.83.4.634

Sahinidis, A. G., Tsaknis, P. A., Gkika, E., and Stavroulakis, D. (2020). "The influence of the big five personality traits and risk aversion on entrepreneurial intention," in *Strategic Innovative Marketing and Tourism*, eds A. Kavoura, E. Kefallonitis, and P. Theodoridis (Cham: Springer), 215–224. doi: 10.1007/978-3-030-36126-6_24

Sajjad, M., Kaleem, N., Chani, M. I., and Ahmed, M. (2020). Worldwide role of women entrepreneurs in economic development. *Asia Pac. J. Innov. Entrep.* 14, 151–160. doi: 10.1108/apjie-06-2019-0041

Salahuddin, A., Mahmood, Q. K., and Ahmad, A. (2021). Breaking second glass ceiling: lived experiences of women entrepreneurs in Pakistan. *Qual. Quant.* 51, 1–12. doi: 10.4324/9780203932117-1

Sarfraz, M., Ivascu, L., Belu, R., and Artene, A. (2021). Accentuating the interconnection between business sustainability and organizational performance in the context of the circular economy: the moderating role of organizational competitiveness. *Bus. Strategy Environ.* 30, 2108–2118. doi: 10.1002/bse.2735

Shah, S. G. M., Sarfraz, M., and Ivascu, L. (2020). Assessing the interrelationship corporate environmental responsibility, innovative strategies, cognitive and hierarchical CEO: a stakeholder theory perspective. *Corp. Soc. Responsib. Environ. Manag.* 28, 457–473. doi: 10.1002/csr.2061

Sims, H. P., and Manz, C. C. (1991). Superleadership: beyond the myth of heroic leadership. *Organ. Dyn.* 19, 18–35. doi: 10.1016/0090-2616(91)90051-A

Siwadi, P., and Mhangami, M. (2011). An analysis of the performance of women entrepreneurs in a multi-currency economy: the case of Midlands province of Zimbabwe. *Univ. Botsw. J.* 8, 174–182.

Smith, G. M. (1967). Usefulness of peer ratings of personality in educational research. *Educ. Psychol. Meas.* 27, 967–984. doi: 10.1177/001316446702700445

Strümpfer, D. J. W., Danana, N., Gouws, J. F., and Viviers, M. R. (1998). Personality dispositions and job satisfaction. *S. Afr. J. Psychol.* 28, 92–100. doi: 10.1177/008124639802800206

Tan, L. P., Le, A. N. H., and Xuan, L. P. (2020). A systematic literature review on social entrepreneurial intention. *J. Soc. Entrepr.* 11, 241–256. doi: 10.1080/19420676.2019.1640770

Tan, L. P., Pham, L. X., and Bui, T. T. (2021). Personality traits and social entrepreneurial intention: the mediating effect of perceived desirability and perceived feasibility. *J. Entrep.* 30, 56–80. doi: 10.1177/0971355720974811

Tomy, S., and Pardede, E. (2020). An entrepreneurial intention model focussing on higher education. *Int. J. Entrep. Behav. Res.* 26, 1423–1447. doi: 10.3389/fpsyg.2020.588634

Wang, J.-H., Chang, C.-C., Yao, S.-N., and Liang, C. (2016). The contribution of self-efficacy to the relationship between personality traits and entrepreneurial intention. *High. Educ.* 72, 209–224. doi: 10.1007/s10734-015-9946-y

Weisberg, Y. J., DeYoung, C. G., and Hirsh, J. B. (2011). Gender differences in personality across the ten aspects of the Big Five. *Front. Psychol.* 2:178. doi: 10.3389/fpsyg.2011.00178

Wu, W., Wang, H., Zheng, C., and Wu, Y. J. (2019). Effect of narcissism, psychopathy, and machiavellianism on entrepreneurial intention—the mediating of entrepreneurial self-efficacy. *Front. Psychol.* 10:360. doi: 10.3389/fpsyg.2019.00360

Yap, S. C. Y., Anusic, I., and Lucas, R. E. (2012). Does personality moderate reaction and adaptation to major life events? Evidence from the British Household Panel Survey. *J. Res. Pers.* 46, 477–488. doi: 10.1016/j.jrp.2012.05.005

Yousaf, U., Ali, S. A., Ahmed, M., Usman, B., and Sameer, I. (2021). From entrepreneurial education to entrepreneurial intention: a sequential mediation of self-efficacy and entrepreneurial attitude. *Int. J. Innov. Sci.* 13, 364–380. doi: 10.1108/ijis-09-2020-0133

Zechmeister, E. B., Shaughnessy, J. J., and Zechmeister, J. S. (1997). *A Practical Introduction to Research Methods in Psychology Humanities, Social Sciences & World Languages*. New York, NY: McGraw-Hill.

Zhao, H., and Seibert, S. (2006). The Big Five personality dimensions and entrepreneurial status: a meta-analytical review. *J. Appl. Psychol.* 91, 259–271. doi: 10.1037/0021-9010.91.2.259

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Linkage Between Inclusive Digital Finance and High-Tech Enterprise Innovation Performance: Role of Debt and Equity Financing

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This study investigates the relationship between digital financial inclusion, external financing, and the innovation performance of high-tech enterprises in China. The choice of corporate financing methods is an important part of organizational behavioral psychology, and different financing models will have a certain effect on organizational performance, especially in the digital economy environment. Therefore, based on resource dependence theory and financing constraint theory, the present study utilizes the panel data collected from the China Stock Market & Accounting Research (CSMAR) database from 2011 to 2020 of 112 companies in the Yangtze River Delta region and the "The Peking University Digital Financial Inclusion Index of China (PKU-DFIIC)" released by the Peking University Digital Finance Research Center and Ant Financial Group. The results show that the Digital Financial Inclusion Index (DFIIC) has a significant positive correlation with the innovation performance of high-tech enterprises. The higher the level of debt financing, the stronger the role of digital financial inclusion in promoting innovation performance. Investigating the DFIIC in terms of coverage breadth and usage depth, we find that usage depth does not significantly encourage innovation performance. The effect of the interaction between coverage breadth and external financing is consistent with the results for the DFIIC. The study suggests that equity financing promotes the usage depth of the DFIIC in state-owned enterprises. In contrast, debt financing promotes the coverage breadth of non-state-owned enterprises. Finally, we propose relevant policy recommendations based on the research results. It includes in-depth popularization of inclusive finance in the daily operations of enterprises at the technical level, refinement of external financing policy incentives for enterprises based on the characteristics of ownership, and strengthening the research of technologies such as big data, artificial intelligence (AI), and cloud computing. The paper presents a range of theoretical and practical implications for practitioners and academics relevant to high-tech enterprises.

Keywords: inclusive digital finance, external financing, innovation performance, digital economy, sustainability, information communication technology, equity financing

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INTRODUCTION

The digital economy is developing rapidly, and the need to support its development has become a global consensus. Platform support, data drive, and inclusive sharing are its three primary characteristics. The digital economy is based on new-generation information technology, which gave birth to new business models and economic activities. Innovation in information technology improves the efficiency of resource allocation. As global industries undergo digital innovation, many countries witness the digital reform of financial institutions (Shaikh et al., 2017), the rise of the digital banking culture (Gruin and Knaack, 2020), and social currency digitization. Technological innovation fosters firms' development and national competitiveness. As knowledge and technology-intensive entity, high-tech enterprises play a key role in promoting the transformation of scientific research results. The Yangtze River Delta region is the core of the urban agglomeration in the Yangtze River Economic Belt. The integrated development of the area helps promote the domestic economic cycle. Since a national strategy revolves around this region, financial technology talents, technology, capital, information, and other resources have been effectively integrated. The regional financial system has been continuously improved.

Technological innovation promotes scientific and technological research and corporate development activities, encouraging changes in the financial environment. The "14th Five-Year Plan" proposed that the national governance efficiency should be further improved. The Chinese state has vigorously promoted the development of inclusive digital finance. The development of big data, 5G, and artificial intelligence (AI) has enabled financial technology to support corporate operations. Digital financial inclusion gained momentum in the financial sector due to the Internet. It has expanded the coverage of financial services, improved financial risk control, and increased the availability of loans for small and medium-sized enterprises (SMEs) (Berger and Udell, 2006). It allowed greater inclusion into the financial system, and it is expected to support the financial service industry in the future. Existing research on digital financial inclusion mostly focuses on its macroeconomic aspects. Allen et al. (2016) found that financial inclusion expands employment opportunities and increases income levels. In addition, digital financial inclusion significantly affects innovation and entrepreneurship (Xie et al., 2018), household consumption (Yi and Zhou, 2018; Ding et al., 2019; Cheng and Gong, 2020), and industrial structure upgrades (Tang et al., 2019). Inclusive finance addresses the financing problems of disadvantaged groups in the market; hence, existing research on micro-enterprises primarily investigates SMEs' financing constraints (Wan et al., 2020; Yu and Dou, 2020).

In the market economy, enterprises find it is difficult to meet their capital needs solely relying on internal financing. Firms often need to receive funds from other economic entities. Company executives often decide how companies raise funds. Different financing models will have a certain effect on organizational performance especially in the digital economy environment. External financing plays an essential role in corporate innovation (Fernandez, 2017; Shah et al., 2019; Wellalage and Fernandez, 2019). Savings may be converted into investment in daily production and operations.

Overall, the previous research agrees on the following aspects. (1) Substantial research on digital financial inclusion exists at the macro level. However, its impact on micro-enterprises innovation activities needs further discussion, especially considering the rapid development of financial technology. Whether inclusive finance promotes the realization of corporate innovation should be further investigated. (2) Most research on external financing addresses debt financing obtained from banks. In contrast, the comparative analysis of equity financing and debt financing is seldom conducted whether differences exist in how debt and equity financing influence enterprise innovation activities should be investigated. (3) With the digitalization of inclusive finance, various studies have qualitatively analyzed its development history and influence on people's livelihood and consumption patterns. Quantitative analysis has primarily focused on macro-industry levels, addressing entrepreneurial activities and the financing environment. However, the relationship between digital financial inclusion and a company's existing external financing and financing structure should be further explored.

This study focuses on whether the digital financial inclusion environment and external source financing significantly impact the innovation performance of high-tech enterprises. In this respect, the study's results complement existing research on financial inclusion. Moreover, this study focuses on the Yangtze River Delta region, addressing enterprises in four provinces and cities of the Yangtze River Delta, further contributing to research in the field.

The study had structured in the following way: section "Introduction" provides the overview of the paper while briefly explaining the topic's background. While section "Theoretical Framework and Research Hypotheses," the literature review, investigates the research question backed by previous knowledge. Moreover, section "Materials and Methods" discusses the study methodology and results presented in section "Results." Similarly, section "The Nature of Corporate Ownership" discusses corporate ownership, and section "Conclusion" concludes the findings by proposing implications and final wording on the study.

THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESES

Digital Financial Inclusion and Innovation Performance

Global digital financial inclusion can be classified based on service forms and institutional changes. It has experienced an evolution of the type microfinance → inclusive finance → inclusive digital finance (Hu and Cheng, 2020). According to "External Control of Organizations" published by Salancik and Pfeffer (1978), the core hypothesis of resource dependence theory is organizations need to survive by acquiring resources in the environment. No organization is self-sufficient and must exchange with the environment. Organizations

should be regarded as political actors rather than just work organizations that accomplish tasks. The resource dependence theory puts forward four important assumptions: (1) the most important thing for an organization is to care about survival; (2) in order to survive, the organization needs resources, and the organization itself usually cannot produce these resources; (3) the organization must be related to what it depends on. The factors in the environment interact, these factors usually include other organizations; (4) the survival of an organization is based on the ability to control its relationship with other organizations. It shows that the heterogeneous resources owned by the organization are the source of its competitive advantage and the determinants of performance differences between the organizations. The development of inclusive digital finance has evolved as a national strategy in China, becoming a driving force for supply-side structural reforms (Wu, 2019; Ajaz et al., 2020). Inclusive digital finance has improved firms' external financial environment, optimizing financing conditions (Shen et al., 2010) and helping them solve practical development issues. Therefore, under the inclusive finance policy, high-tech enterprises receiving government subsidies and enjoying preferential tax policies increase the enterprise's economic benefits and release a positive signal outside the organization, helping firms attract external financing (Liu et al., 2020) and improving their competitiveness. The development of digital financial inclusion has also made innovative products more accessible to traditional finance, effectively alleviating the problems of high financing costs and low efficiency in the traditional financial service industry (Berger and Udell, 2006; Allen et al., 2016). Innovation faces high upfront costs in technology-intensive high-tech enterprises, especially in the case of small and micro-enterprises, and substantial uncertainty (Sarfraz et al., 2020; Wan et al., 2020). Digital financial inclusion reduces the financial risks of early technology research and the development of enterprises. Enterprises use external financing and internal financing channels to protect their innovative activities. Using financial technology, digital financial inclusion reduces corporate financial services and labor costs through the Internet, alleviating corporate financing constraints (Yu and Dou, 2020), and attracting people who the modern financial service industry has long excluded. The financial system has improved the availability of financial services for SMEs and other underserved "long-tail" consumer groups (Cheng and Gong, 2020). It has enhanced the development vitality of the financial industry and provided enterprises with a rather innovative ecological environment (Hu et al., 2019). Hence, we propose the following hypothesis:

H1: Digital financial inclusion has a positive impact on the innovation performance of high-tech enterprises.

Digital Financial Inclusion, External Financing, and Innovation Performance

External financing raises funds from outside the company, usually through equity financing or debt financing. Existing research suggests that external financing plays an essential role in corporate innovation (Ayyagari et al., 2011; Fernandez, 2017). Fernandez (2017) found that small innovative companies mainly rely on bank financing (Wellalage and Fernandez, 2019). Using corporate data from Eastern Europe and Central Asia, the study proposes that bank financing has a greater impact on corporate innovation; hence, innovation policy increases SMEs' external financing opportunities. External financing provides stronger support to technology companies, which usually face high R&D risks. Gonzalez and James (2007) addressed United States-listed technology companies, showing that they are more likely to obtain bank loans, while the current income and cash flow aspects are less relevant. Egger and Keuschnigg (2017) and Neuhann and Saidi (2018) found that banks are willing to provide loans to production companies, even if they are risky.

Research on external financing considers two aspects: debt financing and equity financing. Bank loans represent debt financing. Commercial banks obtain interest income by providing short-term and long-term loans to enterprises. At the same time, firms receive a fair capital turnover. Equity financing implies the introduction of new shareholders to obtain financing without repayment of principal and interest and has a long-term nature. Both are fundamental channels for enterprises to obtain external funds. With the digital development of inclusive finance in China, corporate financing costs have gradually decreased at the technical level, and financing channels have continued to expand. The widespread promotion of inclusive digital finance has enabled inclusive finance to be applied to enterprise operations together with digital innovation (Shah et al., 2021). As a result, R&D risks can be compensated to some extent, and R&D enterprise innovation results can be promoted. Jorgenson's neoclassical investment model pointed out that the government promotes the inclusiveness of finance through financial discounts and tax rebates, among others, to reduce the cost of capital for enterprises. The government implements an inclusive financial policy and provides incentives and subsidies to banks and other financial institutions to make it easier to approve loans to technology-based SMEs, stimulate R&D investment, and extend the inclusive financial policy to SMEs and the general public. Doing so, the government promotes mass entrepreneurship, further increases the availability of debt financing and equity financing for enterprises, and stimulates the vitality of enterprise innovation. When a company has sufficient external financing support, its technological research, and development capacity increase, promoting the digital innovation of the industry and the efficiency of the research and development output. The impact of digital financial inclusion on corporate innovation performance is inseparable from its interaction with external financing. Hence, we propose the following hypotheses:

H2a: The higher the level of corporate debt financing, the stronger the role of digital financial inclusion in promoting corporate innovation performance.

H2b: The higher the level of corporate equity financing, the stronger the role of digital financial inclusion in promoting corporate innovation performance.

The proposed theoretical model is shown in **Figure 1**.

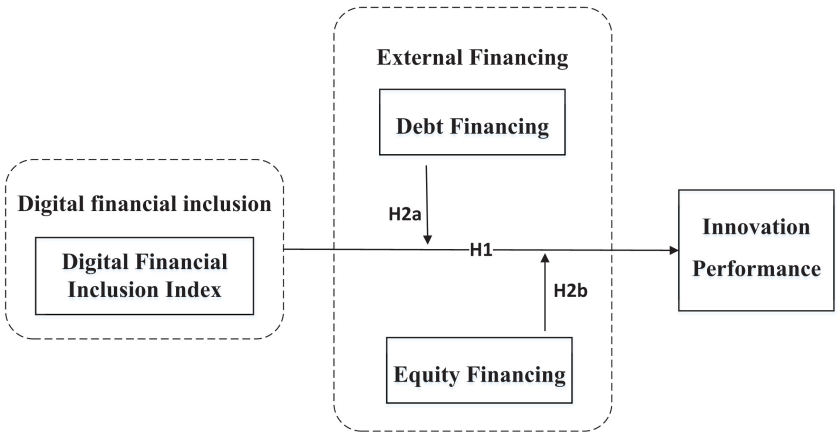

FIGURE 1 | Theoretical model diagram.

MATERIALS AND METHODS

Sample Selection and Data Sources

The data of this research comes from the China Stock Market & Accounting Research (CSMAR) database. CSMAR database is an economic and financial field developed by Shenzhen Sysma Data Technology Co., Ltd. After 21 years of continuous accumulation and improvement, the CSMAR database has covered 18 series including factor research, character characteristics, green economy, stocks, companies, overseas, information, funds, bonds, industries, economics, and commodity futures, including 160+ databases, more than 4,000 tables, 50,000 fields. In addition, based on the "Administrative Measures for the Recognition of High-tech Enterprises" promulgated in 2012, this study examines the panel data obtained from 112 high-tech companies in the Yangtze River Delta region, Shanghai, Zhejiang, Jiangsu, and Anhui. The province and city data cover the period between 2011 and 2020 and are obtained from "The Peking University Digital Financial Inclusion Index of China (PKU-DFIIC)" released by Peking University Digital Finance Research Center and Ant Financial Group. The initial sampling criteria are as follows:

(1) Companies with special treatments such as ST, *ST, and delisting are excluded;
(2) To ensure data integrity, companies with incomplete data disclosure are eliminated;
(3) Key indicators with missing observations are excluded.

Finally, 112 high-tech enterprises' data in the four provinces are selected. The data used for analysis are mainly obtained from the CSMAR database, wind database, and Juchao Information Network, and processed using Stata15.0 statistical software. And for companies lacking patent application data information, we use the information provided by the National Intellectual Property Office (CNIPA) to manually supplement. Furthermore, to reduce the influence of outliers, this study minorize the upper and lower 1% quantiles on all continuous variables.

Variable Selection and Measurement

The measurement and identification of the variables used for analysis are shown in **Table 1**. The independent variables in this study are digital financial inclusion and external financing. Digital financial inclusion is proxied by China's Digital Financial Inclusion Index (DFIIC) (*fin*) (Guo et al., 2020), which represents the development status of digital financial inclusion in the region. The larger the index, the higher the level of digital financial inclusion in the region. At the city level, the China Digital Financial Inclusive Development Index developed by the Peking University Digital Finance Research Center and Ant Financial Services Group is employed to describe the inclusiveness and development of digital finance at the regional level in China. The index is comprehensively measured using the coverage breadth, usage depth, and digitization level. As mentioned above, external financing comprises debt financing and equity financing. In line with the literature, debt financing is expressed by the proportion of the total short-term and long-term loans in the total assets of the current period. Equity financing is proxied by current changes in the company's equity and capital reserves as a proportion of total assets.

The dependent variable in this study is innovation performance (*innov*). Its measurement is in line with Xie and Zuo (2013), Guoqing et al. (2014), and Meuleman and De Maeseneire (2012). The number of patent applications of a company in the current year is used as a measure of innovation performance, including the sum of inventions, utility models, and designs. Missing data are manually supplemented utilizing the company's annual reports and data from the National Intellectual Property Office (CNIPA). According to previous studies, the age and size of a company significantly impact their innovation performance. High-tech companies are also affected by the external influences of company growth and industry differences. Therefore, to reduce the interference of other variables on the results, in line with Li and Zhao (2016) and Liu et al. (2019), we control the age of the enterprise (*age*), its size (*size*), the fixed asset ratio (*fixas*), intangible assets ratio (*intanas*), financial leverage (*lev*), and tangible assets ratio

TABLE 1 | Variable names and identification.

Types		Identification	Name	Measurement method
Dependent variable		*innov*	Innovation performance	Number of patent applications (inventions, utility models, and designs)
Independent variables	Digital financial inclusion	*fin*	Digital financial inclusion index	Jointly prepared by the Digital Finance Research Center of Peking University and Ant Financial Group
		co	Coverage breadth	
		de	Usage depth	
	External financing	*loan*	Debt financing	Debt financing = (short-term loans + long-term loans) / total assets
		sto	Equity financing	Equity financing = (current changes in the equity + changes in capital reserve) / total assets
Control variables		*fixas*	Fixed asset ratio	Fixed asset ratio = net fixed assets / total assets
		intanas	Intangible assets ratio	Intangible assets ratio = net intangible assets / total assets
		lev	Financial leverage	Financial leverage = total liability / total assets
		tanas	Tangible assets ratio	Tangible assets ratio = (total assets − net intangible assets − net value of goodwill) / total assets
		age	The age of the enterprise	The number of years since the company was founded
		size	The size of the enterprise	Natural logarithm of total assets
		Year	Time effect	Virtual variable
		Industry	Industry effect	Virtual variable, set up according to the 2012 classification standards of the China Securities Regulatory Commission

(*tanas*). The age of an enterprise is the number of years since its establishment. Its size is the natural logarithm of its total assets. The ratio of fixed assets is expressed as the ratio of net fixed assets to total assets. The same is true for intangible assets. Financial leverage is expressed as the ratio of total liabilities to total assets. Tangible assets are expressed as the proportion of total assets after deducting intangible assets and the net value of goodwill in total assets. This study controls the year and industry effects. The dummy for the value of the enterprise in the year is equal to 1, and 0 otherwise. The industry effect is also proxied by a dummy variable set according to the 2012 classification standard of the China Securities Regulatory Commission.

Regression Model

This study develops the following three regression models to test the proposed research hypotheses:

$$Innov_{i,t} = \alpha_0 + \beta_0 fin_{i,t} + \sum_{i,t} control + \mu_0; \quad (1)$$

$$Innov_{i,t} = \alpha_1 + \beta_1 fin_{i,t} + \Theta_1 (fin_{i,t} \times loan_{i,t}) + \lambda_1 loan_{i,t} + \sum_{i,t} control + \mu_1; \quad (2)$$

$$Innov_{i,t} = \alpha_2 + \beta_2 fin_{i,t} + \Theta_2 \left(fin_{i,t} \times sto_{i,t}\right) + \lambda_2 sto_{i,t} + \sum_{i,t} control + \mu_2. \quad (3)$$

$Innov_{i,t}$ represents the innovation performance of company i in year t. $Fin_{i,t}$ is the DFIIC of the province where the company is located in year t, $loan_{i,t}$ represents its debt financing level, $sto_{i,t}$ is the equity financing level, and β_0 is the total effect of digital financial inclusion on innovation performance. In addition, $fin_{i,t} \times loan_{i,t}$ is the interaction between digital financial inclusion and debt financing, $fin_{i,t} \times sto_{i,t}$ represents the interaction between digital financial inclusion and equity financing, and $\sum_{i,t} control$ is a vector of control variables, including enterprise age, size, fixed asset ratio, intangible asset ratio, and financial leverage, among others, while α is a constant, and μ is a random disturbance term.

RESULTS

Descriptive Statistics and Correlation Analysis

Tables 2, **3** report the descriptive statistics and correlation analysis of the variables used for the analysis. A significant correlation is observed between the main variables. A large

TABLE 2 | Descriptive statistics.

Variable	Obs	Mean	SD	Min	Max
innov	724	22.84	51.02	1	338
fin	724	26.24	7.71	7.74	37.77
co	724	24.13	7.18	6.67	34.63
de	724	28.10	8.15	8.62	40.04
sto	724	15.00	7.014	0	22.74
loan	724	6.473	3.744	0	9.62
fixas	724	104.42	106.24	0.47	671.62
intanas	724	25.93	26.79	0	197.23
tanas	724	89.70	137.94	35.85	100
lev	724	1.04	2.80	−25.48	69.27
age	724	16.95	5.79	2	33
size	724	19.90	0.99	11.00	24.36

TABLE 3 | Digital financial inclusion and innovation performance: primary results.

	(1)	(2)	(3)
Variables	**Innov**	**Innov**	**Innov**
fin	0.446*	1.505*	1.523*
	(2.072)	(2.411)	(2.252)
loan		−0.042*	
		(−1.820)	
fin × *loan*		8.416***	
		(2.766)	
sto			−0.056
			(0.363)
fin × *sto*			0.014
			(0.012)
Control variables			
fixas	−0.033*	−0.034*	−0.028*
	(−2.331)	(−2.439)	(−1.992)
intanas	0.144***	0.132*	0.115*
	(2.631)	(2.435)	(2.101)
tanas	0.033***	0.032***	0.030***
	(2.901)	(2.816)	(2.725)
lev	1.931	1.991	1.018
	(0.987)	(1.025)	(0.531)
age	−0.318	−0.272	−0.261
	(−1.266)	(−1.088)	(−1.054)
size	12.397***	12.249***	14.493***
	(4.269)	(4.240)	(4.837)
Constant	−264.131***	−528.792***	−895.925***
	(−7.197)	(−5.233)	(−7.602)
Year	Control	Control	Control
ID	Control	Control	Control
Observations	724	693	681
R-squared	0.151	0.166	0.158

*Robust standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.*

difference exists between the minimum (1) and maximum (338) enterprises' innovation performance, with an average value of 22.84. The sample firms have a large gap in innovation performance, and their overall innovation performance is low. The average value of corporate equity financing is high, while the average debt financing is low. The median value of the three indicators of digital financial inclusion is slightly higher than the simple average between the corresponding maximum and minimum values, indicating that there is no significant difference in the degree of promotion and development of digital financial inclusion in the four provinces and cities of the Yangtze River Delta. From the perspective of the enterprise scale, the median value is 19.90, a relatively high level compared to the minimum (11.00) and the maximum value (24.36). Substantial differences are observed in the sizes of sample enterprises.

Empirical Results

This study uses panel fixed effects to verify the relationship between digital financial inclusion and innovation performance (Models 1–3 in **Table 3**). The results of Model 1 show that after controlling for the related control variables and the enterprises and time fixed effects, digital financial inclusion has a positive and significant relationship with the innovation performance of high-tech enterprises ($p < 0.1$). The result is consistent with previous research results and theoretical analysis. The development of digital financial inclusion optimizes the financial environment. Technological innovation improves the convenience of corporate financing, promoting corporate R&D and improving high-tech enterprises' innovation performance. Hence, H1 is verified.

To examine the influence of digital financial inclusion on corporate innovation in different external financing scenarios, the effects of the interactions between digital financial inclusion, debt financing, and equity financing are considered.

The results of Model 2 indicate that the coefficient on the interaction between digital financial inclusion and debt financing is positive and significant at the 1% level. With an increase in the level of corporate debt financing, the role of digital financial inclusion in promoting corporate innovation performance also increases. The results of Model 3 show that the coefficient on the interaction between digital financial inclusion and debt financing is not statistically significant. Compared with equity financing, the higher the level of debt financing, the stronger the role of digital financial inclusion in promoting innovation performance. Hence, H2a is verified, while H2b is not. A possible explanation is that the approval procedures for external equity financing, such as additional issuance or allotment of Chinese listed companies, are complicated and demanding. Chinese firms cannot stably rely on equity financing as a source of funds. Hence, companies tend to focus on debt financing.

TABLE 4 | Coverage breadth and depth of use of digital financial inclusion and innovation performance.

	***X*: coverage breadth**			***X*: usage depth**		
Variables	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
X	0.022***	0.047***	0.082	2.644	2.13	−1.8
	(4.629)	(3.240)	(1.561)	(2.105)	(2.13)	(1.6)
loan		−0.001*			−3.65	
		(−1.845)			(3.85)	
X × *loan*		0.064*			−2.405	
		(1.197)			(3.20)	
sto			−0.166***			−0.9
			(−2.914)			(4.5)
X × *sto*			−2.171			−3.4
			(−0.937)			(3.1)
Control variables:	Control	Control	Control	Control	Control	Control
Year	Control	Control	Control	Control	Control	Control
ID	Control	Control	Control	Control	Control	Control
Constant	0.480	−2.171	0.156	5.500	−3.241	0.375
	(0.584)	(−0.937)	(0.188)	(−2.168)	(−0.995)	(0.846)
Observations	724	693	681	724	693	681
R-squared	0.413	0.534	0.537	0.184	0.123	0.129

*Robust standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.*

TABLE 5 | State-owned enterprises.

	(1)	(1)	(1)	(2)	(2)	(2)	(3)	(3)	(3)
Variables	**Innov**	**Innov**	**Innov**	**Innov**	**Innov**	**Innov**	**Innov**	**Innov**	**Innov**
fin	11.95***			9.32***			7.35***		
	(0.60)			(1.035)			(0.354)		
co		15.45***			14.62***			10.56***	
		(1.033)			(1.93)			(0.847)	
de			7.11***			2.88***			1.77*
			(0.392)			(0.445)			(0.654)
loan				12.57**	−4.86	23.91***			
				(3.29)	(4.62)	(2.08)			
fin × *loan*				0.19*					
				(0.068)					
co × *loan*					−0.03				
					(0.112)				
de × *loan*						0.42***			
						(0.03)			
sto							−9.11**	9.270***	10.79**
							(1.86)	(1.067)	(2.89)
fin × *sto*							0.32**		
							(0.05)		
co × *sto*								0.339***	
								(0.025)	
de × *sto*									0.38**
									(0.07)
Control variables:	Control	Control	Control	Control	Control	Control	Control	Control	Control
Constant	327.0**	396.75**	205.28**	272.30**	350.46*	154.33***	457.19**	547.62**	293.25***
	(67.99)	(95.82)	(39.27)	(68.31)	(110.79)	(22.66)	(97.20)	(113.66)	(46.74)
Year	Control	Control	Control	Control	Control	Control	Control	Control	Control
ID	Control	Control	Control	Control	Control	Control	Control	Control	Control
N	216	216	216	216	216	216	216	216	216
R-squared	0.67	0.716	0.559	0.688	0.727	0.601	0.697	0.743	0.605

*Robust standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.*

To further verify the relationship between digital financial inclusion, external financing, and corporate innovation performance, this study used the measurements proposed by Liao et al. (2020). In line with the trend of the China Digital Financial Inclusive Development Index, this approach acknowledges that the Digital Support Service Level Index has largely fluctuated since 2011. The proposed measures use the two first-level indexes of the coverage breadth (*co*) and usage depth (*de*) of digital financial inclusion to assess the development and impact of digital financial inclusion. **Table 4** shows the results for the interaction between the coverage breadth and usage depth of digital financial inclusion and external financing.

The results for the coverage breadth of digital financial inclusion show that when external financing is not considered, the breadth of coverage has a significant positive relationship with innovation performance ($p < 0.01$). The coefficient on the interaction between coverage breadth and debt financing is positive and significant at 10% level. With an increase in the level of corporate debt financing, the coverage of digital financial inclusion increases the promotion of corporate innovation performance, in line with previous results on the comprehensive DFIIC.

The results for the usage depth of digital financial inclusion indicate that when external financing is not considered, the positive relationship between the depth of use and innovation performance is not significant. The coefficient on the interaction with external financing is not statistically significant. This result may be due to the fact that although digital financial inclusion has been widely promoted in China, the degree of digitalization of enterprises is still low, and digitalization has not yet penetrated the production and operation stages. The impact of the usage depth of inclusive finance on corporate innovation remains to be verified over time.

THE NATURE OF CORPORATE OWNERSHIP

In a socialist system with Chinese characteristics, the relationship between digital financial inclusion, external financing, and

TABLE 6 | Non-state-owned enterprises.

	(1)	(1)	(1)	(2)	(2)	(2)	(3)	(3)	(3)
Variables	**Innov**	**Innov**	**Innov**	**Innov**	**Innov**	**Innov**	**Innov**	**Innov**	**Innov**
fin	0.95***			0.340*			0.331		
	(0.28)			(0.1718)			(0.349)		
co		1.074***			0.419*			0.379	
		(0.287)			(0.204)			(0.345)	
de			0.755**			0.202			0.457
			(0.324)			(0.176)			(0.36)
loan				5.27***	−5.10***	−5.17**			
				(1.674)	(1.562)	(1.91)			
fin × *loan*				0.112***					
				(0.02)					
co × *loan*					0.114***				
					(0.021)				
de × *loan*						0.102***			
						(0.025)			
sto							−0.299	−0.357	0.194
							(0.468)	(0.462)	(0.466)
fin × *sto*							0.039**		
							(0.017)		
co × *sto*								0.043**	
								(0.019)	
de × *sto*									0.019
									(0.014)
Control variables:	Control	Control	Control	Control	Control	Control	Control	Control	Control
Constant	67.37**	70.03***	62.19***	76.27**	−79.11**	70.18**	66.96**	68.61***	68.53**
	(19.84)	(20.31)	(20.26)	(31.47)	(32.94)	(31.34)	(23.209)	(22.529)	(25.69)
Year	Control	Control	Control	Control	Control	Control	Control	Control	Control
ID	Control	Control	Control	Control	Control	Control	Control	Control	Control
N	508	508	508	508	508	508	508	508	508
R-squared	0.18	0.182	0.171	0.2023	0.20378	0.1925	0.1974	0.198	0.189

*Robust standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.*

corporate innovation may vary due to differences in corporate ownership. Therefore, this study divides the sample into state-owned enterprises (SOEs) and non-SOEs and studies the effect of corporate ownership in the proposed theoretical model.

State-owned enterprises are mainly controlled by the government and are heavily supported by national policies. Hence, the R&D investment of state-owned high-tech enterprises is likely to be affected differently by economic policies. In addition, external financing is the main channel of R&D financing for SOEs. Since equity financing costs are relatively low and enjoy tax incentives, risk-averse SOEs are more inclined to equity financing. The results in **Table 5** indicates that for SOEs, the comprehensive DFIIC, coverage breadth, and usage depth all play a significant role in promoting innovation performance. The coefficient on the interaction between equity financing and the three indicators are positive and significant, while the effect of the interaction between debt financing and the coverage breadth of digital financial inclusion is not significant. It may be because for SOEs, the effect of equity financing is slightly higher than that of debt financing. The latter has not yet reached optimality in promoting innovation performance, and debt financing policies targeting SOEs still need improvement.

In contrast, non-state-owned firms mainly depend on the market for financing and face higher risks. Therefore, they typically have stronger risk tolerance than SOEs and focus on the economic utility of external funds, followed by the level of external financing costs. Therefore, the external financing of non-SOEs usually relies on debt financing methods, such as bank loans, for supporting R&D. The results in **Table 6** shows that for non-SOEs, the effect of the interaction between external financing and the comprehensive index of digital financial inclusion is consistent with the results for SOEs. In terms of the coverage breadth and usage depth, the coefficients on the interaction between debt financing and the three indicators are all positive and significant, while the interaction effects of equity financing and the usage depth of digital financial inclusion are not significant. In the external financing of non-SOEs, the effect of debt financing is slightly higher than that of equity financing, suggesting that non-SOEs' equity financing has not yet reached optimality in promoting innovation performance.

CONCLUSION

This study examines the relationship between digital financial inclusion and corporate innovation performance, as well as the relationship between external financing, financial inclusion, and corporate innovation, in the context of the digital economy. By introducing the inclusive digital finance coverage breadth and usage depth, we construct a research framework that links inclusive digital finance, external financing, and the innovation performance of high-tech enterprises. The regional data of three provinces and one city in the Yangtze River Delta are employed to study the interaction between digital financial inclusion and external financing. On this basis, we study the in-depth influence of the nature of corporate ownership.

The theoretical contribution of this research is twofold. First, by verifying the impact of the interaction between digital financial inclusion and external financing, this study enriches existing knowledge of digital financial inclusion and the path mechanism between innovation and innovation performance. Second, the study combines macro- and micro-level approaches. It addresses regional external financing channels, the development of digital financial inclusion, and micro-enterprise practices, clarifying the different mechanisms of action at play in the relationship between digital financial inclusion, external financing, and corporate innovation performance.

The research in this article also has certain shortcomings. The research scope belongs to regional research. In the future, the sample size can be expanded and further studies can be carried out on specific corporate practices.

Policy Recommendations

This study focuses on high-tech enterprises in the Yangtze River Delta, China. The integration of regional financial technology talents, technology, capital, and other resources is relatively complete in this region; hence, the problems reflected in its economic data are forward-looking and a reference for future research. This study proposes the following policy recommendations.

(1) Further strengthen the usage depth of digital financial inclusion and popularize the digital degree of financial inclusion at the technical level. In promoting innovation performance, the impact of the interaction between the usage depth of digital financial inclusion and external financing is not significant. Although digital financial inclusion has been widely promoted in the country, its degree of digitalization has not yet penetrated into the daily operations of enterprises in the Yangtze River Delta region.
(2) Further improving incentives for enterprises' external financing policies. The external financing strategy of high-tech enterprises should further refine specific measures based on the characteristics of corporate ownership. Equity financing can better promote the usage depth of digital financial inclusion in SOEs, while debt financing can promote the coverage breadth of non-SOEs. Therefore, support for high-tech companies should be further increased at the level of financing policy formulation.
(3) Technological innovation is the driving force behind the development of enterprises. R&D based on big data, AI, cloud computing, and other technologies should be further strengthened, and enterprises should be encouraged to use big data for technological upgrades and innovation. While strengthening technological innovation, it is necessary to nurture the long-term development of enterprises through the digital transformation of inclusive finance.

DATA AVAILABILITY STATEMENT

Publicly available datasets were analyzed in this study. This data can be found here: The Peking University Digital Financial Inclusion Index of China (PKU-DFIIC), available at https://idf.pku.edu.cn/zsbz/515313.htm.

AUTHOR CONTRIBUTIONS

Both authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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REFERENCES

Ajaz, A., Shenbei, Z., and Sarfraz, M. (2020). Delineating the influence of boardroom gender diversity on corporate social responsibility, financial performance, and reputation. *Logforum* 16, 61–74. doi: 10.17270/J.LOG.2020.376

Allen, F., Demirguc-Kunt, A., Klapper, L., and Peria, M. S. M. (2016). The foundations of financial inclusion: understanding ownership and use of formal accounts. *J. Financ. Int.* 27, 1–30. doi: 10.1016/j.jfi.2015.12.003

Ayyagari, M., Demirgüç-Kunt, A., and Maksimovic, V. (2011). Firm innovation in emerging markets: the role of finance, governance, and competition. *J. Financ. Quant. Anal.* 46, 1545–1580. doi: 10.1017/S0022109011000378

Berger, A. N., and Udell, G. F. (2006). A more complete conceptual framework for SME finance. *J. Bank. Finance* 30, 2945–2966. doi: 10.1016/j.jbankfin.2006.05.008

Cheng, X., and Gong, Q. (2020). How does digital financial inclusion affect the development of the real economy —Based on the analysis of the system GMM model and the intermediary effect test. *J. Hunan Univ. (Soc. Sci. Edn.)* 34, 59–67.

Ding, R., Liu, R., and Zhang, Q. (2019). Research on the impact and mechanism of digital inclusive finance on the development of service industry—an empirical analysis based on inter-provincial panel data. *Finance Econ.* 07, 4–10.

Egger, P. H., and Keuschnigg, C. (2017). Access to credit and comparative advantage. *Can. J. Econ.* 50, 481–505. doi: 10.1111/caje.12266

Fernandez, V. (2017). The finance of innovation in Latin America. *Int. Rev. Financ. Anal.* 53, 37–47. doi: 10.1016/j.irfa.2017.08.008

Gonzalez, L., and James, C. (2007). Banks and bubbles: how good are bankers at spotting winners? *J. Financ. Econ.* 86, 40–70. doi: 10.1016/j.jfineco.2006.07.004

Gruin, J., and Knaack, P. (2020). Not just another shadow bank: Chinese authoritarian capitalism and the 'developmental'promise of digital financial innovation. *New Polit. Econ.* 25, 370–387. doi: 10.1080/13563467.2018.1562437

Guo, F., Wang, J., Wang, F., Kong, T., Zhang, X., and Cheng, Z. (2020). Measuring China's digital financial inclusion: index compilation and spatial characteristics. *China Econ. Q.* 19, 1401–1418.

Guoqing, L., Zhou, W., and Chunyu, Z. (2014). Research on the performance of subsidizing innovation for Chinese strategic emerging industry. *Econ. Res. J.* 7, 44–55.

Hu, B., and Cheng, X. (2020). Financial technology, digital financial inclusion and national financial competitiveness. *J. Wuhan Univ. (Philos. Soc. Sci. Edn.)* 73, 130–141.

Hu, J., Jiang, H., and Holmes, M. (2019). Government subsidies and corporate investment efficiency: evidence from China. *Emerg. Mark. Rev.* 41:100658. doi: 10.1016/S0140-6736(19)30841-4

Li, C., and Zhao, X. (2016). Research on the effect of my country's high-tech enterprises' fiscal and tax incentives on R&D investment. *Tax. Res.* 2, 105–109.

Liao, J., Hu, Y., and Xiang, H. (2020). Does the development of digital financial inclusion ease corporate financing constraints? —Based on the moderating effect of corporate social responsibility. *J. Yunnan Univ. Finance Econ.* 36, 73–87.

Liu, X., Kong, X., Liu, C., and Wang, Q. (2019). Do government subsidies promote independent innovation of enterprises? *J. Cap. Univ. Econ. Bus.* 21, 85–93. doi: 10.3390/ijerph16173084

Liu, X., Song, H., and Fan, L. (2020). The signal transmission effect of government subsidies and enterprise innovation on investors' investment decisions. *Sci. Technol. Progr. Policy* 37, 26–33.

Meuleman, M., and De Maeseneire, W. (2012). Do R&D subsidies affect SMEs' access to external financing? *Res. Policy* 41, 580–591. doi: 10.1016/j.respol.2012.01.001

Neuhann, D., and Saidi, F. (2018). Do universal banks finance riskier but more productive firms? *J. Financ. Econ.* 128, 66–85. doi: 10.1016/j.jfineco.2018.01.011

Salancik, G. R., and Pfeffer, J. (1978). A social information processing approach to job attitudes and task design. *Adm. Sci. Q.* 23, 224–253. doi: 10.2307/2392563

Sarfraz, M., Shah, S. G. M., Ivascu, L., and Qureshi, M. A. A. (2020). Explicating the impact of hierarchical CEO succession on small-medium enterprises' performance and cash holdings. *Int. J. Finance Econ.* doi: 10.1002/ijfe.2289

Shah, S. G. M., Sarfraz, M., and Ivascu, L. (2021). Assessing the interrelationship corporate environmental responsibility, innovative strategies, cognitive and hierarchical CEO: a stakeholder theory perspective. *Corp. Soc. Responsib. Environ. Manag.* 28, 457–473. doi: 10.1002/csr.2061

Shah, S. G. M., Sarfraz, M., Fareed, Z., Rehman, M. A., Maqbool, A., and Qureshi, M. A. A. (2019). Whether CEO succession via hierarchical jumps is detrimental or blessing in disguise? Evidence from Chinese listed firms. *Zagreb Int. Rev. Econ. Bus.* 22, 23–41. doi: 10.2478/zireb-2019-0018

Shaikh, A. A., Glavee-Geo, R., and Karjaluoto, H. (2017). Exploring the nexus between financial sector reforms and the emergence of digital banking culture–Evidences from a developing country. *Res. Int. Bus. Finance* 42, 1030–1039. doi: 10.1016/j.ribaf.2017.07.039

Shen, H., Kou, H., and Zhang, C. (2010). An empirical study of financial development, financing constraints and corporate investment. *China Industr. Econ.* 6, 55–64. doi: 10.1371/journal.pone.0247549

Tang, W., Li, S., and Tao, Y. (2019). The development of digital inclusive finance and the upgrading of industrial structure—empirical evidence from 283 cities. *J. Guangdong Univ. Finance Econ.* 34, 35–49.

Wan, J., Zhou, Q., and Xiao, Y. (2020). Digital finance, financing constraints and enterprise innovation. *Econ. Rev.* 1, 71–83.

Wellalage, N. H., and Fernandez, V. (2019). Innovation and SME finance: evidence from developing countries. *Int. Rev. Financ. Anal.* 66:101370. doi: 10.1016/j.irfa.2019.06.009

Wu, S. (2019). Risk issues, regulatory challenges and development suggestions of digital financial inclusion. *Technoecon. Manag. Res.* 1, 66–69.

Xie, X., and Zuo, L. (2013). The characteristics of enterprise collaborative innovation network and innovation performance: a study on the mediating effect based on knowledge absorptive capacity. *Nankai Manag. Rev.* 16, 47–56.

Xie, X., She, Y., Zhang, H., and Guo, F. (2018). Can digital financial inclusion promote entrepreneurship? —Evidence from China. *Economics (Quarterly)* 4, 1557–1580.

Yi, X., and Zhou, L. (2018). Is the development of digital financial inclusion significantly affecting household consumption—micro evidence from Chinese households. *Financial Res.* 11, 47–67.

Yu, P., and Dou, J. (2020). Does the development of digital financial inclusion ease the financing constraints of SMEs? *Finance Account. Month.* 03, 140–146.

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Influential Pathways of Employees' Career Growth: Linkage of Psychological and Organizational Factors Based on Qualitative Comparative Analysis

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Implementing the "hierarchical diagnosis and treatment" system highlights the important role of general practitioners as "residents' health gatekeepers." Still, the low level of career growth always limits the realization of their service value. Inertial thinking uses a single factor to explain the complexity of career growth in previous studies; in fact, it isn't easy to assess whether the factor is a sufficient and necessary condition for a high level of career growth. Herein, we have used a set theory perspective to analyze the mechanism of influencing high-level career growth by combining psychological and organizational factors. This research aims to analyze causal complexity relationship between these conditions and results is analyzed in detail. We choose fuzzy-set qualitative comparative analysis (fsQCA) with a sample of 407 GPs to test 5 antecedent conditional variables that can affect their career growth. The variables include professional identity, self-efficacy, achievement motivation, training mechanism, and incentive mechanism. To ensure the universality and diversity of data, the samples were selected from community medical institutions in different regions of China. The results show that three pathways can affect the high career growth of GPs, and the optimal pathway A2 is the linkage matching of high incentive mechanism, high professional identity, high achievement motivation, and high self-efficacy. At the same time, we find that professional identity plays an alternative role in the three pathways. When professional identity is at a high level, as long as achievement motivation and self-efficacy are superior, or achievement motivation, self-efficacy, and achievement motivation are superior, a high level of career growth can be achieved. We broke the shackles of previous studies that only focused on the impact of single factors on the career growth of GPs. From the perspective of set theory, we use configurational thinking to construct Influential pathways of high career growth of GPs by integrating antecedents. The results can provide effective support for improving GPs' service ability and realizing their service value to protect residents' health.

Keywords: employees career growth, entrepreneurial psychological factors, organizational factors, configurational theory, influential pathways

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INTRODUCTION

With the rapid development of the economy and the continuous improvement of living standards, the residents' demands for health are getting higher and higher. However, the huge population is gradually showing the trend of an aging population and the prevalence of diseases in China (Yang et al., 2019; Zhang et al., 2021), which puts forward higher medical and health services requirements (Liu et al., 2019). How to protect and improve the health of residents is becoming an urgent issue. According to the actual situation, the government proposed the policy of "serious diseases into hospitals and minor diseases into communities" to realize the medical service system of community first diagnosis. On the one hand, it can alleviate the pressure of medical treatment in large hospitals (Meng and Pan, 2013). On the other hand, it can promote the development of community health service medical system (Liu et al., 2019; Zhou et al., 2020). As the core force of community development, general practitioners (GPs) play an important role as "residents' health gatekeepers," however, the low professional ability, the vague career goal development planning, and the lack of attention to humanistic care greatly hinder the process of their career growth (Wang et al., 2019), resulting in a serious mismatch between their lower service ability and their responsibilities (Zhang et al., 2020). It has formed such a situation that the GPs have not trusted the residents, and the community's first diagnosis policy is difficult to promote.

Career growth is a dynamic process, reflecting the direction and speed of the flow of individual professional values that influence practices (Hui and Graen, 1997). According to the guidance of the State Council of China, general practitioners are defined as comprehensive medical talents who can integrate prevention, health care, diagnosis, treatment of common/frequently occurring diseases and referral, patient rehabilitation, and chronic disease management (Liu et al., 2018). So, they are called the "residents' health gatekeepers" and show the characteristics of continuous and comprehensive medical services. Combined with the above definition, the career growth of GPs can be described as the process in which individuals develop along with more valuable career goals, continuously improve their professional ability, apply more emotions to their work, and bear more responsibilities and accept more challenges with the accumulation of experience.

The key to promoting the development of GPs' career growth is to explore its influencing factors deeply. The government has developed a training mechanism and incentive mechanism to enhance GPs' professional ability and mobilize their working enthusiasm to accelerate GPs' career growth. To improve the training quality of GPs, strengthen the construction of training bases and teaching staff, the National Health Commission and the education department have improved the training system and applied various training methods for GPs, such as standardized training, job-transfer training, directional free training and so on. In the document named "Opinions on reforming and improving the incentive mechanism of training and using general practitioners" issued by the General Office of the State Council, PRC on January 24, 2018, many preferential measures have been put forward for the career development of GPs based on salary and career planning, which has enhanced the sense of professional honor and adhered to the combination of spiritual rewards and material rewards. At present, most researchers are focusing on improving career growth and have summarized the correlated influencing factors from multiple perspectives (Ellis et al., 2020; Harris et al., 2020; Zhao et al., 2020). In general, career growth is a dynamic development process that is influenced by values and systems, divided into psychological and organizational levels.

At the psychological level, scholars mainly emphasize the important influence of professional identity (PI), achievement motivation (AM), and self-efficacy (SE) on career growth and have conducted in-depth studies. PI is the degree of consistency between the individual and his occupation or the perception of belonging to a certain occupation (Johnson et al., 2006), which is the basic element for realizing the value of life. The fundamental driving force for promoting GPs' career growth lies in the recognition and devotion of their role as "residents' health gatekeepers" (Johnson et al., 2006; Gu et al., 2019). The higher the PI, the greater the degree of responsibility and efforts of GPs for this profession, while the low PI will lose professional confidence and easily lead to job burnout (Li L. et al., 2020). AM is the desire to achieve a certain goal through efforts, which reflects the individual's preference for success, and it is the internal driving force to pursue success. The results of career growth depend on self-motivation and preference for success, and high AM easily enhances the desire to develop a high level of professional ability and accelerates the achievement of career goals (McClelland, 1976; Liu et al., 1991; Consoli et al., 2010). Generally, GPs with high AM have a strong professional ability, so they are more likely to be recognized and trusted in helping patients relieve pain and health guidance. Significantly, this sense of honor will stimulate their motivation to succeed, so as to achieve high career growth. SE is the judgment and self-confidence in one's ability to achieve a specific goal when facing difficulties (Bandura and Locke, 2003). SE is an important internal driving factor that can influence human behaviors and act as a lasting driving force for promoting career growth (Yao et al., 2013; Yoon and Christopher, 2016). GPs with high SE have a serious work attitude, stable mood, clear logic, and strong communication skills. They improve their skills and purify professional ethics to achieve high professional goals and professional ability.

The training mechanism (TM) and incentive mechanism (IM) have profound influences at the organizational level and have been subject to extensive research on career growth. For GPs, training can improve professional skills and humanistic qualities (Berkhof et al., 2011; Clayton et al., 2013; Stephen and Robert, 2016; Wang et al., 2017). The process of personal career growth needs to be recognized by organizations (Stephen et al., 2015; Laurence et al., 2016). Hence, the IM can guide and control individual behavior to mobilize enthusiasm (Campion et al., 2011; Peterson et al., 2019; Li X. et al., 2020), an effective driving force for GPs to achieve their career goals. Specifically, material incentives should ensure that the basic living needs of GPs can be satisfied (He and Long, 2011). Mental stimulation can produce strong emotional dependence, allowing GPs to obtain

additional happiness and identity from work (Zhang et al., 2014). In summary, high TM and IM can promote and stimulate the realization of GPs' professional goals, the improvement of professional ability and emotional investment.

According to the summary of the existing articles, we find a certain correlation between psychological and organizational factors. The scholar believes that the SE of enterprise managers is positively correlated with AM ($r = 0.55$, $P < 0.01$) (Yang and Gu, 2007). The PI of undergraduate nursing students is positively correlated with AM ($r = 0.42$, $P < 0.01$), and negatively correlated with the motivation of avoiding failure ($r = 0.38$, $P < 0.01$) (Jiang et al., 2014). The PI of male nurses has a positive impact on learning SE ($r = 0.28$, ~ 0.35, $P < 0.01$) (Zuo et al., 2011). It is found that there is a positive correlation1 between PI, AM, and SE, and the three factors can predict each other. It has been reported that improving the salary and welfare level of GPs can enhance their professional self-confidence and PI (Zhang et al., 2014). Regular training can effectively improve the professional identity, self-efficacy and achievement motivation of GPs (Jiang and Zhou, 2019). Therefore, psychological and organizational factors have the basic conditions for linkage.

However, the current research mainly focuses on a single level and does not comprehensively evaluate the multiple driving factors affecting the high career growth of GPs. The internal mechanism of collaborative interaction between the psychological and the organizational level affecting the career growth of GPs is relatively vague, and the influence pathways of multiple concurrent factors are ignored. The career growth of GPs is a complex process affected by the synergy of psychology and organization. Qualitative comparative analysis (QCA) uses the perspective of configuration analysis to explore and integrate the complexity of antecedent conditions, which can fully combine the advantages of quantitative and qualitative research (Yan et al., 2018; Du et al., 2021). As shown in **Figure 1**, five antecedent conditions, including PI, AM, and SE at the psychological level and IM and TM at the organizational level, are integrated to form a variety of configurations *via* QCA. Finally, based on the analysis of the reliability and validity of the research data, we conducted fuzzy set processing (calibration) and necessary condition analysis on the data according to the steps of FsQCA, so as to further analyze the configurations of high and non-high career growth of GPs.

MATERIALS AND METHODS

Sample

The data were collected in the form of online questionnaires between May and June 2020 on the Questionnaire Star platform. The questionnaires covered 20 provinces, four municipalities, and five autonomous regions by simple random sampling in China. The types of medical institutions of GPs included hospitals, community health service centers (stations), central health hospitals, township (town) health hospitals, village health clinics (stations), and clinics. Finally, 407 valid responses were obtained from 465 distributed questionnaires, yielding a validity rate of 87.53%. The sample covers hundreds of medical institutions in most provinces and cities of China (almost all types of medical institutions where GPs work). From the perspective of gender characteristics of the sample, the proportion of men and women is not much different, and the proportion of women is slightly higher, accounting for 52.09%. From the working years, age structure, education level, and position of the sample, 60.93% of the GPs have more than 10 years of working experience, 62.41% are over 40 years old, 69.29% have bachelor's degree, 10.32% have a graduate degree, and 93.36% have a senior professional title, which indicates that most of the GPs in the sample have senior working experience and high cultural quality. From the perspective of team size, 82.31% of the teams have more than 15 people, which indicates that most of the GPs in the sample has a large team size. Generally, the development of medical teams of this size is relatively mature and representative. The basic characteristics of the research sample are shown in **Table 1**.

Fuzzy-Set Qualitative Comparative Analysis Procedures, Methods, and Data Preparation

The American sociologist Ragin first proposed qualitative comparative analysis (QCA) in the 1980s (Ragin, 1987). The method aims to solve causal complexity and emphasizes that it is not just a single factor that affects the results. Significantly, from a holistic perspective, different pathways affecting the results are often obtained by exploring a combination of antecedent conditions. A new causal relationship was developed based on the QCA method—"Multiple concurrent causalities." The QCA method denies any form of constant causality and holds that the causality depends on the specific situation and configuration (Du and Phillip, 2021). Therefore, it is different from the mainstream statistical method of developing a single causal model that best fits the data. Instead, it focuses on the diversity and complexity of causality and determines the number and characteristics of different causal models among multiple comparable cases (Medina et al., 2017). QCA makes up for the deficiency of qualitative analysis and quantitative analysis. It not only conducts statistical analysis on the research object but also analyzes the whole research object. It can deal with a few case studies and solve the problems of causal complexity in a large number sample by configurational analysis.

In our study, 407 GPs included in a previous large-sample study were investigated (Du and Jia, 2017). However, to avoid the complication of the research results caused by too many conditions (Greckhamer et al., 2013), we selected the standard of 4–7 condition variables concerning the medium sample (10–50). We set five condition variables (professional identity, achievement motivation, self-efficacy, incentive mechanism, and training mechanism), they were selected to analyze the outcome variable (career growth). QCA mainly includes crisp-set QCA (csQCA) and fuzzy-set QCA (fsQCA). Herein, fsQCA was used for data analysis because of its universality and practicability. Specifically, fsQCA is based on "set theory" to analyze further the necessity and sufficiency of antecedent conditions and conduct condition configuration analysis.

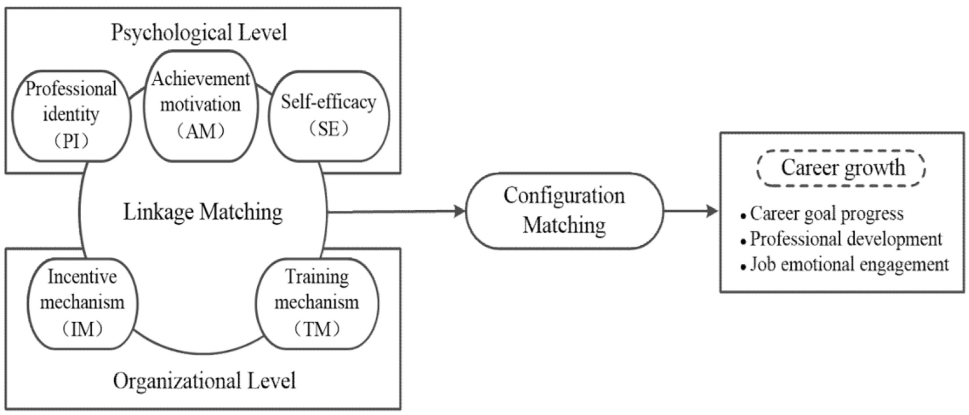

FIGURE 1 | Career growth driving mechanism model.

TABLE 1 | Basic characteristics of the research sample.

GP characteristics	Measurement items	Sample size	Percentage (%)
Gender	Male	195	47.91
	Female	212	52.09
Age	21–25 years old	14	3.44
	26–30 years old	44	10.81
	31–35 years old	40	9.83
	36–40 years old	55	13.51
	Over 40 years old	254	62.41
Working years	Less than 1 year	29	7.13
	1–3 years	39	9.58
	3–5 years	36	8.85
	5–10 years	55	13.51
	More than 10 years	248	60.93
Education level	High school and below	9	2.21
	Junior college	74	18.18
	Undergraduate	282	69.29
	Postgraduate	42	10.32
Team size	Fewer than 5 people	35	8.6
	6–10 people	17	4.18
	11–15 people	20	4.91
	15 people or more	335	82.31
Position	Medical assistant	27	6.63
	Resident	65	15.97
	Attending physician	139	34.15
	Others (chief physician, deputy chief physician, practicing assistant physician, etc.)	176	43.24

Measures and Calibrations for Set Membership

All variables were measured with a 5-point Likert scale. The three dimensions of career growth of GPs included progress toward vocational goals, development of professional ability, and emotional engagement in their positions, which was obtained *via* the form of semi-structured interviews (face to face) with 38 GPs (from 11 community hospitals in Zhenjiang City, Jiangsu Province) based on the grounded theory. Then, based on the career growth research scale developed by Weng and Hu (2009), a 12-item questionnaire was designed (an example item is "Basic medical work such as disease management has brought me closer to my career goals"). The results showed that Cronbach's alpha coefficient was 0.740, the AVE was higher than 0.5, and the CR was higher than 0.7. The minimum square root of 0.722 was greater than the maximum correlation coefficient of 0.114. Thus, the questionnaire showed good internal consistency reliability, content validity, and discrimination validity.

The single-dimension professional identity (PI) scale developed by Wei (2008), combined with the college teacher PI scale developed by Zhu (2012), was used in this study. There were five items in total (e.g., "I am proud of being a general practitioner").

The single-dimension achievement motivation (AM) scale developed by Zhou (2008), combined with the professional AM scale on science and technology talents developed by Wang et al. (2020), was applied in this study. There were five items in total (e.g., "I am willing to be challenged by more difficult tasks").

The single-dimension self-efficacy (SE) scale that was developed by Schwarzer et al. (1999) and translated and revised by Wang et al. (2001) was used in this study. There were six items in total (e.g., "I believe I can deal with unexpected things").

The four dimensions of the incentive mechanism (IM) scale summarized *via* the scale developed by Mao (2012) and the working characteristics of GPs were used in this study. There were four items total (e.g., "My unit will give us some kind of medal or honorary title").

The three dimensions of the training mechanism (TM) scale summarized *via* the training mechanism model developed by Liu (2013) and the Kirkpatrick training evaluation model were adopted in this study. There were six items in total (e.g., "The content and training methods are consistent with the job requirements").

In **Table 2**, the reliability and validity of each variable are presented. The Cronbach's alpha coefficients of all variables were greater than 0.7 (O'Leary-Kelly and Vokurka, 1998), indicating that the variables had excellent reliability. The factor loadings were all higher than 0.6, reflecting that the variables had outstanding convergent validity. Furthermore, the internal consistency reliability was greater than 0.75, and the AVE was greater than 0.5, indicating good discriminant validity among the variables.

In our study, the "direct method" was used to calibrate the original data. According to the measurement values of the 5-point Likert scale, we assigned the scale anchors 95, 50, and 5% as the thresholds for fully in, crossover, and fully out. The assignment criteria are shown in **Table 3**, and the calibrated sets were subordinate to 0–1. We conducted a sufficiency analysis following established QCA procedures by using a frequency benchmark $\geq$ 2, raw consistency benchmark $\geq$ 0.8, and a proportional reduction in inconsistency (PRI) $\geq$ 0.70 (Greckhamer et al., 2018).

RESULTS

Necessary Conditions Analysis

The necessary conditions needed to be tested before constructing the truth table (**Supplementary Table 1**). We conducted a fuzzy-set analysis of necessary conditions using a consistency benchmark of 0.90, the antecedent conditions exceeding the

TABLE 2 | Reliability and validity analysis results.

Variable	Dimension	Measurement standard	Loading	Cronbach's alpha coefficient	AVE	Internal consistency reliability
Career growth	Career goal progress	S1	0.775	0.841	0.640	0.842
		S2	0.849			
		S3	0.773			
	Professional development	S5	0.633	0.867	0.522	0.867
		S6	0.723			
		S7	0.736			
		S8	0.793			
		S9	0.727			
		S10	0.729			
	Job emotional engagement	S12	0.713	0.784	0.556	0.788
		S13	0.812			
		S14	0.700			
Professional identity	–	S15	0.797	0.899	0.689	0.913
		S16	0.908			
		S18	0.861			
		S19	0.602			
		S20	0.844			
Achievement motivation	–	S21	0.655	0.821	0.516	0.837
		S22	0.766			
		S23	0.753			
		S24	0.691			
		S25	0.725			
Self-efficacy	–	S26	0.655	0.901	0.627	0.907
		S27	0.775			
		S28	0.825			
		S29	0.887			
		S30	0.876			
		S31	0.651			
Incentive mechanism	–	S32	0.807	0.894	0.680	0.895
		S33	0.809			
		S34	0.846			
		S35	0.836			
Training mechanism	–	S36	0.830	0.946	0.750	0.947
		S37	0.832			
		S38	0.886			
		S39	0.886			
		S40	0.911			
		S41	0.853			

TABLE 3 | Fuzzy set calibrations.

Research variables		Threshold value		
		Fully out	Crossover	Fully in
Conditional variables	Professional identity (PI)	2.98	3.9	4.7
	Achievement motivation (AM)	3.14	4	4.7
	Self-efficacy (SE)	3.2	4	4.7
	Incentive mechanism (IM)	3	3.9	4.7
	Training mechanism (TM)	2.94	3.9	4.7
Outcome variable	Career growth	3.3	4.1	4.7

TABLE 4 | Analysis of necessary conditions for GPs career growth in FsQCA.

Sets of condition	Outcome variable	
	High career growth	Not-high career growth
Professional identity	0.899	0.532
∼Professional identity	0.489	0.843
Achievement motivation	0.854	0.506
∼Achievement motivation	0.519	0.845
Self-efficacy	0.842	0.516
∼Self-efficacy	0.513	0.819
Incentive mechanism	0.839	0.550
∼Incentive mechanism	0.518	0.785
Training mechanism	0.797	0.524
∼Training mechanism	0.554	0.806

TABLE 5 | Configurations for achieving GPs career growth (FsQCA).

Antecedent conditions	High career growth			Not-high career growth	
	A1	A2	A3	NA1	NA2
Professional identity (PI)	●	●	●		●
Achievement motivation (AM)	●	●	⊗	⊗	●
Self-efficacy (SE)	●	●	⊗	⊗	●
Incentive mechanism (IM)		●	⊗	⊗	
Training mechanism (TM)	⊗		⊗	⊗	⊗
Consistency	0.882	0.866	0.855	0.869	0.831
Raw coverage	0.436	0.808	0.416	0.756	0.387
Unique coverage	0.003	0.380	0.045	0.395	0.026
Overall solution coverage	0.861			0.782	
Overall solution consistency	0.855			0.833	

"●" indicates the existence of core causal conditions, "⊗" indicates the absence of core causal conditions, "•" indicates the existence of peripheral conditions, and "⊗" indicates the absence of peripheral conditions.

benchmark were considered a superset of the result variables. As shown in **Table 4**, no single variable was necessary for high career growth. Therefore, the antecedent conditions were entered in fsQCA to explore the configurations of high career growth.

Configuration Analysis

The fsQCA method can obtain three kinds of solutions: complex, intermediate, and parsimonious. The difference between these solutions lies in the configurational types included in the analysis scope when conducting Boolean minimization analysis. As the complex solutions are not simplified, more configurations are obtained, which is not conducive to analyze the result pathways. The parsimonious solution takes all the logical remainder into the simplification process, and it is easy to simplify the important necessary conditions. However, an important advantage of the intermediate solution is that it does not eliminate the necessary conditions. It retains the necessary conditions and can explain the configurational mechanism (Rihoux and Ragin, 2009). Therefore, the intermediate solution should be illustrated in QCA research (Zhang and Du, 2019).

The difference between the core and peripheral conditions lies in whether the antecedent conditions appear in parsimonious and intermediate solutions. If the antecedent condition exists, it is called the core condition and has an important influence on the result. If the antecedent condition only appears in the intermediate solutions, it is called a peripheral condition and plays an auxiliary role (Fiss, 2011).

According to the analysis of necessity, the single antecedent variable was weak in explaining the career growth of GPs. Therefore, five antecedent conditions were analyzed through fsQCA 3.0 to obtain the combination of antecedent conditions of career growth. According to the results, we analyzed psychological and organizational factors' influence pathways on career growth.

After processing the calibration results of 407 cases *via* fsQCA 3.0, we obtained three solutions, including complex, parsimonious, and intermediate. In **Table 5**, the intermediate solution was obtained based on the counterfactual analysis. It was assumed that the appearance of each condition variable could promote the career growth of GPs. According to the fsQCA method, three configurations (A1, A2, and A3) could produce high career growth, and the consistency indexes of the three configurations were 0.882, 0.866, and 0.855, respectively. The three configurations are all-sufficient conditions for high career growth. The consistency of the model solution is 0.855, which further indicates that the three configurations covering the majority of cases are sufficient conditions. The coverage of the solution is 0.861, indicating that they explain about 86% of the reasons for high career growth. Simultaneously, assuming that the absence of each condition variable may lead to not-high career growth, the fsQCA method shows that there are two configurations (NA1, NA2), and they cover the vast majority of cases, not only constituting sufficient conditions but also explaining the reasons for about 83% of not-high career growth.

High Career Growth Configurations of General Practitioners

(1) A1: PI*AM*SE*∼ TM

Regardless of whether the TM is perfect, as long as there is a high PI, clear AM, and strong SE, the career growth behavior of

GPs will be triggered. PI, AM, and SE are interconnected internal driving forces. High PI is the premise of achieving high AM and high SE. In detail, for GPs, the higher recognition of their role as "residents' health gatekeepers," the more efforts they will make to reduce disease incidence rates among patients and provide primary care services in the community, which will further strengthen their belief during the process of improving the ability to face challenges. In contrast, the more self-confident they are in achieving their established goals (possessing higher SE), the more motivated they will be to succeed. Simultaneously, they are willing to make more efforts to improve their professional ability and enrich their professional emotions (Wang et al., 2014; Schoen, 2015; Gong and Xue, 2020) to promote the generation of high PI.

(2) A2: PI*AM*SE*IM

As long as the IM of the organization is perfect, the internal driving forces of PI, AM, and SE can be stimulated to produce a comprehensive effect, which will induce the career growth behavior of GPs. The perfect IM is the external force for career growth. The formulation of regulations can fully mobilize the enthusiasm of GPs mainly from the material (promotion opportunities) and spirit (awarding medals) perspectives to meet their motivational needs and form a strong sense of happiness and belonging to produce a high PI (Wang et al., 2016). The higher the PI is, the stronger the goals, initiative, and persistence to pursue success. Therefore, GPs can respond positively and constantly seek solutions until the goal is achieved when facing difficulties and challenges.

(3) A3: PI*∼AM*∼E*∼IM*∼TMs

Regardless of whether AM is clear, SE is strong, and the IM and TM are perfect, as long as GPs have a high PI, which will lead to career growth behavior. PI is the individual recognition of the nature and content of one's occupation, and it is the individual basis for working hard and achieving organizational goals. With the intensification of medical system reform in China, GPs shoulder the responsibility of building a comprehensive and responsible health medical management mode of the "integration of first diagnosis and referral." PI is the internal driving force for individuals to realize their life value. The higher the PI is, the stronger the desire to achieve the established goals. It is possible to improve GPs' professional ability in various ways, accelerating their career growth.

By comparing the coverage indexes of the three configurations, it can be seen that A2 has the highest case coverage, which can explain 80% of the result variable. Therefore, it is more likely to produce high career growth of GPs, indicating most GPs obtain high career growth *via* the pathway. This fully shows that high PI, AM, and SE are the internal driving forces for GPs to achieve high career growth. These positive psychological factors serve as a solid bulwark against real problems such as low wages and distrust among residents. Meanwhile, the high IM can fully mobilize the enthusiasm of GPs. By formulating contract service policies, the government increases the income level of GPs. In addition, to broaden their career development pathways, specific posts are set up to encourage GPs to work at the grass-roots level so that their professional and managerial abilities can be fully trained. Therefore, according to the interaction of internal and external factors, it is easier to stimulate the high career growth of GPs.

Through a comprehensive analysis of the three configurations, PI as a core condition can directly affect the generation of high career growth of GPs in the A3 pathway. Due to the low skill level of GPs, they have not been trusted by residents. Low social status recognition makes them doubt their value and leads to job burnout. In recent years, China has gradually affirmed the importance of GPs, believing that they are "residents' health gatekeepers," and has begun to cultivate a large number of qualified GP's and establish a perfect team of GPs, to establish the social status of GPs and increase their PI. Meanwhile, it is found that there is a substitution effect of PI, AM, and SE in A1 and A2 pathways. When high IM existence or high IM and high TM simultaneous absence, it will produce high career growth. As a positive psychological factor, high PI, high SE, and high AM in pathways A1 and A2 are the internal driving forces affecting behaviors, which can effectively mobilize the subjective initiative and thus stimulate high career growth of GPs. China improves the skills of GPs to obtain high AM and SE. At the same time, it can improve the salary level to obtain high PI. Thus, the comprehensive effect of the three factors on high career growth is increased.

Not-High Career Growth Configurations of General Practitioners

There are two configurations, including NA1 and NA2, that can produce not-high career growth. Firstly, NA1 shows that whether PI exists or not, as long as lacking AM, SE, IM, and TM, GPs will not produce a high level of career growth. Secondly, NA2 shows that as long as lacking TM, even if there is a high PI, AM, and SE, GPs will not produce a high level of career growth. Lastly, through comprehensive analysis, it can be seen that NA1 and NA2 all show the same characteristics; that is, GPs' career growth is inseparable from the organization to develop a sound TM. As long as lacking TM, it will lead to not-high career growth. In recent years, China has successfully implemented the TM for GPs in Jiangsu and Guizhou Province. According to different GPs, various training strategies were formulated, such as continuing education and job transfer training, which can effectively improve their professional abilities to avoid not-high career growth of GPs.

CONCLUSION

In our study, 407 GPs from different regions in China were selected as samples. From the perspectives of psychology and organization, we constructed five antecedent conditions and used configurational theorizing and QCA to explore these multiple drivers of high career growth. The conclusions are as follows. The study found that there are three pathways of high career growth. The three interactive internal driving forces promote the development of high career growth, forming the pathway A1.

The IM, as an external force, acts on the internal driving force to stimulate the comprehensive effect of the three elements and can promote its adjustment and improvement at the same time. The linkage matching of internal and external factors to jointly promote GPs' high career growth, forming the pathway A2. The development of career growth is based on the understanding and recognition of the occupation, which directly affects the degree of goal setting and effort, forming the pathway A3. The A2 path explains 80% of the resulting variable. Therefore, it is the optimal path to produce high career growth for GPs. The pathways show that PI has a direct impact on high career growth in A3. Pathway A1 shows the comprehensive effect of three internal driving forces (PI, AM, and SE) to stimulate high career growth at the psychological level. Pathway A2 is formed by the interaction of psychological factors and organizational factors.

Theoretical Contribution

This study selected five key antecedent conditions at the psychological and organizational levels to investigate the driving mechanism of career growth for GPs. The previous studies were limited to the psychological or organizational level, but the internal mechanism of the synergistic effect from the two levels on career growth was unclear. Therefore, this study enriched psychological level findings by examining the organizational level and deeply analyzing the collaborative mechanism. This study not only found three pathways that affect career growth but also found a more efficient pathway. Simultaneously, it is emphasized that the career growth of GPs is not determined by a single factor but depends on the different antecedents of psychological and organizational factors. When explaining the inconsistency of SE on career growth conclusions, we may also consider the matching situation of other factors at the psychological level and organizational level or other factors, which is of great significance to improve the situation of inconsistent career growth research results due to the neglect of multiple factors in previous studies.

In terms of research method, previous regression analysis methods emphasized the net effect of a single factor on career growth but ignored the influence of interactions between and among different antecedent conditions. In this study, we used the QCA method to construct the configuration that influences career growth by integrating antecedent conditions, identifying the pathways and mechanisms of career growth through the influence of multiple concurrent factors, exploring the relationship among pathways, and analyzing mutual substitutions for different conditions.

In terms of methodology, we have reversed the previous situation which paying attention to the study of symmetry and ignoring the study of asymmetry. In our study, the asymmetric set relationship is used to replace the correlation relationship, and the causal complexity affecting the career growth of GPs is explained from the perspective of set theory.

Managerial Implications

To strengthen the relationship among the internal driving forces of career growth, it is necessary to improve the PI, AM, and SE of GPs. The stimulation of high AM and SE comes from the devotion and recognition of their occupation, but lower social recognition leads to lower PI. Therefore, it is significant to establish GPs' social image and improve their salary to stimulate high PI to form high AM and SE and achieve the best comprehensive effect.

It is very important to improve the IM and TM. By adjusting the structure and content from two aspects of material and spiritual incentives, the IM can consistently satisfy the conditions that can fully mobilize the enthusiasm of GPs, such as improving the performance evaluation system, increasing learning opportunities, and awarding honorary titles. The optimization of the TM should involve constant updates to content, such as paying attention to the fairness of assessment and the rationality of training design. The IM and TM are the effective external conditions that ensure the fundamental development of GPs' career growth (Harris et al., 2020).

Promoting the interaction between external forces and internal driving forces is the decisive factor in the career growth of GPs. The optimization of external forces is the premise that activates the internal driving forces to achieve comprehensive effects. The psychological factors can constantly be enhanced after the internal driving force is influenced by the perfect external forces. In addition, high internal driving forces interact with each other, which can form a chain of mutual influence to stimulate the perfection and optimization of external forces. Therefore, we explain the causal complexity affecting the career growth of GPs from the perspective of set theory, and use configuration thinking to construct the combination of antecedents and conditions. According to this theoretical basis, the external force and internal driving force exert a reciprocal and circular influence to ensure the sustainable and orderly development of the career growth of GPs, so as to implement the policy of "serious diseases into the hospital and minor diseases into the community," so that medical and health resources can better serve people's health.

Limitations and Future Research

This research with the five antecedent conditions for the career growth of GPs still has the following deficiencies. (1) Because the questionnaire respondents were from many different regions, the proportions of questionnaires returned from different regions were uneven. The research results may reflect problems in areas where the proportion of respondents was relatively small. (2) This study focused on the influence of psychological and organizational factors on the career growth of GPs. In the future, we will further study the impact of other factors at the psychological and organizational levels or the societal level on GPs' career growth.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding authors.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Committee of Jiangsu University, China. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

ZM contributed to the conception and research plan of the study. BG was responsible for data collection and analysis and manuscript writing. ML conducted research methodology guidance. ZL helped in writing the manuscript and editing. LY helped collect data. TL helped adjust the structure of the article and put forward guidance suggestions. All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.796454/full#supplementary-material

REFERENCES

Bandura, A., and Locke, E. A. (2003). Negative self-efficacy and goal effects resisted. *J. Appl. Psychol.* 88, 87–99. doi: 10.1037/0021-9010.88.1.87

Berkhof, M., Rijssen, H. J. V., Schellart, A. J. M., Anema, J. R., and van der Beek, A. J. (2011). Effective training strategies for teaching communication skills to physicians: an overview of systematic reviews. *Patient Educ. Couns.* 84, 152–162. doi: 10.1016/j.pec.2010.06.010

Campion, M. A., Fink, A. A., Ruggeberg, B. J., Carr, L., Phillips, G. M., and Odman, R. B. (2011). Doing competencies well: best practices in competency modeling. *Pers. Psychol.* 64, 225–262. doi: 10.1111/j.1744-6570.2010.01207.x

Clayton, J. M., Butow, P. N., Waters, A., Laidsaar-Powell, R. C., O'Brien, A., Boyle, F., et al. (2013). Evaluation of a novel individualized communication-skills training intervention to improve doctors' confidence and skills in end-of-life communication. *Palliat. Med.* 27, 236–243. doi: 10.1177/0269216312449683

Consoli, S. M., Cédric, L., Levy, A., Pouchain, D., and Laurent, S. (2010). Physicians' degree of motivation regarding their perception of hypertension, and blood pressure control. *J. Hypertens.* 28, 1330–1339. doi: 10.1097/hjh.ob013e32833815ee

Du, Y. Z., and Jia, L. D. (2017). Configurational perspective and qualitative comparative analysis (QCA): a new approach to management research. *Manag. World* 33, 155–167. doi: 10.3969/j.issn.1002-5502.2017.06.011

Du, Y. Z., Li, J. X., Liu, Q. C., Zhao, S. T., and Chen, K. W. (2021). Configurational theorizing and QCA from a complex and dynamic perspective: research progress and future directions. *Manage. World* 37, 180–197. doi: 10.19744/j.cnki.11-1235/f.2021.0042

Du, Y. Z., and Phillip, K. (2021). One size does not fit all: strategy configurations, complex environments, and new venture performance in emerging economies. *J. Bus. Res.* 124, 272–285. doi: 10.1016/j.jbusres.2020.11.059

Ellis, V., Tully, K., Gill, N., McLewin, A., and Clift, S. (2020). 'Creating health': evaluation of three arts for health training events for GP trainees. *Perspect. Public Health* 141, 287–294. doi: 10.1177/1757913920924440

Fiss, P. C. (2011). Building better causal theories: a fuzzy set approach to typologies in organization research. *Acad. Manage. J.* 54, 393–420. doi: 10.5465/amj.2011.60263120

Gong, W., and Xue, J. (2020). The impact of empowering leadership on employee's creativity: the role of individual learning and achievement motivation. *Technol. Econ.* 39, 21–29.

Greckhamer, T., Furnari, S., Fiss, P. C., and Aguilera, R. V. (2018). Studying configurations with qualitative comparative analysis: best practices in strategy and organization research. *Strateg. Organ.* 16, 482–495. doi: 10.1177/1476127018786487

Greckhamer, T., Misangyi, V. F., and Fiss, P. C. (2013). "Chapter 3- The two QCAs: from a small-N to a large-N set theoretic approach," in *Configurational Theory and Methods in Organizational Research (Research in the Sociology of Organizations*, Vol. 38, eds P. C. Fiss, B. Cambré, and A. Marx (Bingley: Emerald Group Publishing Limited), 49–75. doi: 10.1108/S0733-558X20130000038007

Gu, Y. D., Zhou, W. L., and Peng, J. S. (2019). Negative emotions and employee's creativity: moderating effects of organizational identity and professional identity. *J. Manag. Sci. China* 22, 21–35.

Harris, S. M., Binder, P. E., and Sandal, G. M. (2020). General practitioners' experiences of clinical consultations with refugees suffering from mental health problems. *Front. Psychol.* 11:412. doi: 10.3389/fpsyg.2020.00412

He, W., and Long, L. R. (2011). Research on incentive model of internal and external salary combination. *Manage. Rev.* 23, 93–101.

Hui, C., and Graen, G. (1997). Guanxi and professional leadership in contemporary Sino-American joint ventures in mainland China. *Leadersh. Q.* 8, 451–465. doi: 10.1016/S1048-9843(97)90024-2

Jiang, H. L., and Zhou, L. Q. (2019). Exploration on the cultivation of humanistic quality in the standardized training of general practitioners. *Chinas Health Ind.* 16, 154–155. doi: 10.16659/j.cnki.1672-5654.2019.05.154

Jiang, W. J., Zhang, W. W., and Wang, G. C. (2014). Effects of professional identity and achievement motivation on clinical practice behavior of undergraduate nursing students. *Chin. J. Pract. Nurs.* 30, 56–58. doi: 10.3760/cma.j.issn.1672-7088.2014.10.017

Johnson, M. D., Morgeson, F. P., Ilgen, D. R., Meyer, C. J., and Lloyd, J. W. (2006). Multiple professional identities: examining differences in identification across work-related targets. *J. Appl. Psychol.* 91, 498–506. doi: 10.1037/0021-9010.91.2.498

Laurence, C. O., Eley, D., Walters, L., Elliott, T., and Cloninger, C. R. (2016). Personality characteristics and attributes of international medical graduates in general practice training: implications for supporting this valued Australian workforce. *Aust. J. Rural Health* 24, 333–339. doi: 10.1111/ajr.12273

Li, L., Gan, Y., Yang, Y., Jiang, H., Lu, K., Zhou, X., et al. (2020). Analysis on professional identity and related factors among Chinese general practitioners: a national cross-sectional study. *BMC Fam. Pract.* 21:80. doi: 10.1186/s12875-020-01155-4

Li, X., Krumholz, H. M., Yip, W., Cheng, K. K., De Maeseneer, J., Meng, Q., et al. (2020). Quality of primary health care in China: challenges and recommendations. *Lancet* 395, 1802–1812. doi: 10.1016/s0140-6736(20)30122-7

Liu, L., Liao, X. Y., Wu, J., Deng, L., Xiong, M., and Zhuang, L. (2019). Research progress of general-specialty joint outpatient service. *Chin. J. Hosp. Adm.* 35, 915–918. doi: 10.3760/cma.j.issn.1000-6672.2019.11.008

Liu, X., Guo, Z., and Wang, L. (1991). A study on the relationship among achievement motivation, self-concept and students' academic achievement. *J. Psychol. Sci.* 20–23, 65–66. doi: 10.16719/j.cnki.1671-6981.1991.02.004

Liu, Y. X. (2013). *Research on Optimization of Employee Training Mechanism of AB Insurance Investment Company*. Beijing: Jiaotong University.

Liu, Y., Liu, N., Zhang, Q., Wang, C., Gu, Y., and Li, Z. (2018). Salary incentive policy for general practitioners in Britain and its reference significance. *Chin. Gen. Pract.* 21, 3033–3037. doi: 10.12114/j.issn.1007-9572.2018.25.002

Mao, Y. H. (2012). *Research on Incentive Mechanism of Medical Staff in Public Hospitals Under the Background of "New Medical Reform"*. Shanghai: East China University of Science and Technology.

McClelland, D. C. (1976). *The Achieving Society: With a New Introduction*. New York, NY: Halsted Press.

Medina, I., Álamos-Concha, P., Castillo Ortiz, P. J., and Rihoux, B. (2017). *Análisis Cualitativo Comparado (QCA)*. Madrid: CIS-Centro de Investigaciones Sociológicas.

Meng, X. M., and Pan, X. Y. (2013). Digital learning resources and general practitioner training under network environment. *Hebei Med.* 19, 1277–1280. doi: 10.3969/j.issn.1006-6233.2013.08.066

O'Leary-Kelly, S. W., and Vokurka, R. J. (1998). The empirical assessment of construct validity. *Oper. Manag.* 16, 387–405. doi: 10.1016/s0272-6963(98)00020-5

Peterson, G. M., Russell, G., Radford, J. G., Zwar, N., Mazza, D., Eckermann, S., et al. (2019). Effectiveness of quality incentive payments in general practice (EQuIP-GP): a study protocol for a cluster-randomized trial of an outcomes-based funding model in Australian general practice to improve patient care. *BMC Health Serv. Res.* 19:581. doi: 10.1186/s12913-019-4426-1

Ragin, C. C. (1987). *The Comparative Method*. Berkeley, CA: University of California Press.

Rihoux, B., and Ragin, C. (2009). *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques*. Thousand Oaks, CA: SAGE Publications.

Schoen, J. L. (2015). Effects of implicit achievement motivation, expected evaluations and domain knowledge on creative performance. *J. Organ. Behav.* 36, 319–338. doi: 10.1002/job.1982

Schwarzer, R., Mueller, J., and Greenglass, E. (1999). Assessment of perceived general self-efficacy on the internet: data collection in cyberspace. *Anxiety Stress Coping* 12, 145–161. doi: 10.1080/10615809908248327

Stephen, L. V., Heiko, W., and Melissa, A. A. (2015). Innovation through institutionalization: a service ecosystems perspective. *Ind. Mark. Manag.* 44, 63–72. doi: 10.1016/j.indmarman.2014.10.008.F

Stephen, L. V., and Robert, F. L. (2016). Institutions and axioms: an extension and update of service-dominant logic. *J. Acad. Mark. Sci.* 44, 5–23. doi: 10.1007/s11747-015-0456-3

Wang, C. F., Hu, Z. F., and Liu, Y. (2001). Reliability and validity of general self efficacy scale. *Appl. Psychol.* 7, 37–40. doi: 10.3969/j.issn.1006-6020.2001.01.007

Wang, G. W., Shi, X. X., and Man, D. P. (2016). Relationship between professional identity and social support of general practitioners in Shandong Province. *Chin. J. Public Health* 32, 818–820. doi: 10.11847/zgggws2016-32-06-25

Wang, J., Zhao, Q., Liu, T., An, M., and Pan, Z. (2019). Career orientation and its impact factors of general practitioners in Shanghai, China: a cross-sectional study. *BMJ Open* 9:e021980. doi: 10.1136/bmjopen-2018-021980

Wang, L. J., Dai, X. L., Jin, L., and Liu, Q. (2020). Can the talent titles enhance the motivation of scientific and technological talents' professional achievement—evidence from the construction of first-class universities in China. *Sci. Technol. Prog. Policy* 37, 153–160.

Wang, X. H., Feng, W., Qian, Y., Fang, W., Zheng, G., Wang, H., et al. (2017). Study of the formation mechanism and governance logic of the service motivation for community doctors' first contact. *Chin. J. Health Policy* 10, 57–64. doi: 10.1016/10.3969/j.issn.1674-2982.2017.04.010

Wang, X. Y., Lin, S., and Chen, L. Y. (2014). The mechanism of the root causes of challenge and hindrance pressure on scientific research performance: the mediating role of research anxiety and achievement motivation. *Sci. Sci. Manag. S T* 35, 23–30.

Wei, S. H. (2008). *Research on Teachers' Professional Identity. Doctoral dissertation*. Chongqing: Southwest University.

Weng, Q. X., and Hu, P. (2009). The structure of employees' career growth and its influence on turnover intention. *Ind. Eng. Manag.* 14, 97–104. doi: 10.3969/j.issn.1007-5429.2009.01.021

Yan, J. Q., Luo, J. L., and Jia, J. F. (2018). The influence of the linkage effect of organizational situational factors on dual leadership: a study based on QCA technology. *Sci. Sci. Manag. S T* 39, 150–160.

Yang, H., Han, J. J., and Xu, Y. L. (2019). The development, challenge and prospect of general practitioner team construction in China. *Chin. Gen. Pract.* 22, 2267–2279. doi: 10.12114/j.issn.1007-9572.2019.00.351

Yang, H. F., and Gu, J. P. (2007). A research on the emotional intelligence, self-efficacy and achievement motivation of business managers. *J. Psychol. Sci.* 30, 719–722. doi: 10.16719/j.cnki.1671-6981.2007.03.052

Yao, Y. C., Yao, W., Sun, J. F., Wang, W., and Lan, Y. J. (2013). Personality characteristics and general self-efficacy of medical staff. *J. Zheng Zhou Univ.* 48, 514–516. doi: 10.3969/j.issn.1671-6825.2013.04.023

Yoon, J., and Christopher, K. D. (2016). Employees' self-efficacy and perception of individual learning in teams: the cross-level moderating role of team-learning behavior. *J. Organ. Behav.* 37, 1044–1060. doi: 10.1016/10.1002/job.2092

Zhang, D. Y., Zheng, C. J., and Huang, X. (2014). Research of factors affecting professional identity of general practitioner and strategy. *Chin. Gen. Pract.* 12, 1836–1838. doi: 10.16766/j.cnki.issn.1674-4152.2014.11.005

Zhang, M., and Du, Y. Z. (2019). Qualitative comparative analysis (QCA) in management and organization research: position, tactics, and directions. *Chin. J. Manag.* 16, 1312–1323. doi: 10.3969/j.issn.1672-884x.2019.09.005

Zhang, T., Ren, J., Zhang, X., and Max, W. (2020). Medical and socio-demographic characteristics associated with patient-perceived continuity of primary care: a cross-sectional survey in Hangzhou, China. *Int. J. Health Plan. Manag.* 35, 569–580. doi: 10.1002/hpm.2967

Zhang, Y. C., Shang, D., Wang, L. L. (2021). Cultivation of medical and nursing combined with old-age service talents under the background of healthy aging. *Chin. Med. Ethics* 34, 776–780.

Zhao, W., Wang, R., Wang, Y., Zhang, M., and Yin, T. (2020). The necessity of medical humanities education to general practitioners: a brief review. *Iran. J. Public Health* 49, 2054–2059. doi: 10.18502/ijph.v49i11.4720

Zhu, F. P. (2012). *Research on Professional Identity and Organizational Identity of College Teachers in China*. Chengdu: Southwest University of Finance and Economics.

Zhou, Y., Shen, Q., Pan, Q., Tian, Y., Zhang, L., and Geng, J. L. (2020). Analysis on the current situation of general practitioners' demand for the "special-general" mode family doctor team in a district of Beijing. *Chronic Pathematol. J.* 21, 1636–1640.

Zhou, Z. T. (2008). An empirical study on the relationship between university teachers' achievement motivation and job performance. *Mod. Univ. Educ.* 4, 80–85+113.

Zuo, H. X., Xiong, X. M., and Li, Y. (2011). The relationship between male nurse students' mode of attribution and identify with vocation, self-efficiency of study, motivation of study. *Int. J. Nurs.* 30, 456–461. doi: 10.3760/cma.j.issn.1673-4351.2011.03.077

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Exploring the Relationship Between Value Modularity, Knowledge Transfer, and Firm Innovation Performance: Evidence From China

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This study aimed to explore the influence the value modularity and a firm's innovation performance, directly and indirectly, using knowledge management as mediating variable. Moreover, in this study, we used the resource integration ability as a moderator between the relationship value modularity and firm innovation performance. We collected data from the Chinese state-owned and state-controlled high-tech firms from 2011 to 2018. In this study, we used the gray comprehensive evaluation method to test the degree of value modularity, and hierarchical regression analysis is used to analyze the relationship among variables. The outcomes of this study indicate that value modularity and firm innovation performance has inverted U-shaped and significant association. Similarly, results also confirm that knowledge acquisition and knowledge internalization mediate the relationship between value modularity and firm innovation performance. The finding of this research also confirms that resource integration ability negatively affects the relationship between value modularity and firm innovation performance. This paper enriches the research of the value modularity and gives certain inspiration to knowledge management. At the end of this study, we also suggest some significant practical implications.

Keywords: firm's innovation performance, knowledge acquisition, knowledge internalization, value modularity, resource integration ability

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INTRODUCTION

Innovation is the driving force of national science and technology development. Similarly, technological innovations are the backbone of firm development. According to the Chinese National Bureau of Statistics survey data, 20.1% of Chinese firms have carried out innovation support. Moreover, from 20.1% the manufacturing and information technology service industry is taking 40% share. Corporate innovation with the participation of multiple subjects has become the main mode of technological breakthrough. Previous studies show that value modules are becoming a trend in the high-tech industries (Gaynor and Bradner, 2001; Zhu, 2003; Bendoly et al., 2004). Besides, innovation is gradually becoming a modularity process, product production, product design, and organization design gradually tend to be modularized. Under the trend of 3c industrial integration in the 1990s, the United States, Japan, and European countries used

modularity as a carrier to actively promote the adjustment and development of technology (Zhu, 2003). Modularity can be regarded as an external organization of firms, which can supplement the firm with heterogeneous knowledge (Cheng and Shiu, 2016). Baldwin and Clark (1997) believe that modularity can stimulate innovation, accelerate the rate of industrial change, and change the relationship between firms. Previous studies have also shown that modularity reduces the knowledge correlation between different divisions of labor within the system and promotes the growth of knowledge (Baldwin and Clark, 1997; Ravasz et al., 2018). Based on the SECI model, Nonaka and Tadeuchi (1995) regards the value module as a "ba" for storing knowledge, which promotes the efficiency of knowledge transformation and enhances the knowledge storage of the entire organization. Therefore, Chinese national policies encourage corporate innovation. As a new model of cooperating innovation, value modules have a close relationship with knowledge transmission. So, the management of its structure and internal knowledge transmission is vital to future industrial development. Thus, the literature suggests that value modularity has a positive and significant impact on knowledge transmission and firm innovation.

Prior studies indicate that that resource integration ability plays a positive role in the process of firm innovation (Mele et al., 2010; Pan et al., 2018). Edelman et al. (2010) claim that firm innovation depends on human, technological and financial resources. However, firms often face the problems of lack of innovation resources and low utilization of innovation resources that negatively affect the firm's innovation behavior (Rasool et al., 2019). Consequently, to ensure the implementation of innovative behaviors, firms inevitably strengthen the absorption, management, and utilization of resources (Wales et al., 2013). Thus, it is believed that resource integration ability is one of the firm abilities to enhance, and few scholars are skeptical about the active utility of resource integration ability. However, from the perspective of bounded rationality, high resource integration ability is not always an incentive for innovation entities. Prospect theory shows the bounded rationality perspective, which thinks subjects often follow the principle of risk aversion rather than the principle of maximizing benefits when they face risks (Rasool et al., 2021). In this theoretical context, strong resource integration ability will weaken the firms' risk aversion tendency. This is why when subjects face positive feedback, they tend to be "self-good," and the risk aversion of gains and loss is weakened (Jaworski and Kohli, 1991; Belschak and Hartog, 2010). This means that the incentive effect of resource integration ability is potentially negative, and it is important to reveal the mechanism of its occurrence.

In innovation activities, knowledge flow is an effective transmission mechanism (Dyer and Singh, 1998; Zhou and Wu, 2018). With the help of knowledge flow, the innovation subjects in the corporate organization absorb internal and external knowledge to improve technical abilities. Knowledge acquisition is a positive means of acquiring knowledge from the outside, and many studies have confirmed its positive role. (Inkpen, 1998; Mingliang and Bin, 2008; Zhou and Caroline Bingxin, 2012). However, with the increasing awareness of intellectual property protection, firms will strengthen the risk aversion of the loss of their core resources when facing the threat of knowledge leakage, which may be hindering the process of knowledge acquisition. Knowledge internalization is an important part of the firm learning process in a collaborative context, which is the most critical stage to transform external knowledge into valuable knowledge (Tsai et al., 2016; Wipawayangkool and Teng, 2016). Therefore, knowledge acquisition and knowledge internalization have been widely used to transfer knowledge from top management to support staff. It is important to study knowledge acquisition and knowledge internalization as the path to transmit the influence of the value modularity to firm innovation.

Based on the above debate, very few researchers have investigated the relationship between value modularity and firm innovation performance. In particular, the relationship between value modularity, resource integration ability, knowledge acquisition, knowledge internalization, and firm innovation performance still needs to be researched. Therefore, in this study, first, we investigated the direct relationship between value modularity and firm innovation. Second, we tested the moderating effect of resource integration ability between value modularity and firm innovation performance. Third, we explored the negative relationship of value modularity with knowledge acquisition. Fourth, we verified the knowledge acquisition mediating effect between value modularity and firm innovation performance. Fifth, we checked the mediating effect of knowledge internalization between t value modularity and firm innovation performance. Moreover, in this research, we used the prospect theory and information comparison theory to test the above relationships. However, the comprehensive aims of this study were to explore the process of knowledge flow in value modular and try to reveal the law of decision-making behavior of firms in the process of knowledge transmission, which provides theoretical support for guiding the firm behavior in the value module.

The structure of this study is as follows: Second part explained the theoretical framework and hypotheses development. The third part entailed the details about the research methods of this research. In the fourth part, the analysis and results were explained in detail. The fourth part includes a discussion. The fifth part was describing the conclusion and practical implications of the study. The last part was explaining the limitations and future research directions.

THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

The study of Kahneman and Tversky (1979) proposed the prospect theory based on the improvement of the classic expected utility theory in psychology. It believes that managers have limited theoretical behavior characteristics, and the performer makes decisions based on the existing experience and maximizes the value of the prospects. The previous studies based on the core content of prospect theory have verified the existence of reference dependence, risk reversal, loss aversion, diminishing

sensitivity, and framing effects in the process of user information search (Mansourian and Ford, 2007). There are also studies based on prospect theory, considering the behavior characteristics of participants under limited theoretical conditions, and improving and expanding the dynamic game evolution process under the interaction of government-firm-university institutes (Mindruta, 2013). Based on the risk aversion principle of prospect theory, this article can more realistically analyze the situation when subjects choose strategies that give a reasonable description of the degree of the risk appetite of decision-makers.

According to Aoki (2003) modularity is a complex subsystem composed of semi-autonomous subsystems interconnected with other subsystems and certain rules, reflecting the new industrial structure. Value modularity is a process of resource value re-integration among firms based on specialized knowledge division and core competitive advantages (Zhu, 2003). Prospect theory demonstrates that a firm's decision-making behavior is based on the psychological measurement of the risk-return relationship, which mainly follows the principle of loss aversion rather than the principle of profit maximization (Ariely et al., 2005; Gattringer et al., 2017). Whether a firm conducts resource exchange oriented by a conservative mentality or actively opening to the outside world is not necessarily linearly related to the intensity of value modularity but is related to the rational measurement process of the relationship between firm investment and risk (Maggi, 2006). Moreover, based on Cremer's information comparison theory, the process of the firm's profit-risk relationship can be described from the two perspectives of "information assimilation" and "information alienation" (Cremer, 1990). Through these two processes to prove the process of impact of value modularity on firm innovation performance. "Information assimilation" refers to the process of gradually reducing the heterogeneity of knowledge among firms through knowledge sharing. "Information alienation" refers to the process of a gradual increase in knowledge heterogeneity among firms. The superposition of the two processes is the total effect of value modularity on innovation performance.

Value Modularity and Innovation Performance

Generally, the value relationship between subjects within the cooperative organization is established, the trust and organizational coordination mechanisms are still in the teething stage, and it is not mature (Gattringer et al., 2017). In this stage, the relationship among subjects in a corporate organization is showing an upward trend. Value module as a corporate organization, firms in value module will increase the intensity and breadth of cooperation to seize the opportunity and focus on in-depth information exchanges to highlight their unique position in the value module (Schilling, 2000). Therefore, information sharing will be deepened, and this process is "information assimilation." Based on the principle of loss aversion, firms become more willing to cooperate actively and are willing to take the risk of becoming a sunk cost to avoid the loss of possible deeper cooperation (Levy and Levy, 2002). The better mobility of information within the value module increased and keep heterogeneous resources. It is more beneficial for firms to acquire valuable heterogeneous resources from the value module, and the possibility of firm innovativeness can be increased. The effective process of information integration, knowledge heterogeneity among firms is reducing day by day the reduce the firm's competitive advantage (Cremer, 1990). At this time, knowledge flow among subjects may cause firms to face greater potential losses than rewards. Due to knowledge sharing, the strong dependence among firms increases the loss aversion tendency, so firms can reduce learning-oriented cooperation to protect the loss of core resources. Based on the loss aversion principle, firms will change from information sharing to information defense. Thus, firms start up the process of "information alienation" to enhance the knowledge heterogeneity among firms. In this process, if information sharing will be delayed it will reduce the firm innovation performance. Based on the above literature we summarized that the degree of value modularity deepens, the impact of value modularity on firm innovation performance shows a trend of rising first and then suppressing. Therefore, we proposed below mentioned hypothesis.

H1: Value modularity has an inverted U-shaped influence on the firm innovation performance.

Moderating Effect of Resource Integration Ability

The existing studies demonstrated that firms with strong resource integration ability are easier to discriminate external heterogeneous resources, increasing the effectiveness of resource acquisition and improving resource utilization efficiency (Dyer and Singh, 1998; Bitar and Hafsi, 2007). Although this ability can also strengthen firms to adapt to market changes (Brush et al., 2001). It can reduce the take-off between gains and losses when firms face potential risks. This kind of take-off between gains and losses is risk aversion. As far as this risk aversion is concerned, the stronger the resource integration ability is, the weaker the risk aversion is. In the low-to-medium range, as the degree of information assimilation increases, the potential risks associated with information sharing will also gradually increase. Firms with strong resource integration ability are less risk aversion than those with low resource integration ability. Therefore, firms with strong resource integration ability are more likely to lose core resources and are not conducive to improving firm innovation performance.

From a medium to a high degree, the information assimilation among firms is strong, and the knowledge heterogeneity is weak. The high resource dependence among innovation subjects can enhance the firm's risk aversion. Based on the risk aversion principle, firms start to adopt the "defense" strategy to protect core resources and increase knowledge heterogeneity. At the time, it is even worse for firms with low resource integration ability. Specifically, the probability of firms getting valuable information from the value module is diminishing at this stage. If the resource integration ability is poor, resource acquisition and utilization efficiency are low, which intensifies the inhibitory impact of the high degree of value modularity on firm

innovation performance. In summary, the following hypotheses are proposed:

H2: Resource integration ability moderates between the relationship of value modularity and firm innovation performance.

Mediating Effect of Knowledge Acquisition

Knowledge transmission is the process by which the sender transfers knowledge resources to the receiver in a certain way. Previous studies have shown that knowledge acquisition is an important part of knowledge transmission, firms need to actively seek new knowledge to improve innovation performance (Inkpen, 1998; Singh et al., 2002; Sturgeon, 2002; Gebauer et al., 2012; Zhou and Caroline Bingxin, 2012). Firms can acquire knowledge from outside to enrich their knowledge base and thereby enhance the depth and breadth of their knowledge (Zhou and Caroline Bingxin, 2012). Next, firms can explore new market opportunities based on new knowledge to push innovation.

It has been claimed that knowledge acquisition requires an active approach, firms can openly interact with the business environment in this way, which is conducive to the acquisition of external knowledge (Li and Gao, 2021). Value modularity as this active approach provides a platform for the occurrence of knowledge acquisition (Sturgeon, 2002). In comparison with alliance networks, value modules are more tightly connected among firms. Strong relationships are likely to cause the risk of free-riding behavior or accidental spillover of information in cooperation. Based on the principle of loss aversion, strong relationships induce firms to worry more about the loss of core resources. So, firms will act defensively at this time. Firms may even identify the knowledge acquisition opportunities from external innovation subjects and then initiate knowledge desorption to hinder other learning-oriented firms acquire their core information. Resource capacity of the value module is reduced due to knowledge desorption, which is detrimental to the firms' acquisition of heterogeneous resources. Therefore, it is failed to the development of innovative activities. In summary, the following hypotheses are proposed:

H3: Value modularity has a negative influence on knowledge acquisition.

H4: Knowledge acquisition mediates the relationship between value modularity and firm innovation performance.

Mediating Effect of Knowledge Internalization

Knowledge internalization is used as the measure of knowledge transfer outcomes (Aquino and Castro, 2017). Knowledge internalization is first related to the ability to see value in the transferred knowledge. To understand the knowledge as something efficient and useful for organizational routine; to see the knowledge as valuable is the premise for motivation to learn and then appropriate knowledge. Otherwise, what we see is a ceremonial or formal adoption (Kostova and Roth, 2002) as previously. When heterogeneous resources are effectively utilized, firm innovation performance can be improved.

Knowledge internalization is a process by which the innovation subject transforms the externally acquired knowledge into its own explicit or tacit knowledge (Escribano et al., 2009). Knowledge internalization is also seen as a process of searching for valuable knowledge from externally acquired knowledge and transforming and applying it (Goldberg et al., 2006). Value modules have closer linkages than alliance networks, and the heterogeneity of knowledge among firms is higher. Therefore, firms have a greater chance to obtain valuable information from value modules, which would accelerate the process of knowledge internalization. Below mentioned **Figure 1** presents the comprehensive theoretical framework of this study. Based on the above discussion, the following hypothesis is proposed:

H5: Knowledge internalization mediates between the relationship of value modularity and firm innovation performance.

RESEARCH METHODOLOGY

Data Sources

This paper selects the data of Chinese state-owned and state-controlled high-tech firms from the 30 provinces and municipalities (Tibet was excluded due to incomplete data). With the beginning of a new round of scientific and technological revolution, fierce international competition, and China's increasing international influence have put forward higher requirements for Chinese industrial structure, leading position, and technological creativity. Chinese state-owned or state-controlled high-tech firms are responsible for major technological breakthroughs in important strategic areas such as manned spaceflight, deep-sea exploration, high-speed railways, domestically produced aircraft, and mobile communications, which are the vanguard of national innovation and development. Among the top 100 firms of the world in 2020, the total number of Chinese firms ranked first, and state-owned firms accounted for 66.71% of the shortlisted Chinese firms. Chinese high-tech firms will face new market opportunities and challenges, value modules as a new industrial structure play an important role in the future international competition (Cheng and Shiu, 2016). Therefore, it is necessary to study the degree of value modularity of state-owned or state-controlled high-tech firms and the process of knowledge flow and value generation within the organization.

The data sources are as follows: first, the data for the evaluation of the value modularity as the independent variables are mainly from China Statistics Yearbook on High Technology Industry and China Torch Statistical Yearbook from 2012 to 2019, and few data comes from the China National Data Information Statistical Website. The evaluation indexes are shown in **Table 1**. Second, user engagement data was obtained from the Baidu index search of the keyword "state-owned firms," and the annual average of the Baidu index was selected to measure the user engagement. Finally, the data of dependent variables, independent variables,

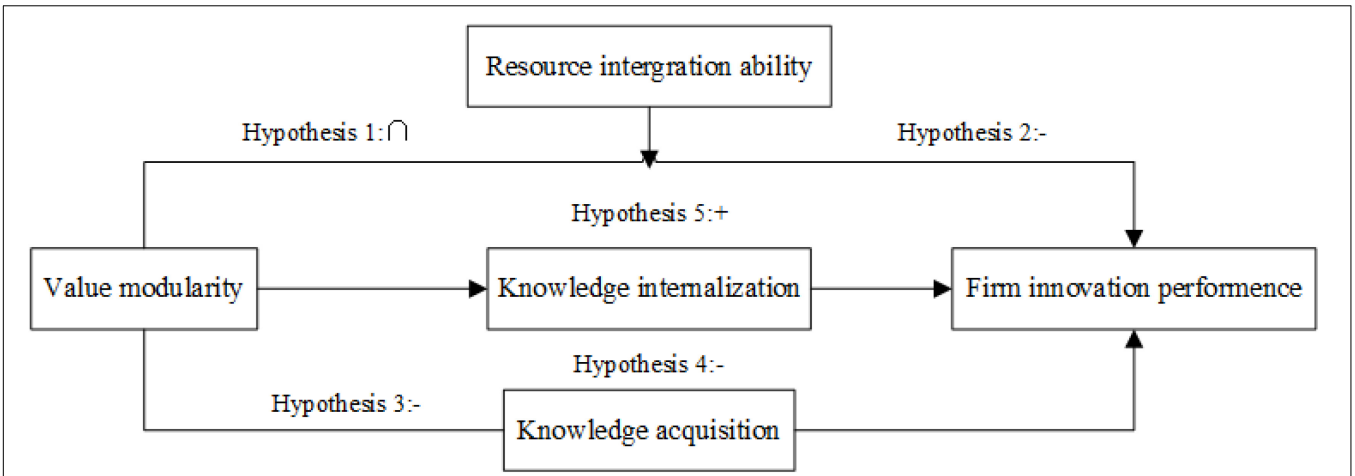

FIGURE 1 | Theoretical Model.

TABLE 1 | Evaluation indicators of value modularity.

Module composition	Innovation subject	Level 1	Level 2	Serial number	Unit
Manufacturing value module	Core manufacturing firms; Upstream and downstream firms	R&D status	Number of in-house R&D facilities	X_1	Individual
			New product development projects	X_2	Individual
			Number of patent applications	X_3	Individual
		Element accumulation	R&D full time personnel equivalent	X_4	Individual
			R&D input	X_5	Million yuan
		Collaborative innovation	Percentage of R&D external expenditures	X_6	Million yuan
Integrated value module	Core manufacturing firms	Knowledge sharing level	External knowledge acquisition expenses	X_7	Million yuan
		Level of knowledge alienation	Rate of change of digestion and absorption expenditures versus external technology acquisition expenditures	X_8	Million yuan
Service value module	Government	Government involvement	R&D investment government funding	X_9	Million yuan
Customer value module	Customer	User participation	The annual average value of the Baidu search index for state-owned firms	X_{10}	/

moderating variables, and control variables were obtained from China Statistics Yearbook on High Technology Industry from 2012 to 2019. The original data were first calculated and then subjected to hierarchical regression analysis.

It is important to better evaluate the organic nature of value modularity. Regarding existing literature, this study divides the value module into four parts, including manufacturing value module, integration value module, service value module, and customer value module. From these four aspects, the process of the resource sharing of the innovation subjects in the value module is evaluated (Adner and Kapoor, 2010; Feng and Wei, 2011) (as shown in **Table 1**). To obtain the marginal revenue, firms decompose the technical elements in a modular manner. The manufacturing value module mainly includes manufacturing firms such as upstream suppliers. For manufacturing firms, their research and development (R&D) capabilities play an important role. Manufacturing firms need to improve the overall technical level of value modules according to the requirements of integrators (Cui et al., 2014). Therefore, R&D level and factor accumulation are used as evaluation indicators for manufacturing value modules. The integrated value module mainly includes system integrators such as service firms. They concentrate on designing and formulating specific modules, then through cooperation with external firms, the resources of other firms can be used flexibly to obtain competitive advantages. Most of the system integrators are in the core position of value module by paying close attention to the demand trends of consumers, and they stimulate distribution structure, technical requirements, and interface standards of their products. With knowledge as the source of innovation, the level of knowledge sharing and knowledge alienation of integrated firms play a key role in promoting the structural maturity of value modules and accelerating resource reserves. Therefore, knowledge sharing and knowledge alienation are selected as the evaluation indicators of the integrated value module. The service value module and customer value module are measured by government involvement and user involvement, respectively.

Research Approach

This paper used two research methods. The first was the gray comprehensive evaluation method. It was based on the

gray relational theory to evaluate the efficiency of complex systems with complex and incomplete information. Some scholars use the gray comprehensive evaluation method to evaluate an innovation ecosystem; previous scholars use it to evaluate a scientific and technological achievement evaluation system. Since value modularity is an uncertain and dynamically changing complex system, it is more appropriate to evaluate it through the gray comprehensive evaluation method.

First, we established an evaluation index set and select evaluation objects; second, the evaluation index for each object is determined. We supposed that the member of evaluation objects is m, and the number of the evaluation indicators of each evaluation object is n. Y_{ij} denotes the best value of the i value module at the j evaluation index:

$$Y_{ij}(i = 1, 2, ..., m; j = 1, 2, ..., n)$$

Which is:

$$\begin{bmatrix} y_{11} & y_{12} & \cdots & y_{1n} \\ y_{21} & y_{22} & \cdots & y_{2n} \\ \cdots & \cdots & \cdots & y_{mn} \\ y_{m1} & y_{m2} & \cdots & y_{mn} \end{bmatrix}$$

Next, we performed dimensionless processing on the data. Y'_{ij} is the data after dimensionless processing, Y_{max} denotes the maximum value in Y_{ij} $(i = 1,\ 2,\ 3, \ldots\ m;\ j = 1,\ 2,\ 3, \ldots\ n)$. The processing method is:

$$Y'_{ij} = \frac{Y_{ij}}{Y_{max}}$$

Finally, the gray relational degree is calculated:

$$r_i = \sum_{j=1}^{n} w_j \frac{min_i min_j |Y'_{ij} - Y_{ij}| + \varepsilon max_i max_j |Y'_{ij} - Y_{ij}|}{\varphi_{ij} + \varepsilon max_i max_j |Y'_{ij} - Y_{ij}|}$$

The second method used was hierarchical regression analysis. The hierarchical regression analysis method was to separately analyze and compare two or more regression models, which were usually used in the study of mediation or regulation. The theoretical model constructed in this paper has moderating variables and intermediate variables, so the simple regression analysis model cannot satisfy the verification of the theoretical model in this paper. By using the hierarchical regression analysis method, the main effect, moderating effect, and mediating effect models can be separately analyzed and compared.

Variable Measurement

The dependent variable was firm innovation performance. The independent variable was value modularity. The moderating variable was resources integration ability. The mediating variables were knowledge acquisition and knowledge internalization. The control variable was the market size, level of R&D investment, and R&D subsidies. All variables and definitions of variables are shown in **Table 2**.

The dependent variable was firm innovation performance. Innovation refers to the innovation of the products sold and the innovation of technology and craftsmanship in the production process (Organisation for Economic Co-operation and Development [OECD], 2007). Innovation performance refers to a quantitative term for the degree of horizontal innovation performance. The patents and new product sales revenue are commonly used by scholars to measure firm innovation performance. In this paper, the new product sales revenue is used as a proxy variable for firm innovation performance. There are two reasons to choose new product sales revenue as the measurement standard: first, despite there being a certain limitation using the sales revenue of new products as the measurement method, a large number of studies have proved their validity as a measure of firm innovation performance. Second, the sales revenue data of new products of China's state-owned or state-controlled high-tech firms in various regions or municipalities are easier to obtain, while the patent data of each province is less statistically available.

TABLE 2 | Variable statistics table.

Variable	Definition
Firm innovation performance	New product sales revenue
Value modularity	The innovation subject in the value module enhances the process of enterprise innovation through resource sharing (As shown in **Table 1**)
Knowledge acquisition	The ratio of R&D external expenditures to total R&D expenditure
Knowledge internalization	The expenditure on digestion and absorption of technology
Resource integration ability	The rate of change of internal R&D expenditures to external technology acquisition expenditures
Market size	The ratio of main business revenue to the number of firms with R&D investment
R&D investment level	The R&D input of state-owned and state-controlled firms
R&D subsidy	The rate of change in labor costs in R&D internal expenditures

The independent variable was value modularity. Previous Authors pointed out that value modularity is a dynamic and continuous process (Wu and Park, 2009). Managers have gradually realized that achieving strategic mutual trust in an organization is the key to improving the efficiency of resource sharing. The value module as an innovative organization has closer connections among subjects, and the evaluation of value modularity is actually to evaluate the effect of the resources flowing among subjects within the value module. Following previous studies, this paper sorts out the evaluation indicators that are shown in **Table 1**. The gray evaluation method is used to evaluate the level of the value modularity. The measurement method is as follows:

The paper selected 30 provinces and 10 evaluation indicators. Assuming the set of evaluation indicators is $x = \{x_1,\ x_2,\ x_3, \ldots\ x_{10}\}$, and the level of value modularity of the i at the j evaluation indicator is denoted as $Y_{ij}(x_{ij} = 1,\ 2,\ 3, \ldots\ n;\ j = 1,\ 2,\ 3, \ldots m)$. In terms of evolutionary time series, the evaluation indicators at different

times from 2011 to 2018 constitute eight ecological spaces of 10×30, $E = x_i = \{x_1, x_2, x_3, \ldots, x_8\}$.

Gray correlation degree of value modularity can be calculated by

$$r_i = \sum_{j=1}^{n} w_j \frac{min_i min_j |Y_{ij}^{'} - Y_{ij}| + \varepsilon max_i max_j |Y_{ij}^{'} - Y_{ij}|}{\varphi_{ij} + \varepsilon max_i max_j |Y_{ij}^{'} - Y_{ij}|} \quad (1)$$

According to the previous calculation methods, in this research, the value of formula (1) is equal to 0.5, the model parameter ε can be derived. Then it is necessary to bring ε into formulation (1) to calculate r_i (r_i as the independent variable "value modularity").

Moderating variable is resource integration ability, which is expressed as the rate of change of internal R&D expenditures to external technology acquisition expenditures (Zott et al., 2011). Resource integration refers to the ratio of the funds consumed by new knowledge and technology acquired from outside to the funds consumed by using new knowledge and technologies.

Mediating variables are knowledge acquisition and knowledge internalization. Knowledge acquisition is measured by the ratio of R&D external expenditures to total R&D expenditure. Digest and absorb technology expenditure are used as an evaluation indicator of knowledge internalization. In the China Statistics Yearbook on High Technology Industry, the expenditure on digestion and absorption of technology is defined as the cost incurred in the mastery, application, or reproduction of foreign technology.

Three control variables are set. First, there is a constraining or facilitating effect of the high-tech market size on R&D activities (Miotti and Policy, 2003; Miotti and Sachwald, 2003). Generally, if a certain industry has a larger market scale in a region, the innovation investment in that region is correspondingly higher. Vice versa, the innovation investment is low. Based on the consideration of stakeholders, the key influencing factor of market size is selected as the control variable. Market size is measured by the ratio of main business revenue to the number of firms with R&D investment. Second, the R&D investment level is expressed by the R&D input of state-owned and state-controlled high-tech firms. The R&D input varies widely among regions in China and needs to be controlled. The southeastern coastal region has a leading level of economic development and a stronger governmental emphasis on innovation. As a result, industries have richer innovation resources, more sufficient innovation funds to support innovation, and tend to invest more in innovation. In comparison, the northwest has a more backward level of economic development and lower innovation investment. Finally, R&D subsidy is expressed by labor cost than R&D internal funding expenditure. China Statistical Yearbook on High Technology Industry defines R&D internal expenditure as the actual expenditure of the survey unit for internal R&D activities (basic research, applied research, and experimental development). It includes direct expenditures for R&D project activities and indirect expenditures for R&D activities such as management fees, service fees, R&D-related capital construction expenditures, and outsourcing processing fees. Some studies have found that R&D subsidies influence firms' innovation performance (Dong et al., 2016). Different regions have different levels of financial subsidies, and subsidies are the most direct motivation for firms to innovate. Therefore, it is necessary to control the variable of R&D subsidies in various regions.

Variable Statistics

The data of value modularity is as shown in **Table 3**. This part visualizes the original data of independent and dependent variables, as shown in **Figures 2**, **3**. These figures show the degree of value modularity and innovation level of state-owned and state-controlled high-tech firms in various regions or municipalities in China. There is a preliminary understanding of the status of cooperative innovation in various regions or municipalities in China.

Figure 2 shows that the sales revenue curve of new products of state-owned and state-controlled high-tech firms in various regions or municipalities in China from 2011 to 2018. It can be seen from **Figure 2** that the sales revenue of new products of state-owned and state-controlled high-tech firms in Guangzhou has been leading the way, and the increase has been the largest in the past few years, from about 1400 billion yuan in 2011 to about 2500 billion yuan in 2019. There is an increase of about 1100 billion Chinese RMB. Besides, the sales revenue of new products of state-owned and state-controlled high-tech firms in Beijing, Shanghai, Liaoning, Jiangsu, Zhejiang, Hubei, and Sichuan is higher than that of other regions or municipalities. This shows that the innovation performance of these regions is high and highlights the innovation vitality and the strong emphasis on innovation by local governments in these regions.

Figure 3 is a curve diagram of evaluation results of the value modularity of state-owned and state-controlled high-tech firms in various regions or municipalities in China from 2011 to 2018. Through the grayness evaluation method, the value range of the measured value modularity is between 0 and 1. It can be seen that the degree of value modularity is still the highest in Guangzhou, even close to 0.9 in 2018. In addition, the degree of value modularity in the five regions of Beijing, Shanghai, Zhejiang, Fujian, and Hebei all exceeded 0.7 in 2018. Therefore, the degree of value modularity in the five regions of Liaoning, Jiangsu, Sichuan, Chongqing, and Shanxi all exceeded 0.6 in 2018. Thus, the following three points can be drawn. First, it can be seen from these data that Guangdong, as a gathering place for promising young people, has the most innovative vitality, and spontaneous cooperative innovation has been stimulated. Second, the cross-regional cooperation and innovation in the Yangtze River Delta are the most prominent. Shanghai, Jiangsu, and Zhejiang all have a high degree of value modularity and a large increase. Finally, in addition to the coastal areas, the inland of Hubei, Sichuan, and Fujian are more prominent in innovation and development and have great development prospects.

RESULTS AND ANALYSIS

Data Analysis

In this study, Stata 16 (StataCorp, California, CA, United States) was used to conduct descriptive statistics and correlation tests,

TABLE 3 | Value modularity datasheet by regions.

Region	2011	2012	2013	2014	2015	2016	2017	2018
Beijing	0.6691	0.6841	0.6669	0.6758	0.6961	0.6879	0.6983	0.7092
Tianjin	0.5581	0.5018	0.5371	0.5321	0.5128	0.5556	0.6638	0.6221
Hebei	0.5095	0.5024	0.5089	0.5263	0.5062	0.5064	0.5453	0.5628
Shanxi	0.4234	0.4469	0.4139	0.4484	0.4203	0.4345	0.4526	0.51
Inner Mongolia	0.4648	0.471	0.456	0.432	0.4113	0.4716	0.471	0.4732
Liaoning	0.5541	0.557	0.5721	0.5951	0.5951	0.6199	0.6304	0.6367
Jilin	0.4993	0.5103	0.572	0.5888	0.533	0.5524	0.5774	0.5847
Heilingjiang	0.4862	0.5238	0.521	0.5115	0.5033	0.5638	0.575	0.5843
Shanghai	0.691	0.7009	0.6688	0.7049	0.6859	0.7193	0.6549	0.6585
Jiangsu	0.6238	0.6985	0.646	0.6813	0.6953	0.7022	0.693	0.7388
Zhejiang	0.6751	0.7768	0.7449	0.7882	0.8142	0.8086	0.8278	0.8368
Anhui	0.5145	0.5678	0.6096	0.5805	0.5518	0.5359	0.542	0.5837
Fujian	0.6245	0.7091	0.7064	0.7088	0.7134	0.7179	0.7176	0.7135
Jiangxi	0.4728	0.4846	0.4737	0.5104	0.5724	0.5057	0.5711	0.5643
Shandong	0.5718	0.5142	0.5888	0.5469	0.5254	0.5448	0.5833	0.5735
Henan	0.5393	0.5899	0.5855	0.5805	0.6194	0.6217	0.5899	0.5747
Hubei	0.6297	0.6633	0.6383	0.6327	0.6832	0.6366	0.6387	0.7112
Hunan	0.6149	0.685	0.6522	0.6754	0.6519	0.6772	0.6731	0.6717
Guangdong	0.7163	0.7655	0.8141	0.8628	0.8357	0.8495	0.8712	0.8904
Guangxi	0.5275	0.5226	0.5229	0.5453	0.5349	0.5379	0.5424	0.5683
Hainan	0.4243	0.4128	0.4086	0.4732	0.492	0.494	0.4946	0.4934
Chongqing	0.5185	0.5829	0.5554	0.5551	0.6233	0.6204	0.6264	0.6125
Sichuan	0.6034	0.6119	0.6217	0.6286	0.6614	0.6619	0.6644	0.6682
Guizhou	0.433	0.447	0.4948	0.4613	0.4634	0.4688	0.4727	0.4751
Yunnan	0.4979	0.4822	0.4699	0.5037	0.5263	0.5117	0.5175	0.592
Shanxi	0.5923	0.5489	0.5933	0.6096	0.6092	0.6609	0.6733	0.6392
Gansu	0.4933	0.4881	0.4857	0.4901	0.4948	0.5034	0.5111	0.508
Qinghai	0.4375	0.4517	0.4492	0.4986	0.4983	0.4964	0.5162	0.5178
Ningxia	0.4809	0.4959	0.4825	0.4986	0.4983	0.4964	0.5073	0.507
Xinjiang	0.4031	0.4437	0.4492	0.4425	0.4562	0.4582	0.4809	0.4796

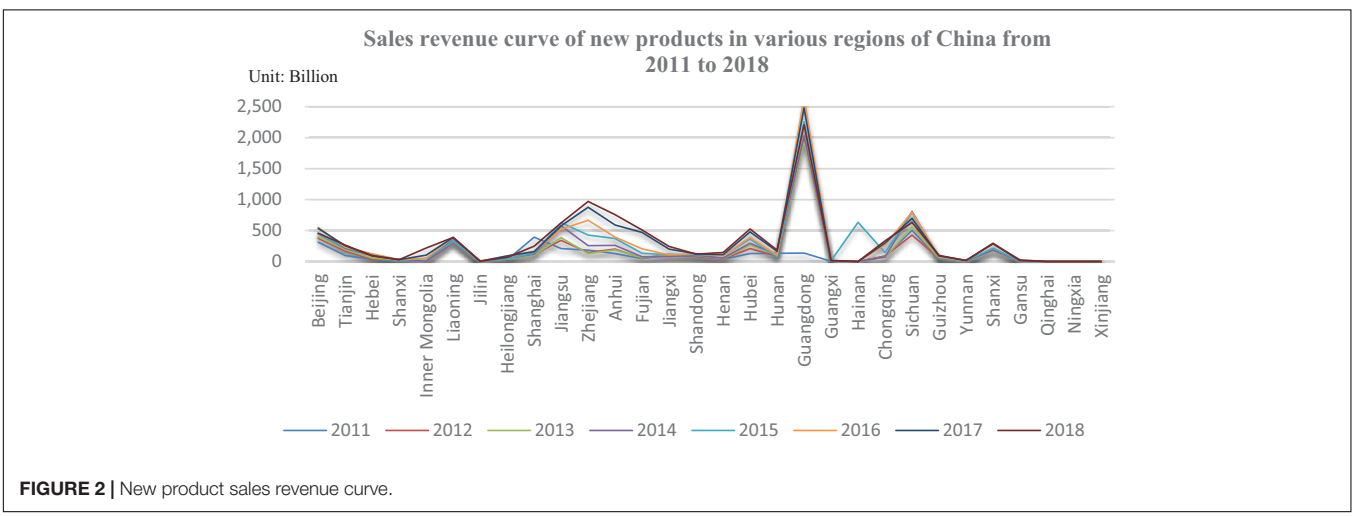

FIGURE 2 | New product sales revenue curve.

and the results are shown in **Table 4**. In general, the absolute value of the correlation coefficient between the variables was <0.7, so the possibility of multicollinearity between the variables was excluded. The correlation coefficients between market size, R&D investment level, and firm innovation performance were 0.721 and 0.861, respectively, both of which were >0.7. It showed that the market size and R&D investment level needed to be controlled for reducing interference items.

Since the data type in this article is panel data, it is usually necessary to perform a unit root test before performing regression

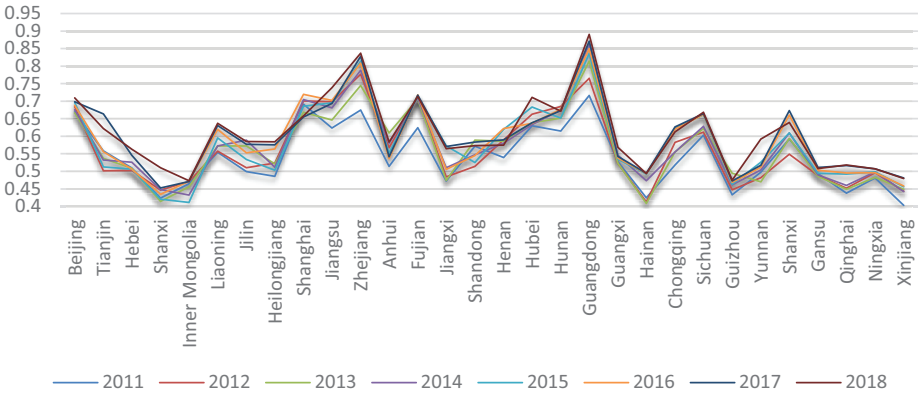

FIGURE 3 | Value modularity evaluation curve.

TABLE 4 | Descriptive statistics and correlation analysis of variables.

Variables	Mean	SD	1	2	3	4	5	6	7	8
1 Firm innovation performance	2623302	4336296	1.000							
2 Knowledge acquisition	0.0576	0.1364	−0.055	1.000						
3 Knowledge internalization	976.8	2759.56	0.180	−0.026	1.000					
4 Resource integration ability	487.277	1552.336	0.005	−0.071	−0.054	1.000				
5 Value modularity	0.5770	0.1028	0.631	0.001	0.219	−0.012	1.000			
6 Market size	0.0232	0.0475	0.721	−0.084	0.193	0.011	0.455	1.000		
7 R&D investment level	517570.5	640833.4	0.861	−0.063	0.148	0.111	0.683	0.670	1.000	
8 R&D subsidy	0.2066	0.6785	0.020	0.013	0.062	−0.038	0.064	−0.014	0.001	1.000

analysis to verify whether there are regression traps in the data. If the result coefficient of the unit root test is not significant, then a further first-level difference test or even a second-level difference test is needed. If the secondary difference test coefficient is still not significant, then we believe that the data has a regression trap, and the next regression analysis cannot be carried out.

Augmented Dickey-Fuller (ADF)-Fisher is a recognized and often chosen method for unit root testing. This paper chooses the ADF-Fisher for unit root tests to verify whether the data selected in this paper exists in regression traps. The results of the unit root analysis are shown in **Table 5**, where we can observe that the test coefficients of all variables are significant, indicating that the unit root test results are excellent, and there is no need for the next difference test to further prove that the data we selected do not have regression traps. In addition, the Kao cointegration test was performed and the ADF value was 1.6469 ($p < 0.01$). Therefore, there are no false regression traps, and regression analysis can be performed.

Model Analysis

The data regression results are shown in **Tables 6–8**. Model 1 is the basic model, which only contains control variables; model 2 adds the primary term of the independent variable based on model 1; model 3 adds the quadratic term of the independent variable and the independent variable to test hypothesis 1; model 13 adds the interaction term of resource integration ability and the independent variable to test hypothesis 2, and it also verifies the moderating effect of resource integration ability; model 4, model 5, model 6, and model 7 are the results of the mediating effect regression of knowledge acquisition, which are used to test hypothesis 3 and hypothesis 4; model 8, model 9, model 10, and model 11 are the results of the mediating effect regression of knowledge internalization, which are used to test hypothesis 5.

TABLE 5 | ADF-Fisher unit root test.

Variables	ADF-Fisher
Firm innovation performance	119.9143***
Knowledge acquisition	122.9929***
Knowledge internalization	229.5232***
Resource integration ability	392.9764***
Value modularity	208.4047***
Market size	66.7216*
R&D investment level	94.0006***
R&D subsidy	99.3604***

****Indicates p < 0.001, ** indicates p < 0.01, * indicates p < 0.05.*

TABLE 6 | Results of main effect analysis.

Variables	Firm innovation performance		
	Model 1	**Model 2**	**Model 3**
Market size	2.39*** (6.36)	2.39*** (6.36)	2.10*** (6.19)
R&D investment level	4.642* (6.79)	4.278*** (12.67)	3.993*** (13.03)
R&D subsidy	0.015 (0.78)	0.012 (0.62)	−0.001 (−0.07)
Value modularity		0.331* (1.88)	7.99*** (7.09)
Value modularity^2			−6.96*** (−7.46)
Constants	−0.365*** (74.18)	0.208** (−2.24)	2.23*** (6.61)
R^2	0.8281	0.7834	0.8250
F	187.05	212.52	220.66

*** *Indicates* $p < 0.001$, ** *indicates* $p < 0.01$, * *indicates* $p < 0.05$.

Main Effects

According to Haans et al. (2016), firstly, it needs to determine whether the quadratic coefficient of the independent variable is significant. Specifically, it is assumed that the regression equation of value modularity and firm innovation performance is $y = \beta_0 + \beta_1 x + \beta_2 x^2$, y represents the dependent variable, x represents the independent variable, and β_0, β_1, β_2 are the factory constant term, the first coefficient of the independent variable, and the quadratic coefficient of the independent variable, respectively. It can be seen from model 3 that the quadratic coefficient of value modularity, $\beta_2 = -6.97$, is significant at the 0.001 level. Secondly, it needs to judge the positive or negative k when the independent variable takes the maximum and minimum values, respectively. After calculation, $k = 7.99 - 13.92x$. Because the independent variables in this study are standardized by the mean, the x is distributed between 0 and 1. When the minimum value of 0 is taken, $k = 7.99$ and k are significantly positive. When the maximum value of 1 is taken, $k = -5.93$ and k are significantly negative. Finally, it needs to determine whether the inflection point is distributed within the range of the independent variable. The inflection point is $-\beta_1/2\beta_2 = 0.574$, which distributes in the range of x. Therefore, there is an inverted U-shaped relationship between the value modularity and firm innovation performance, hypothesis 1 is verified.

Mediating Effect

Table 6 shows the regression results of the mediation effect. Model 4 includes only control variables and it can be seen that the level of R&D investment has a significant positive effect on knowledge acquisition ($\beta = 0.001$, $p < 0.05$). From the regression results of model 5, it can be seen that the value modularity has a significant negative effect on knowledge acquisition ($\beta = -2.448$, $p < 0.1$), hypothesis 4 is verified. Model 6 shows that knowledge acquisition has a significant negative effect on firm innovation performance ($\beta = -0.002$, $p < 0.05$). Model 7 adds knowledge acquisition based on model 3, and the regression results show that the regression coefficient of knowledge acquisition is significant ($\beta = -0.0016$, $p < 0.05$), indicating that the negative mediating effect of knowledge acquisition is significant, so there is the occurrence of the process of knowledge desorption. The coefficient of the squared term of the value modularity and the firm innovation performance is significant ($\beta = 6.841$, $p < 0.01$). It indicates that knowledge acquisition plays a partially mediating role in the relationship between value modularity and firm innovation performance. Therefore, hypothesis 4 is verified.

TABLE 7 | Results of intermediary effect analysis.

Variables	Knowledge acquisition		Innovation performance		Knowledge internalization		Innovation performance	
	Model 4	**Model 5**	**Mode6**	**Model 7**	**Mode8**	**Model 9**	**Model 10**	**Model 11**
Market size	−3.795 (−1.34)	−3.813 (−1.35)	23.092*** (6.19)	20.421*** (6.05)	10.009** (2.01)	10.052*** (2.04)	23.456*** (6.19)	20.599*** (6.02)
R&D investment level	0.001** (2.17)	0.001*** (2.85)	4.738*** (17.04)	4.113*** (13.26)	0.001 (0.38)	−0.001 (−1.11)	4.636*** (16.65)	4.011*** (13.04)
R&D subsidy	−0.09 (−0.61)	−0.066 (−0.45)	0.133 (0.69)	−0.02 (−0.12)	0.261 (1.01)	0.205 (0.80)	0.141 (0.72)	−0.02 (−0.11)
Value modularity		−2.448* (−1.84)		−7.894*** (−7.04)		5.789** (2.49)		−8.036*** (−7.11)
Value modularity^2				6.841*** (7.37)				69.74*** (7.47)
Knowledge acquisition			−0.002** (−2.45)	−0.0016** (−2.04)				
Knowledge internalization							0.043* (0.88)	0.036* (0.82)
Constants	0.357*** (2.71)	1.626** (2.32)	−0.29* (−1.5)	22.149*** (6.61)	0.618*** (2.66)	−2.382* (−1.94)	−0.391** (−2.20)	22.446*** (6.64)
R^2	0.021	0.035	0.786	0.828	0.042	0.067	0.781	0.826
F	1.697	2.134	215.3	187.1	3.46	4.203	209.4	183.7

*** *Indicates* $p < 0.001$, ** *indicates* $p < 0.01$, * *indicates* $p < 0.05$.

TABLE 8 | Results of moderating effect analysis.

Variables	Firm innovation performance	
	Model 12	Model 13
Market size	2.04*** (6.05)	1.98*** (6.24)
R&D investment level	4.113*** (13.26)	4.086*** (13.04)
R&D subsidy	0.02 (−0.12)	−0.012 (−0.07)
Value modularity	7.89*** (7.04)	7.3*** (5.56)
Value modularity ^{2}	−6.84*** (−7.37)	−6.35*** (−5.82)
Resource integration ability	−1.57** (−2.04)	3.711 (0.85)
Value modularity × Resource integration ability		−1.359 (−0.87)
Value modularity^2 × Resource integration ability		1.172*** (1.85)
Constants	2.21*** (6.61)	2.04*** (5.26)
R^2	0.8281	0.8287
F	187.05	139.68

*** Indicates $p < 0.001$, ** indicates $p < 0.01$, * indicates $p < 0.05$.

Similarly, model 8 only contains control variables, and there is a significant positive effect of market size on knowledge internalization ($\beta = 10.009$, $p < 0.05$). From the regression results of model 9 and model 10, it can be seen that the value modularity has a significant positive effect on knowledge internalization ($\beta = 5.789$, $p < 0.05$), and knowledge internalization has a significant positive effect on firm innovation performance ($\beta = 0.043$, $p < 0.01$). Model 11 adds knowledge internalization based on model 3. The regression results show that the regression coefficient of knowledge internalization and the firm innovation performance is significant ($\beta = 0.036$, $p < 0.01$), indicating that the positive mediating effect of knowledge internalization is significant. The coefficient of the squared term of the value modularity and firm innovation performance is significant ($\beta = 69.74$, $p < 0.01$), which indicates that knowledge internalization plays a partially mediating role in the relationship between the value modularity and firm innovation performance. Therefore, hypothesis 5 is supported.

As shown in **Table 9**, it can be seen that the upper and lower limits of the mediating effect of knowledge acquisition do not contain 0 at the 95% CI, and the upper and lower limits of the direct effect of value modularity on firm innovation performance also do not contain 0, which indicates that the mediating role of knowledge acquisition in the path of the relationship between value modularity and firm innovation performance is significant. Thus, hypothesis 4 is further verified. Besides, from **Table 10**, it can be seen that the intermediary effect of knowledge internalization and the direct effect of value modularity on firm innovation performance do not contain 0 in the upper and lower intervals of the CI, which indicates that the mediating effect of knowledge internalization is significant and hypothesis 5 is further tested.

Moderating Effect

To test the moderating role of resource integration ability between value modularity and firm innovation performance, the regression equation is assumed to be $y = \beta_0 + \beta_1 x + \beta_2 x^2 + \beta_3 xz + \beta_4 x^2 z + \beta_5 z$ (z represents the resource integration ability). According to the study of Haans et al. (2016), the inverted U-shaped curve will become flat if β_4 is significantly positive, and if β_4 is significantly negative, the inverted U-shaped curve will become steep. From model 13 in **Table 10**, $\beta_4 = 1.172$ ($p < 0.001$), which indicates that the moderating effect of resource integration ability makes the inverted U-shaped curve of value modularity and firm innovation performance smooth. Hypothesis 2 is partially tested.

According to the study of Aiken and West (1991), the moderating effect of the inverted U-shaped curve can be tested. When testing the moderating effect of the inverted

TABLE 9 | Results of bootstrap mediated effects analysis (knowledge acquisition).

Index	Effect value	Boot	Boot CI	Boot CI	z	Effectiveness ratio	Test results
		Standard error	Lower limit	Upper limit			
Indirect effects	−492428	436385.9	1347729	362872.6	−1.13*	20.49%	Some agents
Direct effect	4579168	2037750	585250.6	8573085	2.25*	10.75%	

*According to the critical value table provided by Mackinnon et al. (2002), $|z| > 0.9115$, $p < 0.05$, and * in the table indicates significance at the 5% level.*

TABLE 10 | Results of bootstrap mediated effects analysis (knowledge internalization).

Index	Effect value	Boot	Boot CI	Boot CI	z	Effectiveness ratio	Test results
		Standard error	Lower limit	Upper limit			
Indirect effects	103020	268507.8	423245.7	629285.6	1.38*	25.2%	Some agents
Direct effect	3983720	1879066	300817.9	7666622	2.12*	25.8%	

*According to the critical value table provided by Mackinnon et al. (2002), $|z| > 0.9115$, $p < 0.05$, and * in the table indicates significance at the 5% level.*

U-shaped relationship, suppose both the coefficients of "independent variable × moderating variable" and "squared term of independent variable × moderating variable" are significant. In that case, it means that the moderating variable not only changes the shape of the inverted U-shaped but also changes the overall inclination of the curve. The slope of the regression line was calculated for high and low resource integration ability by using the mean value of resource integration ability plus or minus one standard deviation as the grouping criterion. It can be seen from model 13 in **Table 10**, $\beta_1 = 7.3$, $\beta_2 = -6.35$, $\beta_3 = -1.359$, $\beta_4 = 1.172$, β_1, β_2, β_3, β_4 are significant, $k = (2.344z - 12.7)x - 1.359z + 7.3$. It is finally concluded that in the low degree, the simple slope of high resource integration ability is lower than that of low resource integration ability ($5.941 < 8.659$); in the high degree, the simple slope of high resource integration ability is significantly negative and smaller in absolute value than that of low resource integration ability ($6.385 < 10.356$), and low resource integration ability reinforces the effect of the value modularity on firm innovation performance. The inhibition of value modularity on firms' innovation performance. Hypothesis 2 is tested.

An interactive effect diagram reveals the moderating effect of resource integration ability on the relationship between value modularity and firm innovation performance (as shown in **Figure 4**). It can be seen from **Figure 4** that the curve of high resource integration ability is flatter than that of low resource integration ability, indicating that resource integration ability weakens the inverted U-shaped relationship between the value modularity and firm innovation performance. Before the degree of value modularity reaches the optimal value, firms tend to undergo a process of "information assimilation." At this stage, compared with low resource integration ability, firms with high resource integration ability can reduce the negative impact for firms. Therefore, high resource integration ability weakens the positive effect of value modularity on the firm innovation performance. Besides, it is increasingly difficult for firms to obtain valuable information in the value module, firms with high resource integration ability can convert marginal knowledge into effective knowledge and implement it than those with low resource integration ability. Thus, high resource integration ability mitigates the inhibitory effect of value modularity on firm innovation performance.

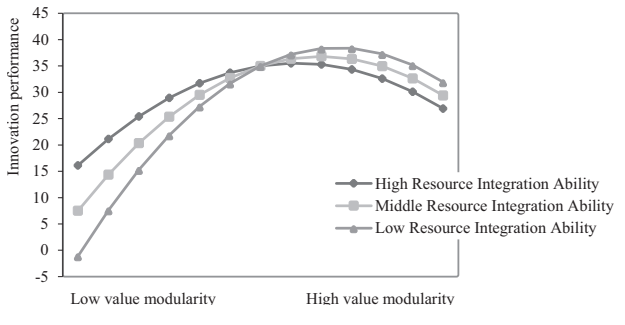

FIGURE 4 | Moderating effect of resource integration ability.

DISCUSSION

This study selected the data of Chinese state-owned and state-controlled high-tech firms from the 30 provinces and municipalities from 2011 to 2018. Based on prospect theory and information comparison theory, this paper empirically analyzes the relationship among value modularity, knowledge acquisition, knowledge internalization, resource integration ability, and firm innovation performance. This study concludes, first, there is an inverted U-shaped relationship between value modularity and firm innovation performance. Second, as the knowledge transmission path of value modularity on firm innovation performance, knowledge acquisition and knowledge internalization play a mediating role in their relationship. Third, resource integration ability weakens the inverted U-shaped relationship between value modularity and firm innovation performance. Fourth, when the degree of value modularity exceeds a certain limit, it is not conducive to firm knowledge acquisition.

At present, scholars extensively discuss the utility of value modularity. As an organization that is more closely connected and more stable than the network, scholars are interested in what impact it has on the firm innovation (Tao and Xu, 2005). Previous scholars' research on value modularity is more case studies based on social phenomena, and less empirical research is used to clearly prove the possible relationship between value modules and firm innovation. This study shows that there is a non-linear relationship between value modularity and firm innovation performance, which is an inverted U-shape relationship. The inverted U-shape relationship illustrates that a too high or too low degree of value modularity is not conducive to the improvement of firm innovation performance, while a moderate degree of value modularity is beneficial to firm innovation performance. Before the degree of value modularity reaches the optimal value, "information assimilation" occurs among firms. Firms gradually establish more intimate connections with each other, and active knowledge flow stimulates more innovation activities. However, further information assimilation will increase the risk of core resource leakage. After the degree of value modularity exceeds the optimal value, the heterogeneity of knowledge among firms has become lower due to the occurrence of information assimilation. Based on the risk-averse principle, the risk aversion tendency of firms usually promotes the start of the process of "information alienation," this process slows down the rate of increase of the knowledge flow path. At this time, path locks and resource locks are formed, which is not conducive to firms' innovation. This research result provides some theoretical guidance for how to adjust the structure and evolution direction of value modularity in the future.

The role of a complex system is to provide an "efficient place" for the transfer of information, knowledge, and technology among subjects (Sterman, 2010). Knowledge flow often acts as a linker between the system and the subject. Value module as a complex system of multi-agent connection, how to transfer its structural advantages to the firm is a very important problem. The results of this research show that in innovation activities, knowledge acquisition and knowledge internalization serve as

effective paths to transmit the influence of value modules to firms. Besides, the degree of value modularity exceeds a certain limit, it is not conducive for firms to obtain knowledge from outside. When the degree of value modularity reaches the optimal value, the relationship among innovation subjects is the closest, and the resource capacity of the value module also reaches the maximum value. After exceeding the optimal value, firms can initiate "knowledge desorption" to protect core resources, which hinder knowledge acquisition among innovation subjects. This research result breaks people's inherent cognition that a close and complex system may not be able to better promote the flow of information among firms. When the degree of value modularity exceeds a certain level, it will cause the subject's awareness of information protection. This result will have a deeper inspiration for how to adjust the structure of value modular.

Firm resource integration ability has been proven by scholars to be an important ability for the firm to integrate and filter valuable information from externally acquired knowledge. In the process of knowledge flow in a complex system, the moderating effect of firm resource integration ability will play an important role. In today's "cooperation and win-win" situation, the positive incentive orientation of resource integration ability is increasingly regarded as a golden rule. However, there are also negative effects of resource integration ability verified. The research results show that under the specific system scenario of value modularity, resource integration ability weakens the inverted U-shaped relationship between value modularity and firm innovation performance. In the low degree of value modularity, firms with high resource integration ability have strong market resilience. From the perspective of bounded rationality, this ability will weaken the firm's risk aversion and lead to being "self-good" when firms make the decision. This situation usually causes firms to pay insufficient attention to information sharing, which is not conducive to the expansion of knowledge transmission paths among firms. This result is very valuable for us to understand the negative effects of resource integration capabilities, as well as some inspiration for how companies can improve their resource integration capabilities.

CONCLUSION, LIMITATIONS, AND FUTURE RESEARCH DIRECTIONS

Conclusion

This study aims to explore the influence of the relationship between value modularity and a firm's innovation performance. In this study, we also investigate knowledge management as mediating variable. Moreover, in this study, we used the resource integration ability as a moderator between the relationship value modularity and firm innovation performance. The outcomes of this research concluded. Firstly, this research enriches the study on the value module's structural characteristics and knowledge characteristics and opens up the "black box" of knowledge transmission in the value module. This study makes certain contributions to the empirical study on value modularity. Secondly, it clarifies the positive factors and negative factors affecting the knowledge transmission among firms in the value module. This paper made a certain contribution to the development of knowledge management theory in current organizations. Finally, it reveals the negative impact of resource integration ability, which broadens the research on resource integration ability. This paper enriches the research on the application of psychological theory in management.

This research has three outstanding practical values. Firstly, this paper guides the decision-making behavior of firms in the value module, the relationship among firms of value modules should not be too close. Secondly, the role of resource integration ability is better under the high degree of value modularity than at the low degree of value modularity. Firms' resource integration ability at a high degree of value modularity can alleviate the negative impact of value nodularity on firm innovation by improving resource integration ability. Finally, while actively communicating and cooperating among firms, they need to stay alert to prevent the occurrence of "knowledge desorption."

There are some recommendations to maintain the moderate degree of value modularity to avoid low knowledge heterogeneity due to excessive knowledge flow. In the low degree of value modularity, like Qinghai, Gansu, etc. Firms in these regions should vigorously open up their boundaries and then actively establish knowledge transfer paths with the outside to improve information sharing. In the high degree of value modularity, firms should recruit partners with heterogeneous resources to gradually expand the scale of value modules and increase the storage of resources. Only by not standing still the value modularity can continue to give full play to the advantage of the platform for continuing to promote firms' innovation. In addition, it is necessary to adjust the structure of value modules in time and regulate the degree of value modularity in various regions at a moderate degree, in this way to maximize the leverage of value modules and activate the innovation vitality of innovation subjects.

On the whole, from the evaluation results of value modularity, the degree of value modularity in various regions of China is relatively low. Faced with the era that is increasingly inclined to individualization, the production or design process of the product evolves from the "waterfall paradigm→itinerant paradigm→object-oriented paradigm," value module as an important carrier for the application of object-oriented paradigm can meet the needs of customers for custom-made and efficiency (Zhu, 2003). These modules can produce personalized products according to different customer needs. To meet the needs of the times, value modularity will be the main form of industrial integration and development in the future, so local governments need to strengthen their emphasis on local value modules and increase investment in management, capital, and talent. Thereby breaking through the phenomenon of "fusion of corpses."

Firms need to pay attention to the problem of "knowledge desorption" initiated from the increased degree of value modularity. This paper advises that in the high degree of value modularity, firms need to look for new opportunities to broaden the boundaries of cooperation or establish new project partnerships to prevent the occurrence of "knowledge desorption." At the same time, the organizational trust mechanism should be further developed to a certain extent so

that the "defense" barrier of firms can be broken down. It also encourages them to open up their boundaries again and actively cooperate with partner firms for innovation. As a measure of the result of knowledge transfer results, knowledge internalization is the key process of knowledge transfer and the key process of knowledge transmission. Firms need to enhance the ability to identify valuable knowledge to accelerate the rate of knowledge internalization.

Under certain circumstances, resource integration ability is a "double-edged sword", and business managers should pay attention to the dual effects of resource integration ability. At the early stage of the value modularity formation, firms with strong abilities need to eliminate the "self-good" and actively carry out effective innovation cooperation to share information. After the critical value is exceeded, the structure of value modularity is more mature, and firms need to focus on improving their resource integration ability, which helps select valuable information from marginalized resources and weakens the inhibitory effect of the value module on firm innovation performance.

Limitations and Future Research

One limitation of our study is that the evaluation indicators for value modularity are not comprehensive enough and need to be further improved in the subsequent studies. The paper measures value modularity from four parts: manufacturing value module, integrated module, service value module, and customer module. Manufacturing value module measured by its R&D ability; integrated module measured by the level of knowledge sharing and knowledge alienation between it and other firms; service value module, and customer module is only measured by one index, respectively. These indicators used to measure value modularity are limited. For example, in addition to the support of R&D funds, the government is also the role of market regulation in China, so scholars can find suitable measurement methods to measure it in the future. For the gray comprehensive evaluation method, the more and the more complete the index, the higher the accuracy of the measurement. Therefore, scholars can find more suitable indicators to measure value modularity in the future.

Second, resource integration ability can be specifically divided into four levels: resource identification ability, resource acquisition ability, resource allocation ability, and resource utilization ability. The paper selects resource integration ability as only one moderator and does not start from the four subdivision levels. There may be more interesting results to test the moderating effect from four levels, and this is possibility warrants investigation in future research.

Third, the appropriateness of a control mechanism is likely to depend on the context. Our findings suggest an inverted U-shape relationship between the value modularity and firm innovation performance. These findings apply only to Chinese state-owned or state-controlled high-tech firms and other similar settings. A different pattern of findings may emerge in other contexts. It is therefore vital to examine the efficacy systematically across different firm contexts.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

JW contributed in the research formulation and conceptualization. YZ supervised and extensively revised this research manuscript. XH participated in the data curation and visualization. LL participated in the conceptualization and actively drafted the manuscript. SR participated in the formal analysis, data interpretation, and revised the original draft. All authors contributed to the article and approved the submitted version.

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REFERENCES

Adner, R., and Kapoor, R. J. (2010). Value creation in innovation ecosystems: how the structure of technological interdependence affects firm performance in new technology generations. *Strateg. Manag. J.* 31, 306–333. doi: 10.1002/smj.821

Aiken, L. S., and West, S. G. (1991). Multiple regression: testing and interpreting interactions. *J. Oper. Res. Soc.* 45, 119–120. doi: 10.1057/jors.1994.16

Aoki, M. (2003). *The Modular Age: The Nature of the New Industrial Structure*. Shanghai: Shanghai Far Eastern Publishing House.

Aquino, H., and Castro, J. M. D. (2017). Knowledge internalization as a measure of results for organizational knowledge transfer: the proposition of a theoretical framework. *Tour. Manag. Stud.* 13, 83–91. doi: 10.18089/tms.2017.13208

Ariely, D., Huber, J., and Wertenbroch, K. (2005). When do losses loom larger than gains? *J. Mark. Res.* 42, 134–138.

Baldwin, C. Y., and Clark, K. B. (1997). Managing in the age of modularity. *Harv. Bus. Rev.* 75, 84–93.

Belschak, F. D., and Hartog, D. (2010). Consequences of positive and negative feedback: the impact on emotions and extra-role behaviors. *Appl. Psychol.* 58, 274–303. doi: 10.1111/j.1464-0597.2008.00336.x

Bendoly, E., Soni, A., and Venkataramanan, M. A. (2004). Value chain resource planning: adding value with systems beyond the firm. *Bus. Horiz.* 47, 79–86. doi: 10.1016/j.bushor.2003.08.004

Bitar, J., and Hafsi, T. (2007). Strategizing through the capability lens: sources and outcomes of integration. *Manag. Decis.* 45, 403–419. doi: 10.1108/00251740710745043

Brush, C. G., Greene, P. G., and Haller, H. (2001). Creating wealth in organizations | | from initial idea to unique advantage: the entrepreneurial challenge of constructing a resource base. *Acad. Manag. Exec.* 15, 64–80. doi: 10.5465/ame.2001.4251394

Cheng, C., and Shiu, E. (2016). Examining the link between service modularity and firm performance: a capability perspective. *J. Serv. Theory Pract.* 26, 696–720. doi: 10.1108/jstp-06-2015-0140

Cremer, J. (1990). "Common Knowledge and the Co-ordination of Eco-nomic Activities," in *The Firm as a Nexus of Treaties*, eds M. Aoki, B. Gustafssn, and O. E. Williamson (Thousand Oaks: Sage publications), 53–76.

Cui, Q. Y., Yu, K. C., Sun, Z. J., Zhang, S. X., and Wang, X. F. (2014). Value innovation study in service manufacturing mode. *Adv. Mater. Res.* 3382, 1156–1160. doi: 10.3390/ma14174855

Dong, Q., Wang, W., and Xie, Z. (2016). The influence of R&D input impact on the region's innovation performance:a mediating perspective. *Sci. Technol. Prog. Policy* 33, 41–48.

Dyer, J. H., and Singh, H. (1998). The relational view: cooperative strategy and sources of interorganizational competitive advantage. *Acad. Manag. Rev.* 23, 660–679. doi: 10.2307/259056

Edelman, L. F., Brush, C. G., Manolova, T. S., and Greene, P. G. (2010). Start-up motivations and growth intentions of minority nascent entrepreneurs. *J. Small Bus. Manag.* 48, 174–196.

Escribano, A., Fosfuri, A., and Tribo, J. A. (2009). Managing external knowledge flows: the moderating role of absorptive capacity. *Res. Policy* 38, 96–105.

Feng, L., and Wei, M. (2011). The extensive comprehensive evaluation on value module node of service-oriented manufacturing network. *Sci. Technol. Prog. Policy* 28, 124–128.

Gattringer, R., Wiener, M., and Strehl, F. (2017). The challenge of partner selection in collaborative foresight projects. *Technol. Forecast. Soc. Change* 120, 298–310. doi: 10.1016/j.techfore.2017.01.018

Gaynor, M., and Bradner, S. (2001). Using real options to value modularity in standards. *Knowl. Technol. Policy* 14, 41–66.

Gebauer, H., Worch, H., and Truffer, B. (2012). Absorptive capacity, learning processes and combinative capabilities as determinants of strategic innovation. *Eur. Manag. J.* 30, 57–73. doi: 10.1016/j.emj.2011.10.004

Goldberg, M., Pásher, E., and Levin-Sagi, M. (2006). Citizen participation in decision-making processes: knowledge sharing in knowledge cities. *J. Knowl. Manag.* 10, 92–98. doi: 10.1108/13673270610691206

Haans, R., Pieters, C., and He, Z. (2016). Thinking about U: theorizing and testing U-and inverted U-shaped relationships in strategy research. *Strateg. Manag. J.* 37, 1177–1195. doi: 10.1002/smj.2399

Inkpen, A. (1998). Learning, knowledge acquisition, and strategic alliances. *Eur. Manag. J.* 16, 223–229. doi: 10.1016/s0263-2373(97)00090-x

Jaworski, B. J., and Kohli, A. K. (1991). Supervisory feedback: alternative types and their impact on salespeople's performance and satisfaction. *J. Mark. Res.* 28:190. doi: 10.2307/3172807

Kahneman, D., and Tversky, A. (1979). Prospect theory: an analysis of decision under risk. *Econometrica* 47, 263–292. doi: 10.2307/1914185

Kostova, T., and Roth, K. (2002). Adoption of an organizational practice by subsidiaries of multinational corporations: institutional and relational effects. *Acad. Manag. J.* 45, 215–233. doi: 10.2307/3069293

Levy, H., and Levy, M. (2002). Experimental test of the prospect theory value function: a stochastic dominance approach. *Organ. Behav. Hum. Decis. Process.* 89, 1058–1081. doi: 10.1016/s0749-5978(02)00011-0

Li, Z., and Gao, X. (2021). Makers' relationship network, knowledge acquisition and innovation performance: an empirical analysis from china. *Technol. Soc.* 66:101684. doi: 10.1016/j.techsoc.2021.101684

Mackinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., and Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychol. Methods* 7, 83–104. doi: 10.1037/1082-989x.7.1.83

Maggi, M. A. (2006). Loss aversion and perceptual risk aversion. *J. Math. Psychol.* 50, 426–430.

Mansourian, Y., and Ford, N. (2007). Search persistence and failure on the web: a "bounded rationality" and "satisficing" analysis. *J. Doc.* 63, 680–701. doi: 10.1108/00220410710827754

Mele, C., Spena, T. R., and Colurcio, M. (2010). Co-creating value innovation through resource integration. *Int. J. Qual. Serv. Sci.* 2, 60–78. doi: 10.1108/17566691011026603

Mindruta, D. (2013). Value creation in university-firm research collaborations: a matching approach. *Strateg. Manag. J.* 34, 644–665. doi: 10.1186/s13012-016-0428-0

Mingliang, W., and Bin, L. (2008). "International symposium on knowledge acquisition and modeling - new trend of knowledge transformation research: value network,"in. *International Symposium On Knowledge Acquisition And Modeling (kam)* (Wuhan: IEEE), 113–117.

Miotti, L., and Policy, F. (2003). Co-operative R&D: why and with whom?: An integrated framework of analysis. *Psychol. Methods* 32, 1481–1499.

Miotti, L., and Sachwald, F. (2003). Co-operative R&D: why and with whom? an integrated framework of analysis. *Res. Policy* 32, 1481–1499.

Nonaka, I., and Tadeuchi, H. (1995). *The Knowledge-Creation Company: How Japanese Companies Create The Dynamics Of Innovation*. Oxford: Oxford University Press.

Organisation for Economic Co-operation and Development [OECD] (2007). *The Measurement Of Scientific And Technological Activities: Proposed Guidlines For Collecting And Interpreting Innovation Data*. Paris: OECD.

Pan, X., Jing, Z., Song, M., and Ai, B. (2018). Innovation resources integration pattern in high-tech entrepreneurial enterprises. *Int. Entrep. Manag. J.* 14, 51–66. doi: 10.1007/s11365-017-0464-5

Rasool, S. F., Samma, M., Wang, M., Zhao, Y., and Zhang, Y. (2019). How human resource management practices translate into sustainable organizational performance: the mediating role of product, process and knowledge innovation. *Psychol. Res. Behav. Manag.* 12, 1009–1025. doi: 10.2147/PRBM.S204662

Rasool, S. F., Wang, M., Tang, M., Saeed, A., and Iqbal, J. (2021). How toxic workplace environment effects the employee engagement: the mediating role of organizational support and employee wellbeing. *Int. J. Environ. Res. Public Health* 18:2294. doi: 10.3390/ijerph18052294

Ravasz, E., Somera, A. L., Mongru, D. A., Oltvai, Z. N., and Barabasi, A. L. (2018). Hierarchical organization of modularity in metabolic networks. *Science* 297:1551. doi: 10.1126/science.1073374

Schilling, M. A. (2000). Toward a general modular systems theory and its application to interfirm product modularity. *Acad. Manag. Rev.* 25, 312–334. doi: 10.5465/amr.2000.3312918

Singh, P., Lin, T., Mueller, E. T., Lim, G., Perkins, T., and Zhu, W. L. (2002). *Open Mind Common Sense: Knowledge Acquisition From The General Public*. Berlin: Springer.

Sterman, J. D. (2010). Learning in and about complex systems. *Syst. Dyn. Rev.* 10, 291–330. doi: 10.1002/sdr.4260100214

Sturgeon, T. J. (2002). Modular production networks: a new American model of industrial organization. *Ind. Corp. Chang.* 11, 451–496. doi: 10.1093/icc/11.3.451

Tao, W., and Xu, J. P. (2005). Product innovation based on modularity: under the circumstance of value-creating networks. *Sci. Res. Manag.* 15, 71–79.

Tsai, Y.-H., Joe, S. W., Chen, M.-L., Lin, C.-P., Ma, H.-C., and Du, J.-W. (2016). Assessing team performance: moderating roles of transactive memory, hyper competition, and emotional regulation. *Hum. Perform.* 29, 89–105. doi: 10.1080/08959285.2016.1154059

Wales, W. J., Patel, P. C., Parida, V., and Kreiser, P. M. (2013). Nonlinear Effects of Entrepreneurial Orientation on Small Firm Performance: the Moderating Role of Resource Orchestration Capabilities. *Strateg. Entrep. J.* 7, 93–121.

Wipawayangkool, K., and Teng, J. (2016). Paths to tacit knowledge sharing: knowledge internalization and individual-task-technology fit. *Knowl. Manag. Res. Pract.* 4, 309–318. doi: 10.1057/kmrp.2014.33

Wu, L., and Park, D. (2009). Dynamic outsourcing through process modularization. *Bus. Process Manag. J.* 15, 225–244.

Zhou, K. Z., and Caroline Bingxin, L. (2012). How knowledge affects radical innovation: knowledge base, market knowledge acquisition, and internal knowledge sharing. *Strateg. Manag. J.* 33, 1090–1102. doi: 10.1002/smj.1959

Zhou, Y., and Wu, H. (2018). Dynamic analysis and simulation study of knowledge flow under the perspective of industrial transfer. *Expert Syst.* 36: e12345.

Zhu, R. B. (2003). Value modularity integration and industry convergence. *China Ind. Econ.* 2003, 24–31.

Zott, C., Amit, R., and Massa, L. (2011). The business model: recent developments and future research. *J. Manag.* 37, 1019–1042.

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Environmental Problems: An Analysis of Students' Perceptions Towards Selective Waste Collection

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The reduction, reuse, collection and recovery of recyclable materials are sustainable behaviors and people's awareness of them plays an important role in implementing strategies and policies in this field. The quantitative analysis performed on a group of 816 students of Politehnica University of Timisoara, aimed at finding answers to important environmental concerns and observing the students' behaviors of reuse and selective collection of the waste resulted from plastic containers, paper, aluminum, batteries, iron packaging waste, electronic equipment, used cooking oil and printer toner. The research has shown that 'increased amounts of waste' (63.5%) is among the first three concerns Romania has to deal with, besides 'air pollution' (67.9%) and 'deforestation' (63.7%). Moreover, the study highlights the existence of the behavior toward the selective waste collection among students (plastic – 60.3%, paper – 57.8%, and glass – 55.3%). although there are some areas (e.g., selectively collecting used cooking oil or printer toner, their level of knowledge regarding the color code for the recycling bins, etc.) that students still need to be familiarized with through different campaigns, trainings, courses, etc. The results can be used in the development of institutional strategies or of strategic documents targeting environmental protection and sustainable development.

Keywords: environmental problems, selective waste collection, circular economy, waste management, students, reduce, reuse, recycle

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INTRODUCTION

Industrialization and an increase in living standards have led to the generation of impressive amounts of waste that, unfortunately, affect the environment through climate change, through their negative impact on fauna and flora and, ultimately, through their impact on our health. By decomposition, the waste from landfills emits methane, a gas over 80 times more powerful than carbon dioxide (Environmental Defense Fund, 2021), and its illegal burning releases high levels of carbon dioxide into the atmosphere; both are greenhouse gases that warm the planet and change the climate. It has been observed that open landfills let out 91% of all the methane emissions from landfills and that about 40% of the world's waste is burned in this way (Earth Day, 2021). Also, these gases represent unseen dangers for the population in the long run, causing diseases such as asthma, cancer, cardiovascular diseases, genetic disorders in newborns, low birth weight, infectious diseases, etc. Last but not least, due to the ingestion of plastic and garbage, many species of animals, birds and marine mammals are affected, their stomachs being unable to digest the ingested objects.

The Environmental Protection Agency of the United States calculated that, in 2017, the total generation of municipal waste was of 267.8 million tons, a figure that increased by 5.7 million compared to 2015 (Earth Day, 2021), while in 2019, in the European Union, 225 million tons of municipal waste were generated, i.e., 502 kg per person, slightly more than in 2018 (495 kg). Per capita, Denmark (844 kg) was the country that generated the most significant amount of municipal waste in 2019, while Romania ranked last (280 kg) (Eurostat, 2021).

In the EU, environmental efforts have been intensified by implementing initiatives that could lead to a climate-neutral Europe by 2050. Special attention is paid to the circular economy, which aims to reduce waste, and ultimately to reduce its impact on the environment, production and consumption, bringing thus benefits to both the society and the people. Even though circular economy, a cutting-edge research topic both for theoreticians and practitioners (Geissdoerfer et al., 2017), has different definitions, the most used one refers to the activities of reduce, reuse and recycle for economic prosperity and environmental quality (Kirchherr et al., 2017). Circular economy transforms goods and products that are no longer in use into future resources for other people, leading thus to waste minimization (Stahel, 2016), having environmental, economic and social implications both for the industry and for the consumers (Meseguer-Sánchez et al., 2021).

In March 2020, the European Commission put forward a new Circular Economy Action Plan, which focuses on waste prevention and management and aims at boosting economic growth and competitiveness, and at maintaining the Union's leadership position in this field (Parlamentul European, 2021).

The fact that the basic policy for good waste management should be centered around the 3Rs (Reduce, Reuse, and Recycle) principle is very well-known. Mainly, attention should be paid to reducing the amounts of waste, before generating them, and then trying to reuse them or, if this is not possible, selectively collecting them for recycling. In 2018, in the EU, the recycling of municipal waste increased to 67 million tons, corresponding to 150 kg per capita, three times more than in 1995 (23 million tons) (Eurostat, 2020).

However, things are not going well at all for Romania, which in May 2020 was threatened with the start of an infringement procedure by the European Commission, as it has not made any progress since 2014 in municipal waste management and has not complied with the Court of Justice's decision of October 18, 2018, to close the 48 illegal landfills, left out of the initial 68, in the important cities in Romania, representing real dangers for the population's health (European Commission, 2020b).

According to the Country Report on Romania 2020 by the European Commission, Romania is still struggling with waste management, having low recycling of municipal waste (14%) and high landfilling rates (70%) (European Commission, 2020a). Currently, Romania recycles only 15% of the collected waste, with a target of 50%, which is very unlikely to be achieved by 2050 (European Commission, 2019; Florin et al., 2020; Ministerul Mediului, Apelor şi Padurilor, 2021). In line with the revised Waste Framework Directive, that has set more ambitious recycling targets by 2035, the authorities have to ensure that the amount of municipal waste in the landfills is reduced to 10% or less by 2035 (European Commission, 2020a). Measures that could lead to an improvement of the current situation are definitely needed and, for this to happen, people should be made aware of the impact that waste can have on the environment and also of the importance of reducing the amounts of waste that are generated and of the benefits of reusing and recycling them, especially since it was reported that, in the top of the European pollution-related deaths, Romania ranks third with 19% after Bosnia-Herzegovina and Albania (Balkan Insight, 2020).

The transition toward a circular economy depends on the way individuals and organizations adopt values and behaviors that aim to achieve the goal of "zero waste" and turn them into environmentally-conscious consumers, and the importance of sustainability at the local, national and international level. But, in order to attain this, these habits have to be known so that people can understand how their behavior damages the environment, the starting point to obtain education in the circular economy being represented by environmental education initiatives that ensure the development of knowledge, values and attitudes that lead to actions in this respect. In Romania, there are few studies on how people should reuse and recycle and this is a prerequisite for policy development and for a shift toward sustainable behavior. There are also few studies on the young people's attitude toward environmental problems and on their ecological behavior. Research on pro-environmental behavior, whose determinants can be defined by applying theories such as value-belief-norm, theory of planned behavior, Campbell paradigm, is becoming increasingly important in solving environmental problems and achieving the goals of sustainability.

This research aims at gaining insight into the students' level of knowledge about the current environmental problems and into the way they adopt sustainable behaviors in a circular economy in order to issue a warning, if necessary, for the need to create educational programs and to inform them about the philosophy of the 3Rs. Students make up an important percentage of the young and educated population and, therefore, they should be the ones setting up the future trends as far as environmental protection is concerned. They could be of help in educating their colleagues and other categories of the population about environmental behaviors and could act as agents of change in both their homes and their future jobs. Due to the fact that they will be the ones who will hold key positions in society, they will be able to contribute to the adoption of sustainable strategies that will lead to the protection of finite resources and of the environment and to putting an end to climate changes.

The research questions were as follows:

- RQ_1: What is the students' perception on the environmental problems in Romania, on their degree of importance and on the persons responsible for solving them?
- RQ_2: What are the reuse behaviors among the study population?
- RQ_3: What are the behaviors of selectively collecting waste and what is the frequency with which students selectively collect waste resulted from plastic containers, paper, glass, aluminum (beverage cans, cans, etc.), batteries, iron

packaging waste, electronical equipment and household appliances, used cooking oil, and printer toner?
- RQ_4: What is the respondents' level of awareness regarding the type of waste that has to be collected into the containers for selective collection (based on the color of their lids)?
- RQ_5: Are there significant differences between the female and the male respondents regarding the studied aspects?

This study aims at providing answers to the above-mentioned questions and at identifying the areas requiring actions to be taken in order to ensure a better reuse and selective collection leading thus to environmental protection. By being aware of certain environmental protection behaviors, but also of the existing problems in this field, stakeholders can develop policies and action plans that could lead to an improvement of the local and regional ecological protection. This research does not aim at answering "why" these behaviors exist; instead, it tries to capture them, as a photograph of the reality we live in, such analyses not having been carried out so far on this category of population and on this topic.

LITERATURE REVIEW

The 3Rs: Reduce, Reuse, and Recycle

In order to protect the environment, to reduce pollution and to save natural resources, it is necessary to reduce waste, to reuse or to recycle it. These actions are known as the 3Rs, Reduce, Reuse, and Recycle, which, from the mere marketing slogan, have become a way of life for many people.

Reduce refers to the awareness of the fact that we do not need all the products we use, from clothes to food. Consuming less means consuming better and the emphasis should be on a qualitative approach, not on a quantitative one. We should also ask ourselves whether these products with a short life cycle, which will become waste very quickly, really contribute to our well-being and happiness or are just a whim. According to the Institute for European Environmental Policy, the way we consume today is not sustainable; by 2050, every European will have to reduce by 80% the natural resources they currently use for nutrition, accommodation, mobility and pleasure. This thing can only be achieved through a combination of efficiency and sufficiency (Institute for European Environmental Policy, 2019).

Reuse, means finding another use for a specific thing that was to be thrown away and thus increasing its value, making sure that it does not end up in the landfill or recycling center. Before throwing a product in the trash, we should ask ourselves if it can be reused or repaired, saving in this way energy, time, money, resources and eventually ensuring the environmental protection. In other words, each of us should make an effort and consume as few disposable materials as possible. Reports have been written on great business opportunities for companies looking to reuse plastic (Ellen MacArthur Foundation, 2017; Resource Recycling, 2019). Ellen MacArthur Foundation provides a general theoretical model of circular economy based on maintenance, reuse, recovery and recycling of the high volumes of production and waste (Ellen MacArthur Foundation, 2017), while other researchers (Lewandowski, 2016; Silveti and Andersson, 2019), also emphasize the importance of reuse and of the fact that products are created to have a longer life cycle and that companies focus mainly on the reuse of their products, extending thus their life cycle through maintenance, repairs and sustainability.

Recycling helps to conserve resources and reduce the production costs of many products and comprises the process of selective collection (Bacău et al., 2021). The amount of recycled waste has increased a lot, almost tripling from 37 million tons (87 kg per person) in 1995–107 million tons (239 kg per person) in 2019. The amount of municipal waste incinerated in the EU has doubled from 1995 from 30 million tons (70 kg per person) to 60 million tons (134 kg per person) in 2019 (Eurostat, 2021).

Throughout the time, studies have been undertaken in various fields, e.g., medicine (Kirkby, 1993), textile industry (Weber et al., 2017), electronic waste or e-waste (Cairns, 2005; Terazono et al., 2006; Dempsey and Palilonis, 2012), construction waste (Tam and Tam, 2006; Kabirifar et al., 2020) or household waste (Barr et al., 2001), in order to observe the implementation of the 3Rs in waste management.

Selective Collection of Waste in Romania

The selective collection as part of the separate collection is also an essential part of the process of waste recycling to be introduced into the economic cycle (Ciuta et al., 2015). The need for selective collection in order to recycle waste and capitalize on it is increasingly important, due to the fact that Europe is a continent that is poor in raw materials and mineral resources, the European industry relying heavily on imports. For the European countries, there is a European Parliament requirement to carry out concrete measures in order to raise the competitiveness of the secondary raw materials, thus prohibiting the deposit of waste on landfills and ultimately reaching the "zero waste" status (Marcu, 2010; Burlakovs et al., 2018).

The selective collection has at least three objectives: (1) protection of the population's health; (2) protection of the environment; (3) protection and conservation of natural resources. The waste management options aim at preventing the occurrence of waste in waste-generating activities through clean technologies, at reducing the amounts by applying the best technologies, at recovering through reuse, material recycling and energy recovery. As part of the European Union, Romania has signed the Environmental Agreement, which is found in Chapter 22 of the Treaty of Accession to the European Union. Furthermore, based on the European and national legislation provisions in the field, Romania has developed and approved the National Waste Management Plan, which aims at creating the necessary framework for developing and implementing an integrated waste management system, efficient from an ecological and economic point of view and which details the structure of the waste [mixed household waste from the population; assimilable mixed waste, from trade, industry, institutions; municipal and assimilable waste collected separately (with the exception of construction and demolition waste); bulky waste; green waste; market waste; road waste; generated and uncollected waste]. The selective collection is carried out mainly for the household mixed waste collected from the population, for the assimilable

mixed waste collected from trade, industry, institutions, for the municipal and assimilable waste collected separately (with the exception of construction and demolition waste). The selective collection is carried out on several fractions or in a dual system, by wet and dry garbage. The selective collection on several fractions is mainly implemented in the developed countries of the EU, but it has proven to be more expensive; in Romania, waste is usually collected in a dual system, by wet garbage (organic, biodegradable materials, infected paper and cardboard, textiles, small inorganic materials) and dry garbage (paper and cardboard, plastic, glass, metal, and wood).

Nowadays, waste management treats the population differently from public institutions from the waste collection point of view (Iojă et al., 2012; Ciuta et al., 2015; Izvercian and Ivascu, 2015); the legislation is also adapted, but the general purpose remains the same, i.e., reducing the amounts of waste, reusing or recycling them.

The fundamental legislation on selective waste collection starts from Law 211/2011, which establishes "the necessary measures for protecting the environment and the population's health by preventing or reducing the adverse effects caused by waste generation and management" (Ministerul Mediului, Apelor şi Padurilor, 2011). The law establishes the following hierarchy in waste management: prevention, preparation for reuse, recycling, recovery and disposal. Also, under articles 16 and 17, the same law stipulates the obligation of the central public administration authorities governing the environmental protection and of the local public administration to ensure the separate collection for at least the following types of waste: paper, metal, plastic and glass. According to the regulation in practice, Law 211/2011 for households and blocks of flats and Law 132/2010, amended and supplemented by Law 194/2019, on the selective collection of waste in public institutions, all over the territory of Romania waste is collected in different colored bins for institutions and two differently colored bags for households (black bag and yellow bag). Under GEO 74/2018, starting with July 01, 2019, the selective collection of waste is mandatory on four fractions: plastic/metal, paper/cardboard, glass, residual/mixed/household waste. For blocks of flats and individual households (houses), containers/bins or yellow bags will be used as follows: for houses - in specifically colored plastic bags provided free of charge by the sanitation operator -, and for blocks of flats – in yellow bins (plastic/metal), blue (paper/cardboard), green (glass), and black (residual waste) (Ministerul Mediului, Apelor si Padurilor, 2018). However, it is worth mentioning the fact that although there is a clear legislation in this regard for public institutions, for households and blocks of flats the situation remains the same, in two different colored containers, as there are no methodological norms from the central authorities to be put into practice. A particular chapter in the selective collection of waste is treated by Law 132/2010, amended and supplemented by Law 194/2019, on the selective collection of waste in public institutions (Portal Legislativ, 2010, 2019). It established the mandatory legal framework for public institutions regarding the selective collection of waste. Thus, enforcing this law will ensure the degree of selective collection and the increase of the degree of awareness, information, education of the employees and the citizens. Public institutions may carry out the selective collection directly or may delegate this responsibility to third party operators. Each public institution shall appoint a person in charge by the decision of the head of the institution. The legislation stipulates that a plan of measures should be drawn up regarding the selective collection of its waste in each public institution. Also, the employees will be trained through a pre-established program, and an informative program will be prepared for the visitors. Moreover, the waste will be recorded and weighed upon delivery by writing it in a register.

For the population, to stimulate selective collection, local public administrations should apply the principle "pay for how much you throw away," this becoming mandatory only in 2021, under Law 181/2020, in accordance with which all biodegradable waste must be collected separately from other waste, in brown bins or converted into natural fertilizer in your household, with the help of special containers for individual composting (Portal Legislativ, 2020).

Reporting data at the national level on the amounts of waste generated and/or collected differs significantly from one source to another (see data reported by ADID versus the County Waste Management Plan). Moreover, there is no official data on the amounts of waste before 1997 (according to Eurostat, in 1997, Romania reported 325 kg of municipal waste/year/inhabitant and in 2018, 272 kg/year/inhabitant, i.e., decreasing) (Eurostat, 2020).

Selective Collection of Waste in the Timis County

With respect to the Timis County, the county where the university whose students that were surveyed is located, from the amount of municipal and assimilable waste from trade, industry and institutions that was generated and collected at the county level and at all the territorial-administrative units, respectively, in accordance with the County Report on the state of the environment for the year 2016–2019 of the Timis county (Ministerul Mediului, Agenţia Naţională pentru Protecţia Mediului, 2020), the following results were obtained: a significant increase in the amounts for the period 2012–2018, from 116,711.5 to 180,547 tons. Thus, in the Timis county, the amount of selectively collected municipal waste (tons) in 2012 was 11,686 tons, and in 2018, 28,023 tons. The results confirm an increase of almost 54% for 6 years, and what deserves special attention is the fact that approximately 205% is the increase of the amounts collected selectively at the level of all the territorial-administrative units within the county since, in the period prior to 2012, the selective collection in the Timis county was carried out exclusively in Timisoara. Starting with 2012–2013, the selective collection of waste was progressively implemented on the entire territory of the Timis County, which led to this increase of 205%.

To deepen the research, information on selective collection from the Timis Waste Intercommunity Development Association (ADID Timis), which is the coordinating body for municipal and similar waste collection in the Timis County, Romania, was requested. The information received following the request has been approved to be processed for academic and research

purposes. The data obtained from ADID Timis refer strictly to the period 2019–2020, the information not being made public until now. Nevertheless, after having processed the transmitted data, the following aspects regarding the period 2019–2020 can be drawn. First, at the level of the Timis County, the percentage of selectively collected waste from the total collected waste is 15.6%, of which in urban area is 18% and in rural area 11%, the conclusion being that in the urban area, the selective collection is much more advanced with regard to the implementation and the effective collection, compared to the rural area. Second, the percentage of 15.6% comes from the ratio of the amount of recyclable waste plus glass divided by residual waste plus recyclable waste plus glass. Therefore, the percentage means the amount of recycled waste from the total amount collected. The same formula applies to data on urban and rural areas.

Compared to the targets set by the National Plan and the County Waste Management Plan, targets assumed and agreed with the EU, it can be observed that both Romania as a country and the Timis County are at a considerable distance, reaching so far a higher percentage of 18%, compared to the set target of 50%.

As far as the collection points are concerned, there are approximately 538 selective collection points for glass in Timisoara; general collection points for the population do not exist, but instead, there are collection points for waste generators (population, blocks of flats, private households, state institutions, and companies). There are only street waste collection bins at the local level, but they are not especially designed for the selective collection, as they are not in the recreational areas or in the university campus. The concept of selective collection established by the Local Waste Management Plan was to equip the waste generator with a garbage can/yellow bag for houses, blocks of flats and commercial companies for the selective collection. Inside the institutions, the selective collection system is organized according to national and European regulations, but the collection performed by the sanitation operator is performed strictly from the yellow bin in which both plastic and cardboard, paper and aluminum are mixed.

In Timisoara, since 2011, there is a functional municipal waste sorting station, the selectively collected waste is manually sorted on conveyor belts in at least four assortments: cardboard + paper, PET, aluminum cans, PPD. The rest of the waste collected in the black bin is also sorted in this sorting station, in two fractions, i.e., in the dry fraction that can be recovered energetically at the cement factories and in the wet fraction that is deposited at the landfill called the Integrated Management Center of Municipal Waste in Timis County, located in Ghizela.

The sorting of separately collected DMS fractions is applied internationally. The process is performed before treatment and storage. The procedure proved to be a good method of meeting the waste targets in the packaging, given that sorting the DSM collected in the mixture proved difficult and disappointing. In the municipal waste sorting technology, the main aim is to increase the pre-treatment of materials previously separated from municipal solid waste by screening processes to increase the efficiency of manual sorting. The process can reach up to 220 kg/h for paper and cardboard and 145 kg/h for light fractions such as PET bottles or other plastic products. Ferrous and non-ferrous metals are generally removed by magnetic separators. The municipal waste sorting station in Timisoara functions as a recycling center that collects and capitalizes approx. 60–70% of the municipal waste of Timisoara municipality. In light of these statistics, this study aims at shedding light on the way students view environmental problems and on their behaviors on reuse and selective collection. In a constantly developing world, students represent the young and informed segment of the population that will create a more sustainable world in the future.

MATERIALS AND METHODS

In order to conduct the research, a quantitative analysis was carried out, and in order to collect the data, a questionnaire was applied. The target population was represented by the students of Politehnica University of Timisoara and the data were collected during March–April 2021. The students of this university were chosen for this study due to the fact that the authors were able to communicate with them during the COVID-19 pandemic, an extension of the study to other universities in the country being almost impossible during this emergency time. The study was carried out on a sample of 816 subjects from all the study years. As the university's student body counts around 13,000 students, the calculated margin of error was of ±3.3%. Starting from the assumption that a student's gender may impact their behaviors and attitudes, based on existing studies that have already emphasized that (Vicente-Molina et al., 2018; Ramstetter and Habersack, 2020; Wut et al., 2020), the sample was built taking into account the fact that the respondents' gender distribution should be a relatively equal one as the aim of the study was to identify certain particularities of the answers related to this variable; being one of the research questions, it was used for the secondary analysis of this research. Thus, a sample of 409 females and 407 males was built. Their average age, according to the recorded results, was 20.37 years old.

A questionnaire was used to collect the data, its content being validated through the following steps: assessment by experts (sociologists) followed by its qualitative and quantitative pretesting. The Cronbach's Alpha test was used to test the internal consistency of the Likert scales used in the questionnaire. Closed-ended and open questions were used in the questionnaire and, at the end, factual data regarding gender, age, year of study, rural or urban background were also requested.

In order to answer the first two research questions that aimed to capture the students' perception of environmental problems in Romania, their importance and the people responsible for solving them, five questions were included in the questionnaire (four closed questions and one open question). In order to obtain answers to the third research question (reuse behaviors among the study population), six scale questions were used (5-point Likert scale, Cronbach's Alpha's value = 0.758), and nine scale questions (5-point Likert scale, Cronbach's Alpha's value = 0.859) were used to capture the selective collection behavior. The Alpha values obtained for the Likert scales are considered good, being

higher than the minimum acceptable level of 0.7 for internal consistency (Secolsky and Denison, 2017).

To find out the respondents' level of awareness regarding the type of waste that has to be collected into the containers for selective collection, five questions with the same answer variants were used, the respondents being asked to choose the correct variant. The data were analyzed using SPSS Statistics, a software package frequently used for statistical analysis. The data analysis was performed based on the frequencies obtained and, in order to provide answers to the last research question (i.e., the gender variable, on which the secondary analysis was based), a chi-squared test was conducted for all questions.

The questionnaire was anonymous and was applied online on the Isondaje.ro platform (an online survey service). Due to the conditions imposed by the COVID-19 pandemic limiting face-to-face interactions, the questionnaire was applied online as this was considered to be a safer and a more efficient method, the response rate being of approximately 50% and the average duration of completion of about 15 min. The completion of the questionnaire was voluntary and the students could opt out of filling it in at any time; also, no rewards were used for this activity. For the sake of anonymity and confidentiality, the students' e-mail addresses or other personal data were not collected.

RESULTS

Students' Perception of Environmental Problems in Romania, of Their Degree of Importance and the People Responsible for Solving Them

One of the questions addressed to the respondents with the purpose of finding out their opinion on this matter was "How important is environmental protection to you?". Although the answer variants that were provided covered the whole range of answers from "very important" to "not quite important," as it can be seen in the table below (**Table 1**), most of them centered

TABLE 1 | Cross Tabulation and Chi-Square Test on environmental protection based on gender.

			Gender					
			Male	**Female**	**Total**	**Chi-square**	**DF**	**Sig.**
How important is environmental protection to you?	(1) Not quite important	*F*	12	5	17	17.018	2	0.000
		P	2.9%	1.2%	2.1%			
	(2) Quite important	*F*	238	190	428			
		P	58.5%	46.5%	52.5%			
	(3) Very important	*F*	157	214	371			
		P	38.6%	52.3%	45.5%			
Total		*F*	407	409	816			
		P	100%	100%	100%			

A value of χ^2 = 17.018 and a value of p = 0.00 (p < 0.05) were recorded, showing that the female respondents are more interested in the environmental problems than the male respondents.

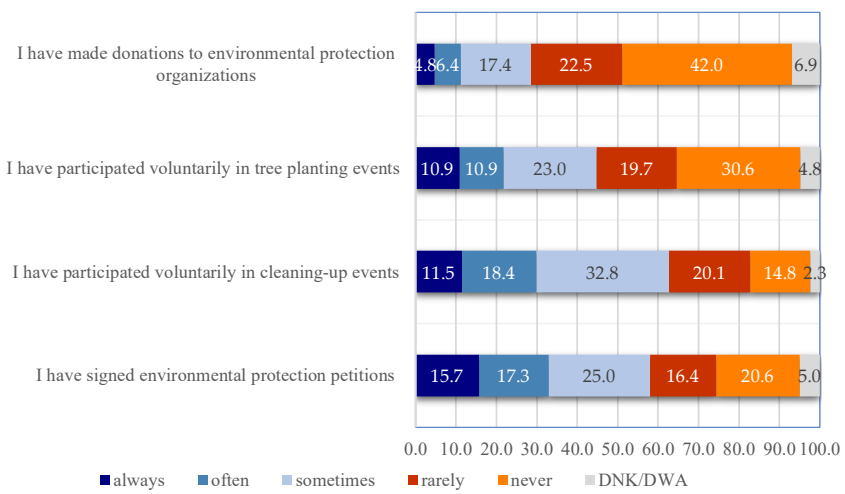

FIGURE 1 | Students' involvement in environmental protection events.

around two answer variants, i.e., "quite important" (52.5%) and "very important" (45.5%). Taking into account these results, it can be posited that the respondents consider environmental problems as being very important; the fact that the "not quite important" and "not at all important" answer variants were selected by very few of them (2.1% and none of the respondents, respectively) also emphasizes this result.

In order to point out other aspects regarding the importance of the environmental protection, a secondary analysis was carried out in order to verify whether there are significant differences among the study population related to the respondents' gender. Following the application of the chi-squared test, the results show that there are significant differences between females and males concerning the way environmental problems are viewed (**Table 1**).

Closely related to the above question was also the question seeking to identify the extent to which the study subjects were involved in environmental protection actions. As it can be seen from the graph below (**Figure 1**), very often, the surveyees signed environmental protection petitions (33% by cumulating percentages from the "always" and "often" answer variants) and participated voluntarily in cleaning-up events (29.9%).

The existence of significant differences between the male and female respondents was also tested in this case. Following the application of the chi-squared test, such significant differences were recorded only for two of the four above-mentioned statements as it can be seen in **Tables 2**, **3**. Based on these results, the following observations can be made:

- There are significant differences between females and males in the way they "have participated voluntarily in cleaning-up events" (**Table 2**). A value of $\chi^2 = 35.446$ and a value of $p = 0.00$ ($p < 0.05$) were recorded. The results show that this type of behavior is more specific to females than to males.

TABLE 2 | Cross Tabulation and Chi-Square Test on the voluntary participation in cleaning-up events based on gender.

			Gender					
			Male	**Female**	**Total**	**Chi-square**	**DF**	**Sig.**
I have participated voluntarily in cleaning-up events	(1) Never	*F*	81	40	121	35.446	5	0.000
		P	19.9%	9.8%	14.8%			
	(2) Rarely	*F*	91	73	164			
		P	22.4%	17.8%	20.1%			
	(3) Sometimes	*F*	130	138	268			
		P	31.9%	33.7%	32.8%			
	(4) Often	*F*	65	85	150			
		P	16.0%	20.8%	18.4%			
	(5) Always	*F*	28	66	94			
		P	6.9%	16.1%	11.5%			
Total		*F*	407	409	816			
		P	100%	100%	100%			

TABLE 3 | Cross Tabulation and Chi-Square Test on signing environmental protection petitions based on gender.

			Gender					
			Male	**Female**	**Total**	**Chi-square**	**DF**	**Sig.**
I have signed environmental protection petitions	(1) Never	*F*	108	60	168	40.845	5	0.000
		P	26.5%	14.7%	20.6%			
	(2) Rarely	*F*	83	51	134			
		P	20.4%	12.5%	16.4%			
	(3) Sometimes	*F*	94	110	204			
		P	23.1%	26.9%	25.0%			
	(4) Often	*F*	58	83	141			
		P	14.3%	20.3%	17.3%			
	(5) Always	*F*	43	85	128			
		P	10.6%	20.8%	15.7%			
Total		*F*	407	409	816			
		P	100%	100%	100%			

- There are significant differences between females and males in the way they "have signed environmental protection petitions" (**Table 3**). A value of $\chi^2 = 40.845$ and a value of $p = 0.00$ ($p < 0.05$) were recorded. The results show that this type of behavior is more specific to females than to males.

Another aspect this study has focused on was identifying the respondents' opinion regarding Romania's main environmental problems. To this purpose, two questions were added to the questionnaire: an open one, the answers to which were coded after the end of the survey, and a closed-ended one, comprising a predefined list of problems from which the subjects had to choose the top three environmental problems by order of preference.

By analyzing the results obtained for the open question (**Figure 2**), depending on the percentages received, "throwing garbage on the ground/in forbidden places" is considered the main environmental problem in Romania (23.9%), being followed by "deforestation" with 17% and "mainly pollution" with 13.6%.

For some answer variants, this question has also presented some small differences between the female and male respondents (resulted from the association tables), but they are not statistically significant. As trends, it can be seen that the biggest

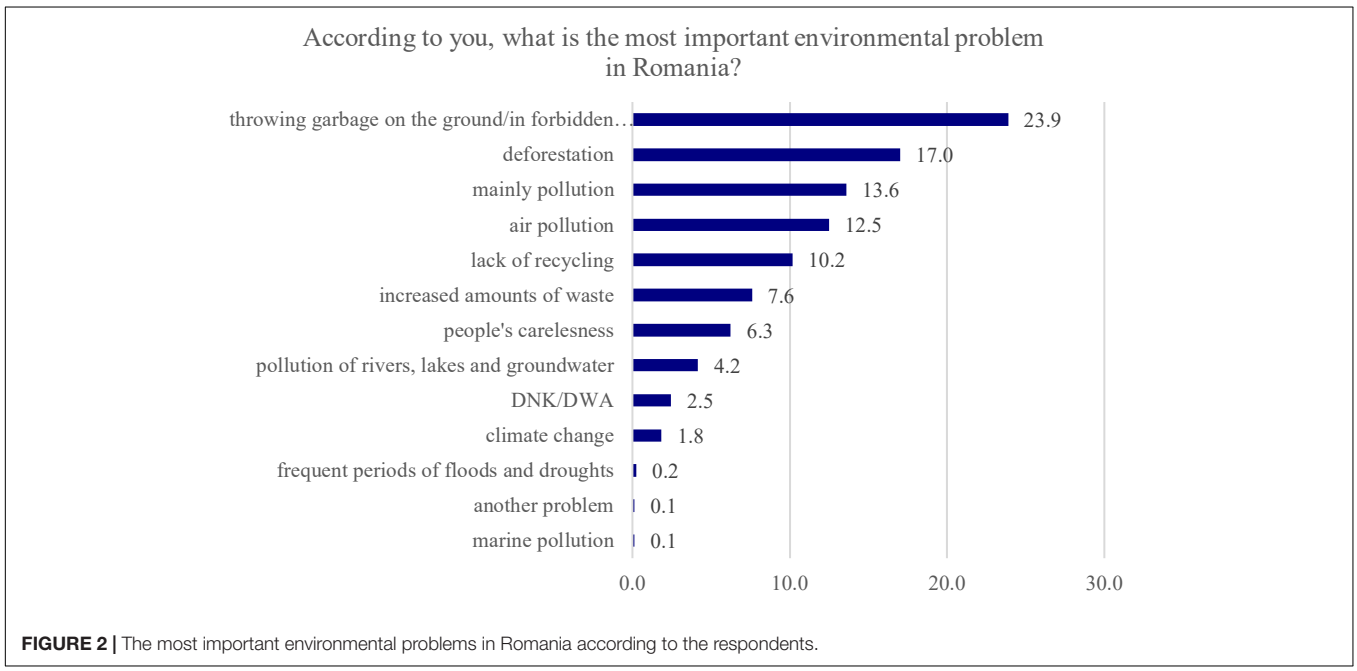

FIGURE 2 | The most important environmental problems in Romania according to the respondents.

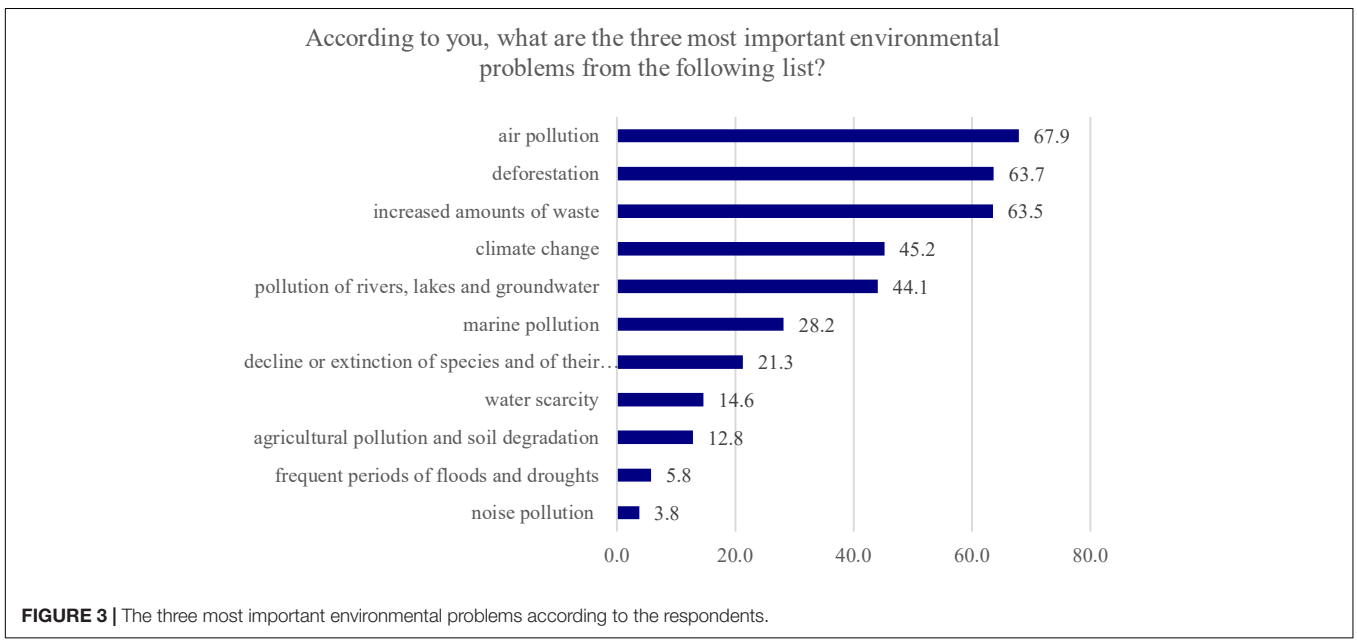

FIGURE 3 | The three most important environmental problems according to the respondents.

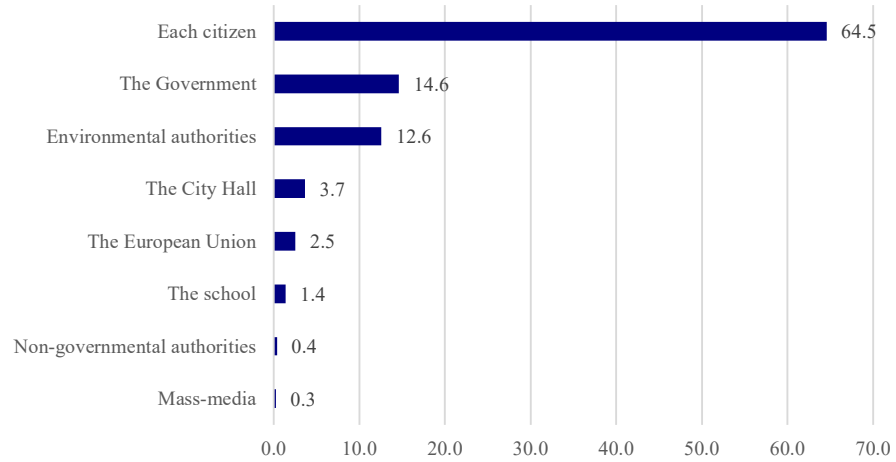

FIGURE 4 | The main actors in solving environmental problems according to the respondents.

differences are registered in the case of the "deforestation" answer variant where, compared to the average obtained from the whole group of respondents, which was 17%, there were variations of up to 21.9% for males and of up to 12.2% for females. Another answer variant for which the statistical differences are not significant but for which there were deviations from the average value (13.8%) is the "mainly pollution" answer variant, with recorded values of 20.3% for the female population and 6.8% for the male population. For the other answers, the differences that were recorded were much smaller.

The answers obtained for the closed-ended question provided a different hierarchy, the first three places being taken by "air pollution," which cumulated 67.9% of the answers, "deforestation" (63.7%) and "increased amounts of waste" (63.5%) (**Figure 3**). By comparing the results of the two questions, it can be posited that the problem of "deforestation" ranks 2nd in both hierarchies, the other problems being slightly different.

According to the respondents, those who should solve the environmental problems are the citizens, this answer variant totaling 64.5% of the responses. At a great distance, there are also the surveyees who consider that "The Government" (14.6%) and the "Environmental authorities" (12.6%) are responsible for dealing with the environmental problems (**Figure 4**).

Students' Reuse Behaviors

The process of waste generation cannot be stopped, but each person can have a positive impact in this matter if they decide to bring around an individual change. By implementing the principle of the 3Rs (Reduction – Reuse – Recycle), people can show they care for the environmental problems that are being felt more and more every day, but also for the conservation of natural resources. Being an integral part of the ecological behavior, reuse is one of the very important steps in the list of actions that each person can take so as to generate as little waste as possible to ultimately reach the landfill. Another aspect the study has addressed was capturing the reuse behavior since nowadays this activity is becoming a trend. Many times, people tend to use things only once and then throw them away. By reusing the materials considered as waste, people can show they care about the climate change and can stop overusing the natural resources by reducing the amount of waste, by reusing it or by donating it to others. As it has been explained in the introductory part of the paper, in order to capture this behavior, six statements referring to the behavior of reuse were added to the questionnaire. The **Figure 5** shows that the statement that recorded the highest percentages for the "always" answer variant was "You repair the damaged items if possible," answered by more than half of the respondents (55.9%). In the order of the recorded percentages, the "often" answer variant follows with 25.6%.

Another statement that exceeded 50% for the "always" answer option was "You reuse the gift bags and boxes you receive" (52.8%), being followed by the category of the respondents who chose the "often" answer option (28.9%). If we were to consider that we can talk about the existence of a reuse behavior among the respondents for the situation where they choose the "always" and "often" answer variants for the statements under investigation, then, the two situations described above fit perfectly to this pattern, the cumulative scores exceeding 80%. "You donate the clothes you no longer use" ranked 3rd in this hierarchy, scoring only 38.2% for the "always" answer option. This is also a case in which we can talk about the existence of a behavior among the surveyees because, taking into account the same principle of cumulation of the scores obtained for the two answer variants, it is clear that a score of 62.1% is obtained. "You donate old but still functional devices to schools

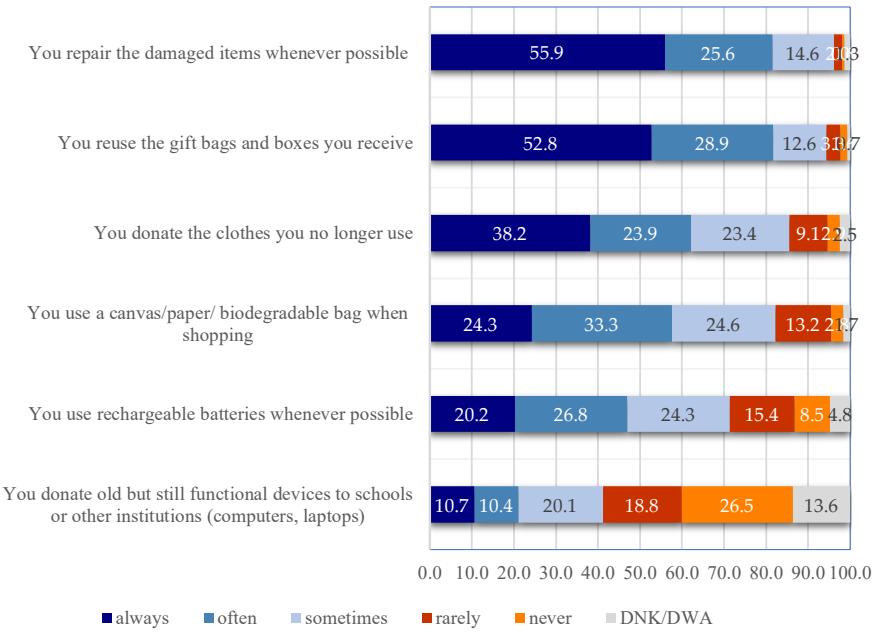

FIGURE 5 | Percentages recorded for the reuse behavior.

or other institutions (computers and laptops)" ranked last in this hierarchy of reuse behavior, scoring only 21.1% by cumulating the two answer variants.

Students' Selective Collection Behavior

Another objective of this study was to observe the students' behavior of selective waste collection. The fact that energy is saved, that natural resources are conserved, that pollution decreases by reducing carbon dioxide emissions and, thus, the greenhouse effect, that the amounts of garbage are reduced, that cheaper packaging and products are obtained, ultimately leading to an increase in the quality of life, can be mentioned among the advantages of selective collection. In this research, the behavior of selective collection is discussed from a general point of view, without emphasizing its occurrence in clearly defined settings, such as at home or in educational institutions. Although, in Romania, under the enforceable legislation, the individuals, the public institutions, the companies, the associations, the

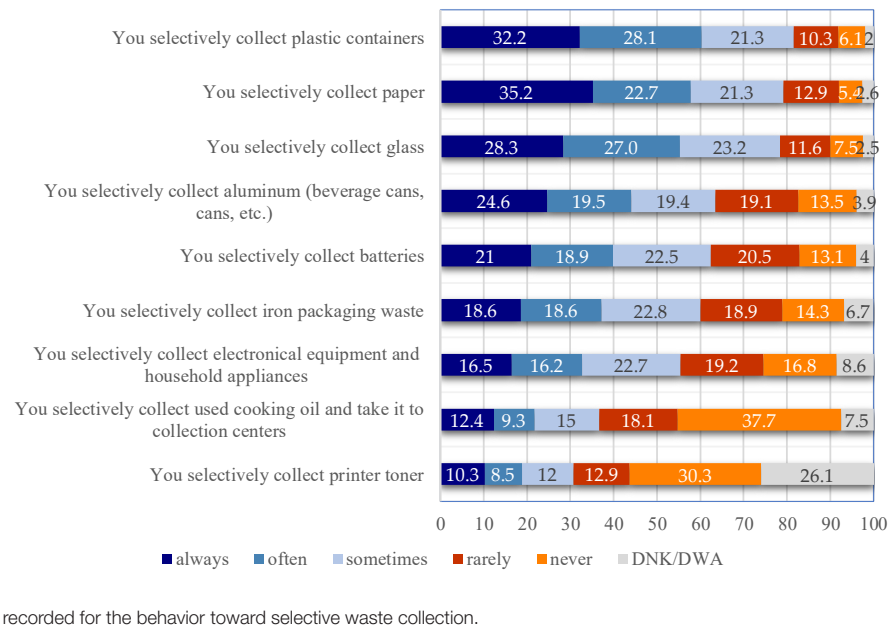

FIGURE 6 | Percentages recorded for the behavior toward selective waste collection.

TABLE 4 | Cross Tabulation and Chi-Square Test on selectively collecting iron packaging waste based on gender.

			Gender					
			Male	**Female**	**Total**	**Chi-square**	**DF**	**Sig.**
You selectively collect iron packaging waste	Never	*F*	44	73	117	13.939	5	0.016
		P	10.8%	17.8%	14.3%			
	Rarely	*F*	72	82	154			
		P	17.7%	20.0%	18.9%			
	Sometimes	*F*	92	94	186			
		P	22.6%	23.0%	22.8%			
	Often	*F*	88	64	152			
		P	21.6%	15.6%	18.6%			
	Always	*F*	85	67	152			
		P	20.9%	16.4%	18.6%			
Total		*F*	407	44	73			
		P	100%	100%	100%			

foundations, i.e., all the people residing in Romania, have the duty and legal obligation to selectively collect waste, the statistics rank us among the last European Union countries in this respect.

To better comprehend the behaviors of selective collection and to better view the results, the percentages obtained for the "always" and "often" answer variants (variants that can lead to the idea of existence of such a behavior), were cumulated.

As it can be seen in the **Figure 6**, in the ranking of selective collection, the first place is taken by the collection of plastic containers that obtained a cumulative score of 60.3%, followed by the collection of paper, with a total of 57.8%. Abiding by the same principle of cumulating the scores obtained for the two answer variants, it can be posited that the selective collection of glass ranks 3rd with 55.3%.

The answer variants presented above are those exceeding 50%. At the other extreme, the collection behaviors that scored high values for the "never" and "rarely" answer variants can be found. "You selectively collect used cooking oil and take it to collection centers" scored the highest percentages, 53.8% of the respondents saying they do so "rarely" or "never" (score obtained by cumulating the two answer variants). This behavior is followed by "You selectively collect printer toner"; in case the above principle of calculation is used, a score of 43.2% is obtained. This last statement also recorded the highest values for the "DNK/DWA" (Don't know the answer/Don't want to answer) answer variant with 26.1%.

Following the application of the chi-squared test, the results show that there are significant differences between males and females in the way they collect iron packaging waste (**Table 4**). A value of $\chi^2 = 13.939$ and a value of $p = 0.01$ ($p < 0.05$) were recorded. The results show that this type of behavior is more specific to males than to females.

For the other answer variants, no significant differences related to the respondents' gender were recorded.

Students' Level of Awareness of the Type of Waste Collected Into the Containers

The study also tried to investigate the respondents' level of knowledge regarding the color codes of the containers for the selective waste collection with two questions. To the first one, "Do you know the color code of recycling bins?", almost three quarters of the respondents (74.6%) selected "yes." This was followed by "no" with 21.9% and "DNK/DWA" with 3.6%. Then, the second question, "What are the types of waste selected according to the color code of recycling bins?", was introduced in the survey in order to capture the respondents' level of awareness regarding the type of waste that has to be collected into the containers for selective collection (based on the color of their lids). For every color code, the same five answer variants were given, and the respondents had to choose the correct one based on their knowledge. In accordance with the enforceable legislation, the color codes that are used are as follows:

- The yellow bin is used for the selective collection of plastic and metal (foils, HDPE, PET, PVC, and other plastics, but also ferrous and non-ferrous metals).
- The blue bin is used for the selective collection of cardboard and paper (printed paper, mixed paper).
- The green bin is used for the selective collection of glass (colored glass and white glass).
- The gray/brown bin is used for the collection of the mixed fraction (bio-waste and household waste),
- The black bin is used for the collection of biodegradable waste from one's own household (dried leaves, grass, flowers, vegetable, and fruit leftovers).

As it can be seen in the **Figure 7**, the correct answers provided by the respondents to the second question (mentioned above) are different from the ones in the first question, where almost two thirds of the respondents stated that they were familiarized with this color code.

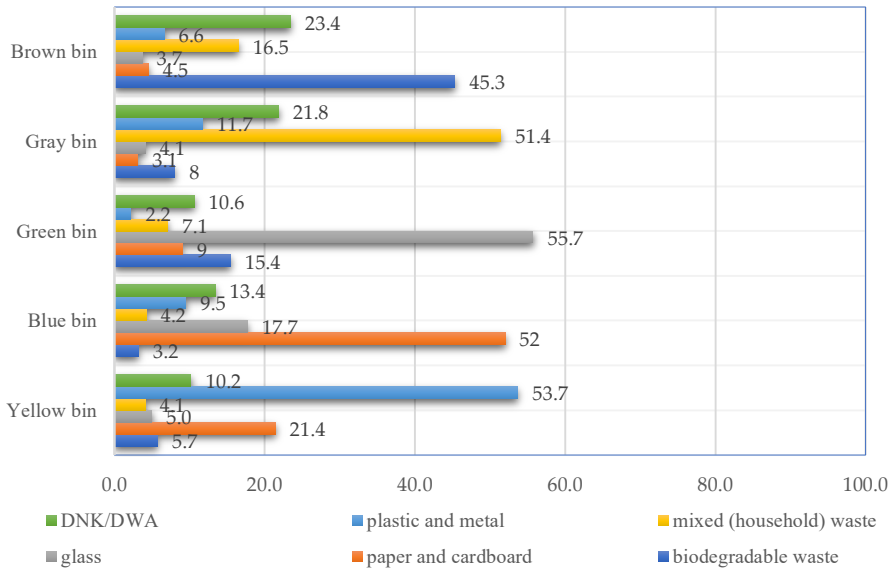

FIGURE 7 | Percentages recorded for the respondents' level of knowledge regarding the color code for the recycling bins in Romania.

The correct answer variants ranged from 45.3% for the brown bins to 55.7% for glass. At least 10% of the respondents stated, for all the situations under investigation, that they did not know the answer to them. Therefore, it can be concluded that awareness campaigns are definitely necessary to inform the population about the color code used for recycling bins. There were no significant variations in the answers based on the respondents' gender.

DISCUSSION

Waste, in addition to being a problem for the environment and generating economic losses, if properly sorted, handed over and recycled, can be used as a resource to create new products. People should be made aware of the impact of waste on the environment, of reusing and recycling it. Although selective collection systems have been introduced directly at the generating source of the waste, they are still not enough due to several reasons, e.g., vandalized collection containers; operators do not follow the collection calendar and mix wastes; large amounts of recyclable waste are stored (Frone and Frone, 2020).

The interest among researchers regarding this topic seems to be high. International studies in universities, based on questionnaires administered to students, have tried to capture the level of the students' awareness of waste minimization, selective collection, reuse and recycling problems with the purpose of further creating awareness programs, campaigns and strategies or even introducing new study disciplines on waste management and the 3 Rs in the curriculum (Desa et al., 2011; Barloa et al., 2016; Saladié and Santos-Lacueva, 2016). The studies have suggested the fact that the students were aware of the above-mentioned problems, but that more awareness campaigns were necessary to teach them about how to put this knowledge into practice.

In Romania, the studies carried out on this topic have been based mainly on the data provided by the decision-makers and, thus, there are very few of them that are based on surveys. Therefore, the research undergone by Pop et al. (2015), can help us understand the population's perception and behavior regarding the environmental problems. By way of comparison with this study, the above-mentioned study is based on a smaller number of respondents from other social and educational backgrounds. At the same time, the issue of selective waste collection has also been studied in other counties and on other categories of respondents (Gherheş and Obrad, 2017).

The students' perception regarding the environmental problems was also surveyed by Târţiu (2011) on 257 respondents, students of ASE University of Bucharest (BAES), who expressed their concern about the environmental problems in Romania and requested additional information to learn about this topic.

In general, the studies are carried out in the Bucharest-Ilfov area, but not only (Târţiu, 2011; Iojă et al., 2012; Sima et al., 2019; Ianoş et al., 2021), while the western part of the country has not been researched regarding the educated young people's perception on environmental problems.

This category of respondents, i.e., the students of Politehnica University of Timisoara, was included in several other studies, which mainly focused on topics regarding students' human values (Dragomir et al., 2020) or their attitudes on electricity, water, plastic or paper consumption (Gherheş and Fărcaşiu, 2021; Gherheş et al., 2021) but did not discuss the above-mentioned topic.

As the results show, the subjects of this study consider to a large extent that the environmental problems are important and very important for them. If these results are compared with those obtained by the Eurobarometer in December 2019, the values

recorded are close to the average obtained in that year in the EU countries, 94% of the citizens saying that the environmental protection is important for them. This study's results exceeded this average, the recorded value being 98%, higher than the value obtained for Romania, which was 87% in 2019. The difference could be found in the respondents' background as the study carried out by the European Commission targeted the entire population. Waste is considered to be one of the biggest environmental problems we face in Romania, a fact confirmed by the answers given to the open question in the questionnaire. To "Throwing garbage on the ground/in forbidden places," an answer variant which cumulated the highest percentages, "lack of recycling," and "increased amounts of waste" could also be added as they refer to the same problem, that of waste. "Pollution of rivers, lakes and groundwater" as well as the answer variants that refer to "mainly pollution" or "climate change," a partial consequence of waste, could also be included here. Even if "increased amounts of waste" was included in a list with other environmental problems, the respondents ranked it on 3rd place, not very far from "air pollution" and "deforestation." As above, the percentages recorded for the variants referring to waste could be added to "increased amounts of waste."

It is interesting to note that the secondary analysis that was carried out revealed the fact that gender also seems to play an important part in the respondents' attitudes toward the importance of the environmental problems in that the female respondents are more aware of the need to protect our environment and also in that they voice and show their concerns more by signing petitions and doing volunteering work as far as environmental protection is concerned.

Another important aspect that was noticed was that of the responsibility for environmental problems, the provided answers placing citizens on the first place in this ranking. By taking responsibility as citizens and not by escalating it to other bodies and institutions, by raising awareness of the importance of the role played by each and every one of us, we could create better conditions for the environmental protection.

Taking an intermediate place in the principle of the 3Rs that aims at reducing the impact of human activities on the environment, as behavior of sustainable consumption, reuse, along with reduction and recycling, can help optimize the use of available resources and, in turn, reduce the carbon footprint. The study has also highlighted the existence of these behaviors in the study population, more than half of the respondents choosing the "You repair the damaged items whenever possible" followed by "You reuse the gift bags and boxes you receive" and "You donate the clothes you no longer use." Nevertheless, behaviors regarding the benefits of reuse that the population must be informed about have also been identified. A good example is "You donate old but still functional devices to schools or other institutions (computers, laptops)", where the obtained percentages lead rather to the idea of the absence of this behavior.

The selective waste collection, as part of recycling, was another aspect that this study has tackled, the results indicating the presence of this behavior for the plastic containers, followed by the collection of paper and glass. For these behaviors, the score of 50% was exceeded by cumulating the "always" and "often" answer variants. This is another case where situations that do not indicate the existence of selective collection behaviors have been identified. For "You selectively collect used cooking oil and take it to collection centers" and "You selectively collect printer toner," the highest values were recorded for the "never" and "rarely" answer variants. Therefore, even for these situations, it would be useful to inform the population about the benefits of this behavior.

The study has also pointed out the fact that, undoubtedly, it is necessary to inform the population about the color codes used on the recycling bins that indicate the type of waste to be collected into them. Although initially three-fourths of the respondents stated that they knew what type of waste should go into which container depending on the bin color, when further assessing their knowledge on this issue, the figures indicated a lower level of information, the range of correct answers being between 45.3% for the brown recycling bins and up to 55.7% for glass.

In order to achieve the objectives and targets regarding the amount of selectively collected waste, in Romania, there was and still is necessary to have a coherent and sustainable legislation, which will lead to, besides the elimination of these environmental pollution factors, to the recycling and reuse of an important part of the waste, as raw or secondary materials (Mihai, 2018; Teodor et al., 2020).

Another solution would be to apply blockchain technology in the waste management field, the aim being to fight climate change for a more sustainable development, but also to comply with the European Union regulations. This technology can lead to a reduction in resource consumption, providing transparency and traceability in the efficient management of the product origin. New digital technologies such as IoT, blockchain technology, AI, etc. combined with circular economy would lead to a greater transparency in waste management and, thus, to the reduction of environmental pollution (Stankovic and Gupta, 2017; Dubey et al., 2019; Geng et al., 2019; Bag et al., 2020; Giudice, 2021; Upadhyay et al., 2021; Yildizbasi, 2021).

CONCLUSION

A first solution to remedy the waste problem would be to carry out awareness and education campaigns for university students. By providing theoretical knowledge and by carrying out extracurricular activities, universities can contribute to cultivating environmentally responsible mentalities that lead to the adoption of sustainable habits. The academic world should start to focus more and more on the concept of circular economy by developing new courses and teaching materials in order to provide the students with the skills required by the circular economic model and as a way to achieve sustainable development. In addition, universities play an essential role in shaping the mentalities of professionals, who will occupy key positions in society after completing their studies, being vectors for the multiplication of environmental protection behaviors. As it has already been mentioned, the provision of theoretical knowledge could be done with the consent of the

management of higher education institutions by introducing topics for discussion that focus on waste management and the 3Rs in some disciplines' syllabuses. The extra-curricular part could be achieved mainly by involving student organizations in environmental protection actions. These could target the entire student community by carrying out environmental protection campaigns within the university as well as by a more focused approach on the university campus. Supported by the management of educational institutions, with the help of the hostels' administrators, such awareness campaigns could lead to the adoption of sustainable behaviors.

Therefore, in waste management, it is necessary to literally involve the entire society represented by local and central public authorities with a decision-making role, by waste generators with a role of reducing quantities and recycling, by professional associations (with a coordinating role at the national level) and research institutions (statistics and forecasts), and by the civil society, actively involved through NGOs or its personnel (the goods consumer and non-governmental organizations).

Although the study has identified gender differences in that women are more aware and more involved in environmental protection activities, regardless of gender, the younger generation should deepen their knowledge in this field and adopt behaviors that could lead to a more sustainable future.

Moreover, by raising awareness and assessing the influences that our behaviors have on the environment, through education, by adopting a sustainable lifestyle and sustainable production and consumption practices, we will be able to reduce the pressure on the planet's resources. Hopefully, in this way, we will not be coerced into asking the earth for more resources than it can generate, not overusing them in advance and not consuming the natural resources that belong to future generations.

Taking into account the fact that Romania still has a lot of problems to solve in the field of environmental protection, it is possible that this solution provided by the blockchain technology, which is still in full development, will help to solve these issues faster. This technology has the potential to change social behaviors, involving more stakeholders, especially the citizens, boosting the waste management process and leading to the ultimate goal, that of "zero pollution" cities.

Although the study provides some answers regarding the environmental problems we face in Romania, the importance and the identification of the people responsible for solving them, but also regarding the behaviors of reuse and recycling, there are limitations to the undertaken analysis, these being the area of coverage, the fact that only the perspective of the students of the Politehnica University of Timisoara is presented. Further studies need to be carried out on larger geographical areas and on different categories of public, where other variables that can influence the attitudes toward environmental protection and the behaviors of reuse and recycling (background of origin, place of origin, the manner in which the legislation in the field is applied, standard of living, economic condition, local culture and beliefs, details about housing conditions, etc.) can be introduced. This objective could be achieved by further conducting qualitative analyses that will definitely lead to a better understanding of the studied behavior.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

REFERENCES

Bacău, C., Mateoc-Sîrb, N., Ciolac, R., Mateoc, T., Teodorescu, R. I., and Tabără, V. (2021). Study on the production and use of biomass energy in the timis county. *Rom. Biotechnol. Lett.* 26, 2434–2440. doi: 10.25083/rbl/26.2/2434.2440

Bag, S., Wood, L. C., Xu, L., Dhamija, P., and Kayikci, Y. (2020). Big data analytics as an operational excellence approach to enhance sustainable supply chain performance. *Resour. Conserv. Recycl.* 153:104559. doi: 10.1016/j.resconrec.2019.104559

Balkan Insight (2020). *Bosnia, Albania, Romania Top European Pollution-Related Deaths Ranking.* Available online at: https://balkaninsight.com/2020/09/08/bosnia-albania-romania-top-european-pollution-related-deaths-ranking (accessed 25 July 2021).

Barloa, E. P., Lapie, L. P., and de la Cruz, C. P. P. (2016). Knowledge, attitudes, and practices on solid waste management among undergraduate students in a Philippine State University. *J. Environ. Earth Sci.* 6, 146–153.

Barr, S., Gilg, A. W., and Ford, N. J. (2001). Differences between household waste reduction, reuse and recycling behaviour: a study of reported behaviours, intentions and explanatory variables. *Environ. Waste Manag.* 4, 69–92.

Burlakovs, J., Jani, Y., Kriipsalu, M., Vincevica-Gaile, Z., Kaczala, F., Celma, G., et al. (2018). On the way to 'zero waste' management: recovery potential of elements, including rare earth elements, from fine fraction of waste. *J. Cleaner Prod.* 186, 81–90. doi: 10.1016/j.jclepro.2018.03.102

Cairns, C. N. (2005). E-waste and the consumer: improving options to reduce, reuse and recycle. *IEEE Int. Symp. Electronics Environ.* 1, 237–242.

Ciuta, S., Apostol, T., and Rusu, V. (2015). Urban and rural MSW stream characterization for separate collection improvement. *Sustainability* 7, 916–931. doi: 10.3390/su7010916

Dempsey, M. E., and Palilonis, A. (2012). Reuse, recycle. reduce: a greener library with print management. *Library Hi Tech.* 30, 408–417. doi: 10.1108/07378831211266555

Desa, A., Ba'yah Abd, Kadir, N., and Yusooff, F. (2011). A study on the knowledge, attitudes, awareness status and behaviour concerning solid waste

management. *Proc. Soc. Behav. Sci.* 18, 643–648. doi: 10.1016/j.sbspro.2011.05.095

Dragomir, G.-M., Cernicova-Buca, M., Gherheş, V., and Cismariu, L. (2020). Engineering students' human values as rhizomatic lines of sustainability. *Sustainability* 12:7417. doi: 10.3390/su12187417

Dubey, R., Gunasekaran, A., Childe, S. J., Blome, C., and Papadopoulos, T. (2019). Big data and predictive analytics and manufacturing performance: integrating institutional theory, resource-based view and big data culture. *Br. J. Manag.* 30, 341–361. doi: 10.1111/1467-8551.12355

Earth Day (2021). *How Our Trash Impacts the Environment*. Available online at: https://www.earthday.org/how-our-trash-impacts-the-environment (accessed 29 May 2021)

Ellen MacArthur Foundation (2017). *Ellen MacArthur Foundation and World Economic Forum Launch Latest Plastic Packaging Research and Global Action Plan Endorsed by Industry.* Cowes: The Ellen MacArthur Foundation.

Environmental Defense Fund (2021). *Methane: a Crucial Opportunity in the Climate Fight. Environmental Defense Fund*. Available online at: https://www.edf.org/climate/methane-crucial-opportunity-climate-fight (accessed 1 June 2021)

European Commission (2019). *The Environmental Implementation Review 2019 Country Report Romania*. Available online at: https://ec.europa.eu/environment/eir/pdf/report_ro_en.pdf (accessed 8 June 2021).

European Commission (2020b). *May Infringements Package: Key Decisions. 14 May 2020*. Available online at: https://ec.europa.eu/commission/presscorner/detail/en/inf_20_859) (accessed 25 July 2021).

European Commission (2020a). *Country Report Romania 2020 European Commission*. Available online at: https://ec.europa.eu/info/sites/default/files/2020-european_semester_country-report-romania_en.pdf (accessed 25 July 2021).

Eurostat (2020). *492 kg of Municipal Waste Generated Per Person in the EU. Eurostat*. Available online at: https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20200318-1) (accessed 25 July 2021).

Eurostat (2021). *Half a Tonne of Municipal Waste Generated Per Person in the EU - Products Eurostat News*. Eurostat. Available online at: https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20210216-1 (accessed 9 June 2021).

Florin, D., Frone, S., Platon, V., and Constantinescu, A. (2020). Green economy prerequisites of waste management. *Sci. Papers Ser. Manag. Econ. Eng. Agric. Rural Dev.* 20, 211–218. doi: 10.1177/0734242X07088432

Frone, D., and Frone, S. (2020). Issues and trends of progress towards sustainable development goals in Romania. *Sci. Papers Ser. Manag. Econ. Eng. Agric. Rural Dev.* 20, 237–245.

Geissdoerfer, M., Savaget, P., Bocken, N. M., and Hultink, E. J. (2017). The circular economy–a new sustainability paradigm? *J Clean. Prod.* 143, 757–768. doi: 10.1016/j.jclepro.2016.12.048

Geng, Y., Sarkis, J., and Bleischwitz, R. (2019). How to globalize the circular economy. *Nat. Comment.* 565, 153–155. doi: 10.1038/d41586-019-00017-z

Gherheş, V., and Fărcaşiu, M. A. (2021). Sustainable behavior among romanian students: a perspective on electricity consumption in households. *Sustainability* 13:9357. doi: 10.3390/su13169357

Gherhes, V., and Obrad, C. (2017). Social responsibility and ecological behaviors towards selective waste collection. *Materiale Plastice* 54, 430–432. doi: 10.37358/mp.17.3.4865

Gherheş, V., Cernicova-Buca, M., Fărcaşiu, M. A., and Palea, A. (2021). Romanian students' environment-related routines during COVID-19 home confinement: water, plastic, and paper consumption. *Int. J. Environ. Res. Public Health* 18:8209. doi: 10.3390/ijerph18158209

Giudice, M. D. (2021). Supply chain management in the era of circular economy: the moderating effect of big data. *Int. J. Logist. Manag.* 32, 337–356. doi: 10.1108/ijlm-03-2020-0119

Ianoş, I., Zamfir, D., Stoica, V., Cercleux, L., Schvab, A., and Pascariu, G. (2021). Municipal solid waste management for sustainable development of Metropolitan Bucharest Area. *Eng. Environ. Manag. J.* 11, 359–369. doi: 10.30638/eemj.2012.045

Institute for European Environmental Policy (2019). *Reaching Sustainable Consumption in Europe by 2050. Institute for European Environmental Policy*. Available online at: https://ieep.eu/news/reaching-sustainable-consumption-in-europe-by-2050 (accessed 7 June 2021).

Iojă, C. I., Onose, D. A., Grădinaru, S. R., and Şerban, C. (2012). Waste management in public educational institutions of bucharest city. *Rom. Proc. Environ. Sci.* 14, 71–78. doi: 10.1038/s41559-020-01358-z

Izvercian, M., and Ivascu, L. (2015). Waste management in the context of sustainable development: case study in Romania. *Proc. Econ. Finance* 26, 717–721. doi: 10.1016/s2212-5671(15)00825-4

Kabirifar, K., Mojtahedi, M., Wang, C., and Tam, V. W. Y. (2020). Construction and demolition waste management contributing factors coupled with reduce, reuse, and recycle strategies for effective waste management: a review. *J. Clean. Prod.* 263:121265. doi: 10.1016/j.jclepro.2020.121265

Kirchherr, J., Reike, D., and Hekkert, M. (2017). Conceptualizing the circular economy: an analysis of 114 definitions. *Resour. Conserv. Recycl.* 127, 221–232. doi: 10.1016/j.resconrec.2017.09.005

Kirkby, G. (1993). Waste management: three R's (reduce, reuse, recycle) reduce waste, save money. *Leadersh. Health Serv.* 2, 30–33.

Lewandowski, M. (2016). Designing the business models for circular economy—towards the conceptual framework. *Sustainability* 8:43. doi: 10.3390/su8010043

Marcu, V. (2010). Conceptul zero deşeuri. *Revista Salubritatea* 1, 5–8.

Meseguer-Sánchez, V., Gálvez-Sánchez, F. J., Molina-Moreno, V., and Wandosell-Fernández-de-Bobadilla, G. (2021). The main research characteristics of the development of the concept of the circular economy concept: a global analysis and the future agenda. *Front. Environ. Sci.* 304:704387.

Mihai, F. C. (2018). Waste collection in rural communities: challenges under EU regulations. a case study of neamt county, Romania. *J. Mat Cycles Waste Manag.* 20, 1337–1347. doi: 10.1007/s10163-017-0637-x

Ministerul Mediului, Agenţia Naţională pentru Protecţia Mediului (2020). *Raportul Judetean Privind Starea Mediului Pentru Anul 2016-2019 Judet Timis*. Available online at: http://www.anpm.ro/documents/28351/2116733/Starea+mediului+APM+Timis+2019+FINAL.pdf/38d11270-e054-40dc-a135-4a8dd88e36d1 (accessed 9 June 2021)

Ministerul Mediului, Apelor şi Padurilor (2011). *Law 211/2011*. Available online at: http://www.mmediu.ro/beta/wp-content/uploads/2012/05/2012-05-17_LEGE_211_2011.pdf (accessed June 8, 2021).

Ministerul Mediului, Apelor si Padurilor (2018). *GEO 74/2018*. Available online at: http://www.mmediu.ro/articol/recomandari-pentru-aplicarea-modificarilorlegislative-introduse-prin-ordonanta-de-urgenta-nr-74-2018/2959 (accessed June 9, 2021).

Ministerul Mediului, Apelor şi Padurilor (2021). Planul National de Gestionare a Deseurilor. Available online at: http://www.mmediu.ro/app/webroot/uploads/files/2018-01-10_MO_11_bis.pdf (accessed June 8, 2021).

Parlamentul European (2021). *Cum Inten?ionează Uniunea Europeană să ajungă la o Economie Circulară Până în 2050?*. Available online at: https://www.europarl.europa.eu/news/ro/headlines/society/20210128STO96607/cum-doreste-ue-sa-obtina-o-economie-circulara-pana-in-2050 (accessed 15 May 2021)

Pop, N., Baciu, C., Brisan, N. S., Muntean, O. L., Costin, D., and Rogozan, D. (2015). *Evaluating Attitudes and Behavior Towards Selective Collection of Waste in Cluj-Napoca City*. Available online at: http://studia.ubbcluj.ro/download/pdf/Ambientum/2015_1_2/10.pdf. (accessed 8 June 2021)

Portal Legislativ (2010). *Law 132/2010*. Available online at: http://legislatie.just.ro/Public/DetaliiDocument/120275 (accessed 9 June 2021)

Portal Legislativ (2019). *Law 194/2019*. Available online at: http://legislatie.just.ro/Public/DetaliiDocumentAfis/219403 (accessed 9 June 2021)

Portal Legislativ (2020). *Law 181/2020*. Available online at: http://legislatie.just.ro/Public/DetaliiDocument/229273 (accessed 9 June 2021)

Ramstetter, L., and Habersack, F. (2020). Do women make a difference? analysing environmental attitudes and actions of members of the European parliament. *Environ. Polit.* 29, 1063–1084. doi: 10.1080/09644016.2019.1609156

Resource Recycling (2019). *Dispatches from Europe: Packaging Reuse in the spotlight. Resource Recycling*. Available online at: https://resource-recycling.com/recycling/2019/04/23/dispatches-from-europe-packaging-reuse-in-the-spotlight/ (accessed 29 May 2021).

Saladié, Ò, and Santos-Lacueva, R. (2016). The role of awareness campaigns in the improvement of separate collection rates of municipal waste among university students: a causal chain approach. *Waste Manag.* 48, 48–55. doi: 10.1016/j.wasman.2015.11.037

Secolsky, C., and Denison, D. B. (2017). *Handbook on Measurement, Assessment, and Evaluation in Higher Education*, 2nd Edn. Milton Park: Routledge.

Silveti, D., and Andersson, K. (2019). Challenges of governing off-grid "productive" sanitation in peri-urban areas: comparison of case studies in Bolivia and South Africa. *Sustainability* 11:3468. doi: 10.3390/su11123468

Sima, M., Grigorescu, I., and Bălteanu, D. (2019). An overview of campus greening initiatives at universities in Romania. *Int J. Sustain. Higher Educ.* 20, 410–422. doi: 10.1108/ijshe-01-2019-0036

Stahel, W. R. (2016). The circular economy. *Nat. News* 531:435.

Stankovic, M., and Gupta, R. F. J. I. (2017). "Industry 4.0—opportunities behind the challenge. United Nations Industrial Development Organization (UNIDO)," in *Proceedings of the Background Paper for UNIDO General Conference*, (Abu Dhabi).

Tam, V. W., and Tam, C. M. (2006). A review on the viable technology for construction waste recycling. *Resour. Conserv. Recycl.* 47, 209–221. doi: 10.1016/s1569-2574(08)60009-x

Târţiu, V. (2011). Evaluation of attitudes & knowledge regarding municipal waste among students. *Case Study Bucharest Acad. Econ. Stud. Econ. Seria Manag.* 11, 263–276.

Teodor, C., Trică, C. L., Ignat, R., and Drăcea, R. M. (2020). Good practices of efficient packaging waste management. *Amfit Econ.* 22, 937–953. doi: 10.1016/j.wasman.2007.03.010

Terazono, A., Murakami, S., Abe, N., Inanc, B., Moriguchi, Y., and Sakai, S. I. (2006). Current status and research on E-waste issues in Asia. *J. Mat. Cycles Waste Manag.* 8, 1–12.

Upadhyay, A., Mukhuty, S., Kumar, V., and Kazancoglu, Y. (2021). Blockchain technology and the circular economy: implications for sustainability and social responsibility. *J. Clean. Prod.* 293, 1–7.

Vicente-Molina, M. A., Fernández-Sainz, A., and Izagirre-Olaizola, J. (2018). Does gender make a difference in pro-environmental behavior? the case of the Basque Country University students. *J. Clean. Prod.* 176, 89–98.

Weber, S., Lynes, J., and Young, S. B. (2017). Fashion interest as a driver for consumer textile waste management: reuse, recycle or disposal. *Int. J. Cons. Stud.* 41, 207–215.

Wut, T. M., Ng, P., Kan, H.-K. M., and Samuel, F. C. (2020). Does gender matter? Attitude towards waste charging policy and pro-environmental behaviours. *Soc. Responsibil. J.* 17, 1100–1115.

Yildizbasi, A. (2021). Blockchain and renewable energy: integration challenges in circular economy era. *Renew. Energy* 176, 183–197. doi: 10.1016/j.renene.2021.05.053

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Effect of Digital Marketing Capabilities and Blockchain Technology on Organizational Performance and Psychology

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Digitalization plays an integral role in the transformation of the Omni structure. This study aims to investigate the effect of digital marketing capabilities (DMCs) and blockchain technology on customer-linking capabilities (CLCs), market-sensing capabilities (MSCs), consumer-brand engagement (CBE), and firm performance in China. The study was quantitative, and a simple random sampling technique was adopted for data collection. Data were collected using a structured questionnaire, 311 questionnaires were distributed, and a 5-point Likert scale was used to collect the data from the respondents who were employed in the Omni structure industries. The research hypothesis was tested using the structural equation modeling (SEM) technique. The results have identified a significant correlation and direct effect between DMCs, CLCs, MSCs, and firm performance. Remarkably, the effect of DMCs on CBE is significant. The mediating effect of MSCs and CLCs is significant between the relationship of DMCs and firm performance. The organization performance in the Omni structure depends on how well the DMCs have been employed. The DMCs influence MSCs, CLCs, and CBE. Henceforth, this study contributes by analyzing the role of DMCs in blockchain technology.

Keywords: customer-linking capabilities, market-sensing, digital marketing capabilities, blockchain, organizational performance, psychology

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INTRODUCTION

The digital and social media techniques have transformed the way consumers access and use information by replacing traditional marketing methods. Digital marketing is reliant on digital platforms and technologies to promote modern marketing strategies to attract potential customers (Chaffey and Smith, 2017). The rapid application of technology, plus changing market trends and procedures, reflects the importance of digitalization (Blut et al., 2018). There is extensive research that shows that customers use smartphones in day-to-day activities, which leads to improvement in their purchasing habits and the overall shopping process (Grewal et al., 2017). In fact, the convergence of smartphone and web-based online shops and supermarket chains as a way of creating the Omni-channel customer experience has been recognized as a new means to resolve the changing direction of retail organizations as agents who promote both physical and digital market infrastructure (Brynjolfsson et al., 2015), and China is not exempted in following this trend.

In Asia, though, several businesses have failed to introduce Omni-channel strategies that meet consumer expectations and function properly (Hosseini et al., 2018; Cao and Tian, 2020). Moreover, this has contributed to a situation where retailers are constantly faced with the difficulty of effectively transforming their business models, which affects the value of their Omni-channel retailing (Massa et al., 2017). As a result, implementing a digital platform must integrate all aspects of corporate performance to ensure that businesses in China achieve full performance quality (Chai-Arayalert and Suttapong, 2020).

On the contrary, implementing digitalization involves several challenges, such as lacking digital capabilities (Kane et al., 2015), uncertain performance outcomes, and the need for transformation of organizational functioning. Further studies on digital marketing capabilities (DMCs) and firm performance are required (Wang, 2020). Furthermore, the COVID-19 crisis has expanded the possibilities and significance of DMCs for businesses (Pedersen et al., 2020; Singh et al., 2020). To stop the spread of the virus, many governments introduced social distancing on a mass scale, so that during the COVID-19 crisis, digital sale platforms were prioritized by many consumers (Herhausen et al., 2015). However, according to Payne et al. (2017), research on consumer-brand engagement (CBE) in the context of Omni-channel marketing is limited.

Therefore, the objective of this study is to explore the role of DMCs concerning market-sensing capabilities (MSCs), customer-linking capabilities (CLCs), and CBE to improve the retailing performance of the firms in China. Second, in this study, firm performance is addressed in the context of the Omni industry. Furthermore, despite exhaustive research, the researcher could not find any study that examined the impact of DMCs on CBE in the Omni structure context. Thus, this study fills a gap in the existing research on this topic.

This study aims to make many contributions. First, it responds to a call for research to fill the gap in marketing skills between available and needed capacity to deal with the dynamics of the digital market capability in the Omni structure context (Day, 2011). The aim is to provide a more comprehensive understanding of DMCs. Second, this article offers empirical data on the effects of the DMCs on firm performance. Finally, it contributes to the growing literature on digitalization by studying the DMCs, performance relationship *via* MSCs, CLCs, and CBE.

THEORETICAL BACKGROUND

Digital Marketing Capabilities

Digital marketing capabilities represent the capabilities of the firm that empower it to adapt its resource formations and build new skills in dealing with stakeholder communication in real-time (Kane et al., 2015). They tend to improve the efficiency of social networking and market analysis concerning stakeholders.

Additionally, DMCs often relate to the relational skills needed to take advantage of the benefits of digitalization (Wang, 2020). They must intrinsically be adaptive so that decisions can be flexible and versatile. Likewise, Teece (2012) recognized the difference between ordinary routine capabilities and dynamic capabilities that facilitate companies to adapt to quickly evolving environments. Common skills ensure that the existing business procedures run smoothly. For instance, the capability of the international systems (IS) is common to support the activities of the supply chain. It operates and builds an efficient network for all the ISs. However, DMCs are dynamic capabilities, which are capable of causing the change in the time of resource combination processes (Eisenhardt and Martin, 2000). They are also useful when there is a need to handle the issues related to the business firm and its stakeholders. Similarly, DMCs assist firms to digitally coordinate and manage relationships with suppliers, customer linking, and channel members. As a result, the firm performance improves (Rai et al., 2006). Moreover, it can be observed that DMCs enhance CBE through changing positive behavior for online shopping (Scheinbaum, 2016). In this scenario, the role of DMCs could be influential on CBE (Farook and Abeysekara, 2016).

Customer-Linking Capabilities

Customer-linking capabilities are the true essence of maintaining a relationship with potential customers and strengthening the bond with existing customers to attract new ones (Vorhies et al., 2011) in order to increase customer lifespan value (Persson and Ryals, 2014). Sharing product information with consumers, receiving consumer requests, working with customers to handle demand, providing an order placement scheme, communicating order status with consumers during order preparation, and the product distribution process are all examples of customer linkage (Leeflang et al., 2014). In this dynamic age, CLCs are crucial because customers look for fast replies to their questions and instant shipments.

Furthermore, since CRCs are often correlated with the inclusion of technology solutions, it is important to consider how and when to use digital technologies (IT) to sustain customer relationship management (CRM) (Wang et al., 2013; Singh et al., 2020). Furthermore, as a channel for collecting information on issues encountered by clients, after-sales services play an important role in customer linkage. A quick reaction to clients is possible, thanks to the smooth and efficient contact among all stakeholders in the supply chain, including customers, after-sales canters, country sales companies, and suppliers. Moreover, CLCs enable digital marketing activities, strategies development, and execution capability, which relate to the overall ability of a firm to succeed (Chinakidzwa and Phiri, 2020a). Perhaps, the CLC is a valuable addition to the process of the firms. This distinctive capability enhances the marketing activities, potentially contributing to the success of the business. Given the statement, the research states that the proliferation of new technologies has expanded the reach of the firms by creating an interactive online environment for the consumers (Clohessy et al., 2019), thereby boosting the revenue of the firm. Undoubtedly, this new paradigm has made businesses invest in new technologies for strengthening the CLCs. Given the illustration, the emergence of new technology solutions has significantly altered the marketing activities of the firms, thereby enhancing the ways the firms can engage with the customers, thus achieving the success of the firms.

Market-Sensing Capabilities

Market-sensing capabilities represent the potential of the firm in recognizing opportunities and foreseeing market changes. Furthermore, MSCs are also defined as the extent to which a firm can actively and purposefully observe the changes in the general environment in terms of the needs of the customer, technological advancement, and modifications in competitor strategies (Miocevic and Morgan, 2018). In addition, Morgan et al. (2012) further explained MSCs as being responsive to the changing demands of the consumers, strategies, and tactics of the competitors, emerging developments in the market structure, and wide-ranging markets and future trends.

The evolution of new technology has changed the business environment by providing numerous business opportunities to firms. Significantly, the interactive technology platforms have made the marketers sense the brand opportunities, thus building long-term consumer-brand relationships. In the illustration, the study states that MSCs improve the performance of the firms by enhancing managerial capabilities around the consumer needs and demands (Sánchez-Gutiérrez et al., 2019). In parallel, the marketing literature suggests that firms use MSCs to gain valuable knowledge for improving the performance of the firms (Cao et al., 2019). Given the articulation, the research suggests firms generate knowledge for targeting the prospective population, thereby cultivating a strong relationship with the consumers. In particular, marketers use external knowledge for responding to market opportunities (Likoum et al., 2020). The MSCs encourage innovativeness, brand engagement, thus achieving superior organizational performance. Firms owning these capabilities substantially improve the competitiveness of the firms, thus strengthening organization performance. In support, the study shows that MSCs allow the marketers to realize opportunities, eventually leveraging the dynamic capabilities to enhance the performance of the firms (Laaksonen and Peltoniemi, 2018). Perhaps, the MSC plays an integral role in configuring the market capabilities into innovative performance and competitiveness of the firms.

Undoubtedly, MSCs are essential, as marketing analysis can provide comprehensive information on the current and future needs of the consumers. Additionally, firms must assess opportunities in data-rich environments to have the best solutions based on the available resources (Wedel and Kannan, 2016; Singh et al., 2020). Manufacturing companies can easily find design defects and offer improved after-sales service to their customers (Coreynen et al., 2017), which eventually improves the performance of the firm.

Consumer Brand Engagement

Both academics and practitioners have paid careful attention to the concept of consumer engagement. Specifically, in the broader sense, CBE has also received much attention in the literature (Hollebeek, 2011). CBE represents the psychological condition of customers, which is mainly dependent on the interactive and co-creative experience with the main brand in the market (Brodie et al., 2011). In addition, several outcomes have been generated by the CBE, such as market effects, consumer effect, brand effect, content effect, and product effect (Barger et al., 2016).

The brand effect consists of the perceived quality of the product, consumer awareness about the brand, loyalty, and associations (Graffigna and Gambetti, 2015), while product effects are comprised of the behavior of consumers toward the product and the frequency of purchase, which is based on the experience of the customer (Ismagilova et al., 2020). The content effect covers the attitudes of the consumers. It activates toward the brand through means such as customer ratings and reviews, re-sharing intentions, and brand-related content (Herhausen et al., 2015). Consumer effects are based on social capital, self-prediction behavior, and consumer power (Brandão et al., 2019; Singh et al., 2020). Last, market effects represent changes in market-level strategies in terms of changes in retailing channels and advertisements, purchase intentions, and conversion rates (Dolbec and Fischer, 2015).

In particular, the adaptation of new retailing channels (i.e., online platforms) has improved the consumer experience, thus enhancing CBE (Essamri et al., 2019). The emerging technologies (i.e., digital marketing) have altered the consumer experience by creating value for the targeted customers (Gielens and Steenkamp, 2019). Thus, echoing this fact, the innovation from businesses has nurtured the firm marketing performance by building strong customer engagement (Önder and Treiblmaier, 2018). Therefore, it has become vital for firms to meet the changing demand of the customers for building long-term customer-brand relationships (Langaro et al., 2018). Research shows that consumer prefers brands that care about their needs, assist them in the decision-making process, and reject the brands that do not value the interest of the consumers (Dodoo, 2018). In such a situation, CBE plays an integral role in developing customer-brand interaction (Abdullah et al., 2018; Hollebeek et al., 2019), thus gaining business success.

Firm Performance

Generally, performance indicates how well an organization is achieving its goals, missions, and values (Gandhi et al., 2017; Khalil et al., 2021). A firm performance, on the other hand, refers to the method of determining the efficiency and efficacy of a particular operation or action (Neely et al., 1995). Marketing performance measurement is the assessment of "the relationship between marketing activities and business performance" (Clark and Ambler, 2001).

Previous studies have claimed that firm performance is represented by some common financial and non-financial measures. Financial measures include net profit, return on assets, inventory turns, net income before tax, inventory management performance, productivity ratio, financial liquidity, market share, quality performance, and before gross tax margin (Gandhi et al., 2017; Sarfraz et al., 2021). In contrast, non-financial measures cover market share, competitive position, performance, quality improvement, and innovation performance.

Measuring a firm performance is the key factor in sustaining the efficiency and effectiveness of its management (Demirbag et al., 2006). Improvement is difficult to achieve without evaluating the current performance first. Therefore, measuring

how the use of organizational resources in terms of different offline and online channels affects business efficiency is essential for organizational performance enhancement (Sharma and Gadenne, 2010; Shah et al., 2021). Based on the previous literature and the gaps identified, this study proposes the following hypothesis. **Figure 1** shows the independent, dependent, and mediating variables of the study.

H1: CLCs have a positive effect on firm performance.
H2: DMCs have a positive effect on CBE.
H3: DMCs have a positive effect on CLCs.
H4: DMCs have a positive effect on MSCs.
H5: Market sensing capabilities have a positive effect on firm performance.
H6: CLCs have a mediating effect on the relationship between DMCs and firm performance.
H7: MSCs have a mediating effect on the relationship between DMCs and firm performance.

RESEARCH METHODOLOGY

This study is quantitative with the approach being cross-sectional. Data were collected from the target population of China who was employed in the Omni structure industries. This study uses employees from service sectors as a sample. The study selected proportionate strata sampling and convenient sampling. After making each stratum, the researcher has visited those conveniently available employees and posted the questionnaires whose addresses were accessible.

According to the data collection procedure, 10 companies were selected, and questionnaires were distributed electronically; 380 self-administered questionnaires were distributed to the employees from service sectors. This technique is also confirmed in the study by Shah (2009). Moreover, some questionnaires were received back through courier from the stated firms of China. Out of 380 questionnaires that were returned, 311 (81%) questionnaires were valid.

Measurement

In this study, a 5-point Likert scale was used to measure the items. DMCs were measured with six items adopted by Wang (2020). CBE was measured with six items adopted by Hollebeek et al. (2014). MSCs were measured with six items adopted by Lindblom et al. (2008). CLCs were measured with five items adopted by Cao and Tian (2020), and firm performance was measured with five items (Croteau and Bergeron, 2001; Kearns and Sabherwal, 2006).

RESULTS

The next move is to look at convergent validity, which describes the degree of a positive association between measurements or metrics with the same construct (Hair et al., 2016). Researchers looked at the average variance extracted (AVE) and indicators of outer loading (Hair et al., 2016). The AVE threshold value is 0.50 or greater, suggesting sufficient convergent validity, or half of the variance of metrics explained by latent constructs (Hair et al., 2017a). The meaning of AVE less than 0.50 indicates that more variation exists in item error than in the variance explained by the build (Hair et al., 2016). Generally, scales or markers with outer loading between 0.40 and 0.70 can be excluded (Hair et al., 2017b). The larger the outer loadings, the more frequent the build indicators are; this is often known as indicator reliability (Hair et al., 2017b). As a result, the convergent validity of the current analysis was determined by analyzing the AVE values and outer loadings. The findings show that both of the AVE values of the constructs are greater than 0.50. As shown in **Table 1**, convergent validity has been identified.

The discriminant validity is defined as extends to a construct that is distinct from the other constructs by empirical standards (Hair et al., 2016). In other words, the indicators of construct

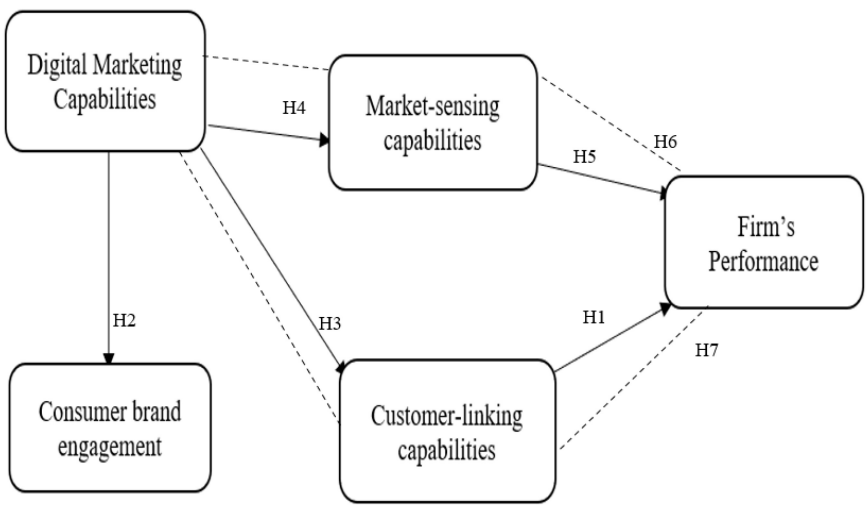

FIGURE 1 | Conceptual model.

TABLE 1 | Internal consistency reliability.

Construct	Cronbach's alpha	rho_A	Composite reliability	Average variance extracted (AVE)
CBE	0.744	0.852	0.828	0.545
CLC	0.748	0.902	0.824	0.522
DMC	0.871	0.875	0.912	0.721
FP	0.925	0.927	0.943	0.769
MSC	0.902	0.905	0.927	0.719

TABLE 2 | Discriminant validity.

	CBE	CLC	DMC	FP	MSC
CBE	0.738				
CLC	0.591	0.723			
DMC	0.784	0.574	0.849		
FP	0.385	0.338	0.382	0.877	
MSC	0.441	0.469	0.503	0.449	0.848

which are theoretically distinct to other constructs are also distinct by empirical standards. The established discriminant validity means that a construct that captures the phenomena is distinct from other constructs in the same model.

The approach commonly used for the assessment of discriminant validity is the Fomell-Larcker criterion. This approach compares the square root of the AVE values with the correlations of a latent variable (Hair et al., 2016). Therefore, the square root of the AVE values should be higher than its correlation with any other construct in the model (Henseler et al., 2009). Hence, in this study from the Fornell-Larcker criterion, the square root of the AVE values of the construct is greater than the highest correlation with any other constructs, so it is concluded that the discriminant validity has been established, and the results are shown in **Table 2**.

Structural Model

According to Hayes technique, the study is used to examine the effect of mediating variables on the relationship between the independent and dependent variables by assessing the structural or inner model. In the PLS-SEM, the key criteria for structural model assessment are the assessment of predictive relevance (Q^3) (Hair et al., 2017b). Therefore, **Figure 2** shows the assessment measurement model, and **Figure 3** shows the structural equation modeling (SEM) evaluated structural models.

Direct Relationship

Customer-linking capabilities are positively related to the firm performance. **Table 3** demonstrates a significant and positive relationship between CLCs and the firm performance (β = 0.163, t = 2.397, p = 0.017), thus, hypothesis 1 (H1) is supported. Hypothesis 2 (H2) predicted that DMCs are positively related to CBE. **Table 3** shows a significant and positive relationship between DMC and CBE (β = 0.784, t = 25.802, p = 0.000), thus, H2 is accepted. Hypothesis 3 (H3) predicted that DMCs are positively related to CLCs. **Table 3** describes a significant

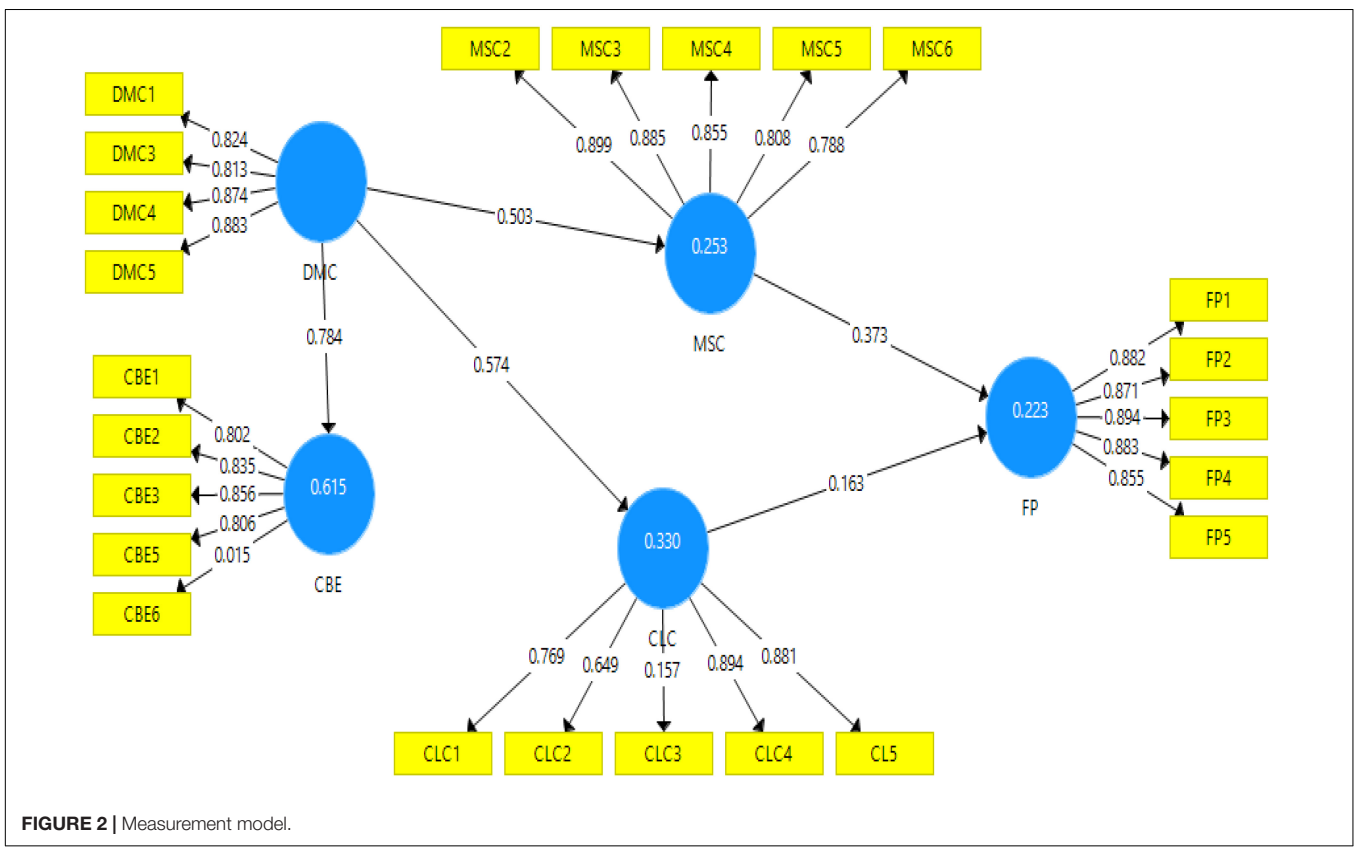

FIGURE 2 | Measurement model.

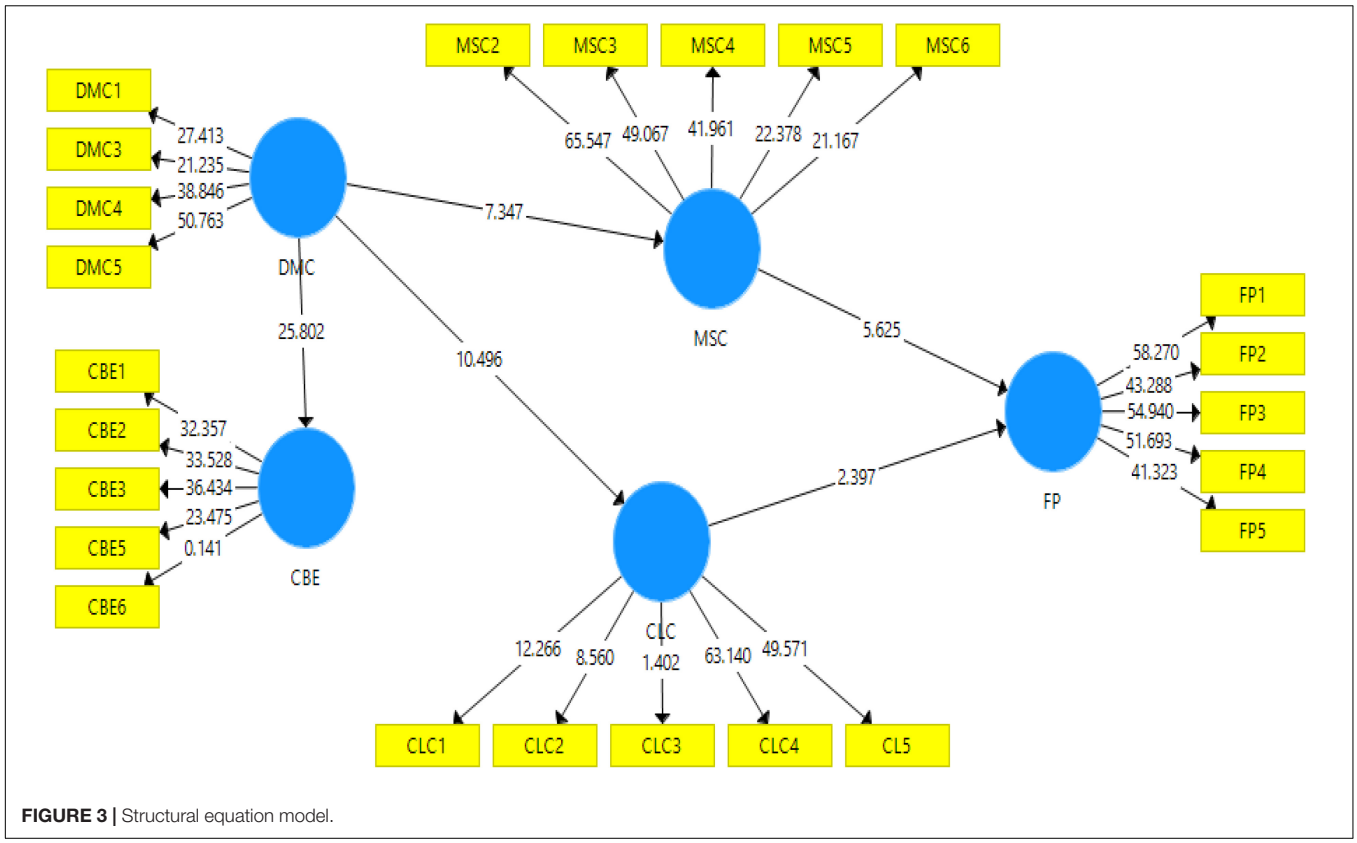

FIGURE 3 | Structural equation model.

and positive relationship between DMC and CLCs (β = 0.574, t = 10.496, p = 0.000), thus, H3 is accepted. Hypothesis 4 (H4) predicted that DMCs are positively related to MSCs. **Table 3** demonstrates a significant and positive relationship between DMCs and MSCs (β = 0.503, t = 7.347, p = 0.000), thus, H4 is accepted. Similarly, hypothesis 5 (H5) predicted that MSCs are positively related to firm performance. Results in **Table 3** demonstrate a significant positive relationship between MSCs and firm performance (β = 0.373, t = 5.625, p = 0.000), thus, H5 is accepted.

TABLE 3 | Direct relationship.

Hypothesis	Relationship	Original sample (O)	*T* statistics (| O/STDEV|)	*P* values	Decision
H1	CLC → FP	0.163	2.397	0.017	Accepted
H2	DMC → CBE	0.784	25.802	0	Accepted
H3	DMC → CLC	0.574	10.496	0	Accepted
H4	DMC → MSC	0.503	7.347	0	Accepted
H5	MSC → FP	0.373	5.625	0	Accepted

TABLE 4 | Indirect relationship.

Hypothesis	Relationship	Original sample (O)	*T* statistics (| O/STDEV|)	*P* values	Decision
H6	DMC → CLC → FP	0.094	2.145	0.032	Accepted
H7	DMC → MSC → FP	0.187	4.152	0	Accepted

Hypothesis 6 (H6) predicted that the mediating effect of CLCs between DMCs and firm performance is significant (β = 0.094, t = 2.145 > 1.96, p = 0.032 < 0.05), therefore, H6 is accepted. Hypothesis 7 (H7) predicted that the mediating effect of MSCs between DMCs, and firm performance is significant (β = 0.187, t = 4.152 > 1.96, p = 0.000 < 0.05), therefore, H7 is accepted (see **Table 4**; Chinakidzwa and Phiri, 2020b).

In **Table 5**, Q^2 shows that the value of CBE is 0.301, CLC is 0.143, firm performance is 0.158, and MSC is 0.167. Hair et al. (2016) argued that the model has predictive relevance if the Q^2 value is greater than zero.

DISCUSSION

The aim of the study was to examine the effect of DMCs and CLCs on firm performance through the mediating effect

TABLE 5 | Predictive relevance.

Construct	SSO	SSE	Q^2 (=1 − SSE/SSO)
CBE	1,290.00	902.121	0.301
CLC	1,290.00	1,105.33	0.143
DMC	1,032.00	1,032.00	
FP	1,290.00	1,085.96	0.158
MSC	1,290.00	1,074.83	0.167

of MSCs and CLCs. Furthermore, the study examines the effect of DMCs on CBE.

Hypothesis 1 predicted that CLCs are positively related to firm performance. It demonstrated a significant and positive relationship between CLCs and firm performance (β = 0.163, t = 2.397, p = 0.017), and the results are similar to that suggested by Leeflang et al. (2014), thus, H1 is supporting. H2 predicted that DMCs are positively related to CBE. It demonstrated a significant and positive relationship between DMCs and CBE (β = 0.784, t = 25.802, p = 0.000). The results are similar to that suggested by Wang (2020), thus, H2 is accepted. H3 predicted that DMC is positively related to CLCs. It demonstrated a significant and positive relationship between DMCs and CLCs (β = 0.574, t = 10.496, p = 0.000), and the results are similar to that suggested by Wang et al. (2013), thus, H3 is accepted. H4 predicted that DMC is positively related to MSCs. It demonstrated a significant and positive relationship between DMCs and MSCs (β = 0.503, t = 7.347, p = 0.000), and the results are similar to that suggested by Wedel and Kannan (2016), thus, H4 is accepted. Similarly, H5 predicted that MSCs are positively related to firm performance. It demonstrated a significant positive relationship between MSCs and firm performance (β = 0.373, t = 5.625, p = 0.000), and the results are similar to that suggested by Coreynen et al. (2017), thus, H5 is accepted. Furthermore, H6 predicted that the mediating effect of CLCs between DMCs and firm performance is significant (β = 0.094, $t = 2.145 > 1.96$, $p = 0.032 < 0.05$), and the results are similar to that suggested by Singh et al. (2020), thus, H6 is accepted. H7 predicted that the mediating effect of MSCs between DMCs and firm performance is significant (β = 0.187, $t = 4.152 > 1.96$, $p = 0.000 < 0.05$), and the results are similar to that suggested by Chinakidzwa and Phiri (2020b), thus, H7 is accepted.

CONCLUSION

Progressed technologies have significantly extended the e-business process for value creation. The innovative advances have altered the dynamic of brand marketing by exclusively providing new products and services to the customer. The emerging technologies have reshaped the marketing discipline by promoting advanced marketing techniques (e.g., applications, software, and infrastructures) for leveraging the worldwide reach of businesses to satisfy the demands of the modern marketplace. In this process, blockchain technology has compelled the technological communication media to strengthen the bond with CLCs, MSCs, and CBE. Today, the novel technologies have allowed the marketers to penetrate deeper into the new marketspace (i.e., digital marketing), thus sensing the changing customer demands. Perhaps, this dynamic market engagement (i.e., CBE) uses modern technologies to enhance consumer involvement, thereby improving the firm performance. However, blockchain technology potentially fosters the firm marketing activities by incrementing innovation, MSCs, subsequently empowering the consumer-centric paradigm.

In fact, this study has examined the important inter-relationships between DMCs, CBE, CLCs, and MSCs in the context of China. According to the findings of the study, the role of DMCs is very important in enhancing both the firm performance and CBE. Furthermore, CLCs and MSCs as mediators played a very important role in maximizing the firm performance, specifically in the Omni industry structure.

Theoretical and Practical Implications

The study revealed two gaps in marketing capabilities: the insufficient current and ideal marketing capabilities between managers. Second, a knowledge gap was discovered, and the contribution of a significant division of DMCs and transformations in industrial service firms extended the scholarly knowledge to rectify this. The COVID-19 crisis heightened the importance and opportunities of DMCs, and this study guides researchers and policymakers in this endeavor.

Study Limitations and Future Research

This study has some limitations. First, the study was conducted only in the context of China. In the future, another sample could be taken from other ASEAN countries such as Malaysia, Singapore, and Indonesia. Second, this study did not focus on a single retail firm, even though doing so would allow for a more finely tuned study of industry-specific DMCs regarding the firm performance. Third, this study used a quantitative approach to test the hypothesis. In the future, both quantitative and qualitative approaches could be employed. For international marketing and the Omni-channel structure, there is still a need for more conceptualization of DMCs.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

REFERENCES

Abdullah, M. I., Sarfraz, M., Arif, A., and Azam, A. (2018). An extension of the theory of planned behavior towards brand equity and premium price. *Pol. J. Manag. Stud.* 18, 20–32. doi: 10.17512/pjms.2018.18.1.02

Barger, V., Peltier, J. W., and Schultz, D. E. (2016). Social media and consumer engagement: a review and research agenda. *J. Res. Interact. Market.* 10, 268–287. doi: 10.1108/JRIM-06-2016-0065

Blut, M., Teller, C., and Floh, A. (2018). Testing retail marketing-mix effects on patronage: a meta-analysis. *J. Retail.* 94, 113–135. doi: 10.1016/j.jretai.2018.03.001

Brandão, A., Pinho, E., and Rodrigues, P. (2019). Antecedents and consequences of luxury brand engagement in social media. *Spanish J. Marketing-ESIC* 23, 163–183. doi: 10.1108/SJME-11-2018-0052

Brodie, R. J., Hollebeek, L. D., Juri, C. B., and Ili, C. A. (2011). Customer engagement: conceptual domain, fundamental propositions, and implications for research. *J. Service Res.* 14, 252–271. doi: 10.1177/1094670511411703

Brynjolfsson, E., Hu, Y. J., Rahman, M. S., Piotrowicz, W., Cuthbertson, R., Herhausen, D., et al. (2015). Association for Information Systems AIS Electronic Library (AISeL) channel integration towards omnichannel management: a literature review. *J. Retail.* 91, 5–16.

Cao, G., and Tian, N. (2020). Enhancing customer-linking marketing capabilities using marketing analytics. *J. Bus. Industrial Market.* 35, 1289–1299. doi: 10.1108/JBIM-09-2019-0407

Cao, G., Duan, Y., and El Banna, A. (2019). A dynamic capability view of marketing analytics: evidence from UK firms. *Industrial Market. Manag.* 76, 72–83. doi: 10.1016/j.indmarman.2018.08.002

Chaffey, D., and Smith, P. R. (2017). *Digital Marketing Excellence: Planning, Optimizing and Integrating Online Marketing*. Milton Park: Routledge. doi: 10.4324/9781315640341

Chai-Arayalert, S., and Suttapong, K. (2020). Increasing potential of distribution channels for creative Thai hand-woven textile products in the digital economy. *Creat. Stud.* 13, 477–493. doi: 10.3846/cs.2020.11865

Chinakidzwa, M., and Phiri, M. (2020a). Exploring digital marketing resources, capabilities and market performance of small to medium agro-processors. a conceptual model. *J. Bus. Retail Manag. Res.* 14. doi: 10.24052/JBRMR/V14IS02/ART-01

Chinakidzwa, M., and Phiri, M. (2020b). Market orientation and market sensing capabilities in a digital world: relationships and impact on market performance. *Retail Market. Rev.* 16, 1–17.

Clark, B. H., and Ambler, T. (2001). Marketing performance measurement: evolution of research and practice. *Int. J. Bus. Perform. Manag.* 3, 231–244. doi: 10.1504/IJBPM.2001.000101

Clohessy, T., Acton, T., and Rogers, N. (2019). "Blockchain adoption: technological, organisational and environmental considerations," in *Business Transformation through Blockchain*, eds H. Treiblmaier and R. Beck (Cham: Palgrave Macmillan). doi: 10.1007/978-3-319-98911-2_2

Coreynen, W., Matthyssens, P., and Van Bockhaven, W. (2017). Boosting servitization through digitization: pathways and dynamic resource configurations for manufacturers. *Industrial Market. Manag.* 60, 42–53. doi: 10.1016/j.indmarman.2016.04.012

Croteau, A.-M., and Bergeron, F. (2001). An information technology trilogy: business strategy, technological deployment and organizational performance. *J. Strategic Inform. Systems* 10, 77–99. doi: 10.1016/S0963-8687(01)00044-0

Day, G. S. (2011). Closing the marketing capabilities gap. *J. Market.* 75, 183–195. doi: 10.1509/jmkg.75.4.183

Demirbag, M., Tatoglu, E., Tekinkus, M., and Zaim, S. (2006). An analysis of the relationship between TQM implementation and organizational performance: evidence from Turkish SMEs. *J. Manufacturing Technol. Manag.* 17, 829–847. doi: 10.1108/17410380610678828

Dodoo, N. A. (2018). Why consumers like facebook brands: the role of aspirational brand personality in consumer behavior. *J. Promot. Manag.* 24, 103–127. doi: 10.1080/10496491.2017.1346536

Dolbec, P.-Y., and Fischer, E. (2015). Refashioning a field? connected consumers and institutional dynamics in markets. *J. Consumer Res.* 41, 1447–1468. doi: 10.1086/680671

Eisenhardt, K. M., and Martin, J. A. (2000). Dynamic capabilities: what are they? *Strategic Manag. J.* 21, 1105–1121. doi: 10.1002/1097-0266(200010/11)21:10/11<1105::AID-SMJ133>3.0.CO;2-E

Essamri, A., McKechnie, S., and Winklhofer, H. (2019). Co-creating corporate brand identity with online brand communities: a managerial perspective. *J. Bus. Res.* 96, 366–375. doi: 10.1016/j.jbusres.2018.07.015

Farook, F. S., and Abeysekara, N. (2016). Influence of social media marketing on customer engagement. *Int. J. Bus. Manag. Invent.* 5, 115–125.

Gandhi, A. V., Shaikh, A., and Sheorey, P. A. (2017). Impact of supply chain management practices on firm performance: empirical evidence from a developing country. *Int. J. Retail Distribut. Manag.* 45, 366–384. doi: 10.1108/IJRDM-06-2015-0076

Gielens, K., and Steenkamp, J.-B. E. M. (2019). Branding in the era of digital (dis) intermediation. *Int. J. Res. Market.* 36, 367–384. doi: 10.1016/j.ijresmar.2019.01.005

Graffigna, G., and Gambetti, R. C. (2015). Grounding consumer-brand engagement: a field-driven conceptualisation. *Int. J. Market Res.* 57, 605–630. doi: 10.2501/IJMR-2015-049

Grewal, D., Roggeveen, A. L., and Nordfält, J. (2017). The future of retailing. *J. Retail.* 93, 1–6. doi: 10.1016/j.jretai.2016.12.008

Hair, J. F. Jr., Sarstedt, M., Matthews, L. M., and Ringle, C. M. (2016). Identifying and treating unobserved heterogeneity with FIMIX-PLS: part I–method. *Eur. Bus. Rev.* 28, 63–76. doi: 10.1108/EBR-09-2015-0094

Hair, J. F., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. (2017a). *A Primer on Partial Lease Squares Structural Equation Modeling(PLS-SEM)*, 2nd Edn. Thousand Oaks, CA: Sage Publications Inc.

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., and Thiele, K. O. (2017b). Mirror, mirror on the wall: a comparative evaluation of composite-based structural equation modeling methods. *J. Acad. Market. Sci.* 45, 616–632. doi: 10.1007/s11747-017-0517-x

Henseler, J., Ringle, C. M., and Sinkovics, R. R. (2009). "The use of partial least squares path modeling in international marketing," in *New Challenges to International Marketing*, eds R. R. Sinkovics and P. N. Ghauri (Bingley: Emerald Group Publishing Limited). doi: 10.1108/S1474-7979(2009)0000020014

Herhausen, D., Binder, J., Schoegel, M., and Herrmann, A. (2015). Integrating bricks with clicks: retailer-level and channel-level outcomes of online–offline channel integration. *J. Retail.* 91, 309–325. doi: 10.1016/j.jretai.2014.12.009

Hollebeek, L. D. (2011). Demystifying customer brand engagement: exploring the loyalty nexus. *J. Market. Manag.* 27, 785–807. doi: 10.1080/0267257X.2010.500132

Hollebeek, L. D., Glynn, M. S., and Brodie, R. J. (2014). Consumer brand engagement in social media: conceptualization, scale development and validation. *J. Int. Market.* 28, 149–165. doi: 10.1016/j.intmar.2013.12.002

Hollebeek, L. D., Srivastava, R. K., and Chen, T. (2019). SD logic–informed customer engagement: integrative framework, revised fundamental propositions, and application to CRM. *J. Acad. Market. Sci.* 47, 161–185. doi: 10.1007/s11747-016-0494-5

Hosseini, S., Merz, M., Röglinger, M., and Wenninger, A. (2018). Mindfully going omni-channel: an economic decision model for evaluating omni-channel strategies. *Decision Support Systems* 109, 74–88. doi: 10.1016/j.dss.2018.01.010

Ismagilova, E., Slade, E., Rana, N. P., and Dwivedi, Y. K. (2020). The effect of characteristics of source credibility on consumer behaviour: a meta-analysis. *J. Retail. Consumer Serv.* 53:101736. doi: 10.1016/j.jretconser.2019.01.005

Kane, G. C., Palmer, D., Phillips, A. N., and Kiron, D. (2015). Is your business ready for a digital future? *MIT Sloan Manag. Rev.* 56:37.

Kearns, G. S., and Sabherwal, R. (2006). Strategic alignment between business and information technology: a knowledge-based view of behaviors, outcome, and consequences. *J. Manag. Inform. Systems* 23, 129–162. doi: 10.2753/MIS0742-1222230306

Khalil, M., Khawaja, K. F., and Sarfraz, M. (2021). The adoption of blockchain technology in the financial sector during the era of fourth industrial revolution: a moderated mediated model. *Qual. Quant.* doi: 10.1007/s11135-021-01229-0

Laaksonen, O., and Peltoniemi, M. (2018). The essence of dynamic capabilities and their measurement. *Int. J. Manag. Rev.* 20, 184–205. doi: 10.1111/ijmr.12122

Langaro, D., Rita, P., and de Fátima Salgueiro, M. (2018). Do social networking sites contribute for building brands? evaluating the impact of users' participation on brand awareness and brand attitude. *J. Market. Commun.* 24, 146–168. doi: 10.1080/13527266.2015.1036100

Leeflang, P. S. H., Verhoef, P. C., Dahlström, P., and Freundt, T. (2014). Challenges and solutions for marketing in a digital era. *Eur. Manag. J.* 32, 1–12. doi: 10.1016/j.emj.2013.12.001

Likoum, S. W. B., Shamout, M. D., Harazneh, I., and Abubakar, A. M. (2020). Market-sensing capability, innovativeness, brand management systems, market dynamism, competitive intensity, and performance: an integrative review. *J. Knowledge Econ.* 11, 593–613. doi: 10.1007/s13132-018-0561-x

Lindblom, A. T., Olkkonen, R. M., Mitronen, L., and Kajalo, S. (2008). Market-sensing capability and business performance of retail entrepreneurs. *Contemporary Manag. Res.* 4, 219–236. doi: 10.7903/cmr.1042

Massa, L., Tucci, C. L., and Afuah, A. (2017). A critical assessment of business model research. *Acad. Manag. Ann.* 11, 73–104. doi: 10.5465/annals.2014.0072

Miocevic, D., and Morgan, R. E. (2018). Operational capabilities and entrepreneurial opportunities in emerging market firms: explaining exporting SME growth. *Int. Market. Rev.* 35, 320–341. doi: 10.1108/IMR-12-2015-0270

Morgan, N. A., Katsikeas, C. S., and Vorhies, D. W. (2012). Export marketing strategy implementation, export marketing capabilities, and export venture performance. *J. Acad. Market. Sci.* 40, 271–289. doi: 10.1007/s11747-011-0275-0

Neely, A., Gregory, M., and Platts, K. (1995). Performance measurement system design: a literature review and research agenda. *Int. J. Operat. Product. Manag.* 15, 80–11. doi: 10.1108/01443579510083622

Önder, I., and Treiblmaier, H. (2018). Blockchain and tourism: three research propositions. *Ann. Tour. Res.* 72, 180–182. doi: 10.1016/j.annals.2018.03.005

Payne, E. M., Peltier, J. W., and Barger, V. A. (2017). Omni-channel marketing, integrated marketing communications and consumer engagement: a research agenda. *J. Res. Interact. Market.* 11, 185–197. doi: 10.1108/JRIM-08-2016-0091

Pedersen, C. L., Ritter, T., and Di Benedetto, C. A. (2020). Managing through a crisis: managerial implications for business-to-business firms. *Industrial Market. Manag.* 88:314. doi: 10.1016/j.indmarman.2020.05.034

Persson, A., and Ryals, L. (2014). Making customer relationship decisions: analytics v rules of thumb. *J. Bus. Res.* 67, 1725–1732. doi: 10.1016/j.jbusres.2014.02.019

Rai, A., Patnayakuni, R., and Seth, N. (2006). Firm performance impacts of digitally enabled supply chain integration capabilities. *MIS Quar.* 30, 225–246. doi: 10.2307/25148729

Sánchez-Gutiérrez, J., Cabanelas, P., Lampón, J. F., and González-Alvarado, T. E. (2019). The impact on competitiveness of customer value creation through relationship capabilities and marketing innovation. *J. Bus. Industrial Market.* 34, 618–662. doi: 10.1108/JBIM-03-2017-0081

Sarfraz, M., He, B., Shah, S. G. M., and Fareed, Z. (2021). Myth or reality? unveiling the effectiveness of hierarchical CEO succession on firm performance and cash holdings. *J. Bus. Econ. Manag.* 22, 1008–1025. doi: 10.3846/jbem.2021.13559

Scheinbaum, A. C. (2016). Digital engagement: opportunities and risks for sponsors: consumer-viewpoint and practical considerations for marketing via mobile and digital platforms. *J. Adv. Res.* 56, 341–345. doi: 10.2501/JAR-2016-040

Shah, N. (2009). *Determinants of Employee Readiness for Organisational Change*. PhD theses, London: Brunel University Brunel Business School.

Shah, S. G. M., Sarfraz, M., and Ivascu, L. (2021). Assessing the interrelationship corporate environmental responsibility, innovative strategies, cognitive and hierarchical CEO: a stakeholder theory perspective. *Corporate Soc. Responsibil. Environ. Manag.* 28, 457–473. doi: 10.1002/csr.2061

Sharma, B., and Gadenne, D. (2010). Entry barriers and industry rivalry: do they mediate the relationship between quality management practices and performance? *Int. J. Qual. Reliabil. Manag.* 27, 779–793. doi: 10.1108/02656711011062381

Singh, R., Charan, P., and Chattopadhyay, M. (2020). Relational capabilities and performance: examining the moderation-mediation effect of organisation structures and dynamic capability. *Knowledge Manag. Res. Practice*. doi: 10.1080/14778238.2020.1843984

Teece, D. J. (2012). Next-generation competition: new concepts for understanding how innovation shapes competition and policy in the digital economy. *JL Econ. Pol'y* 9:97.

Vorhies, D. W., Orr, L. M., and Bush, V. D. (2011). Improving customer-focused marketing capabilities and firm financial performance via marketing exploration and exploitation. *J. Acad. Market. Sci.* 39, 736–756. doi: 10.1007/s11747-010-0228-z

Wang, E. T. G., Hu, H., and Hu, P. J.-H. (2013). Examining the role of information technology in cultivating firms' dynamic marketing capabilities. *Inform. Manag.* 50, 336–343. doi: 10.1016/j.im.2013.04.007

Wang, F. (2020). Digital marketing capabilities in international firms: a relational perspective. *Int. Market. Rev.* 37, 559–577. doi: 10.1108/IMR-04-2018-0128

Wedel, M., and Kannan, P. K. (2016). Marketing analytics for data-rich environments. *J. Market.* 80, 97–121. doi: 10.1509/jm.15.0413

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Approaches Toward Building the Digital Enterprise and Sustainable Economic Development: The Moderating Role of Sustainability

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Achieving enduring economic development is the biggest challenge of today's humanity. However, at present, there is a consensus that the digital economy plays a significant role in achieving sustainable economic development. The advancement of the digital enterprise is critical for obtaining socioeconomic stability and growth. In explanation, this study focuses on gaining economic progression through deploying the modern concept of digitalization. The study analyzes the mediating relationship of digital enterprise among e-commerce, digitalization, and digital marketing and their effect on China's economic development while considering sustainability as a moderating variable. The study has used primary data collection techniques, and the study sample size is 400 respondents. The research has used SmartPLS software to measure the relationship through bootstrapping and algorithms. The study has found significant positive mediation of digital enterprise and moderation of sustainability between digital enterprise and economic development. This study suggests the theoretical and practical implications toward political stability, policymakers, and researcher perspective.

Keywords: e-commerce, digitalization, digital marketing, economic development, sustainability

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INTRODUCTION

Nowadays, data and digital innovation are the main points of interest for most countries worldwide. The rapid development of e-commerce has immensely promoted the world's economic advancement. E-commerce has modified the traditional business structure into an online business platform. It comprehensively strengthened the global economies to embrace innovative technologies, thereby achieving economic development (Tang and Wang, 2020). According to the firm viewpoint, the capacity to viably digitalization, digital marketing, and e-commerce has become a significant chance and test (Pan et al., 2020; Mohsin et al., 2021). The headway of innovation has helped global business. Many individuals utilize the internet to do everything, from leading examinations to buying items on the Web. The internet is significantly influencing practically all organizations.

Economic development might be accomplished through sustainability. Nations comprise adverse consequences without political stability and financial turn of events. Countries might have the chance to achieve economic development in a limited period while having political stability (Hutter et al., 2019). In an outline of the studies of economic development, Fukuyama required the

improvement of a strategy that focuses on cultural support elements into current hypothetical and observational models which financial researchers are currently using.

Explicitly, the various employments of the internet by business substances incorporate the capacity to promote, create, or perform standard business capacities for economic development. Along these lines, many firms accept the digital enterprise for a significant number of their exercises with the moderation of sustainability. One effect for the digital enterprise is to heighten contest and produce benefits for buyers, with lower costs and more decisions (Konopczyński, 2014; Shah et al., 2021). The internet and Web-based business led to productivity upgrades, better resource usage, quicker an ideal opportunity to showcase, decreased complete request satisfaction times, and improved client support (Gordon, 2019; Ajaz et al., 2020).

Fundamentally, the digital enterprise is significantly growing freedom for business-to-business and business-to-shopper Web-based business exchanges across borders. For business-to-shopper exchanges, Web sets had created an upheaval in worldwide e-commerce: the individualization of trading. Innovation has extended the customer's commercial center to an extraordinary degree (Di Nardo et al., 2020).

The reception of data innovation comparatively displays network externality achieved by more clients, with the subsequent advantages for the clients (Kinelski, 2020; Pervez et al., 2022). In recent years, various studies have thought about R&D as an intermediary variable for information capital while analyzing the connection between digitalization, e-commerce, and digital marketing on economic development. Alongside digital enterprise's quick advancement, internet business innovations have become a significant information capital for working with a business.

Researchers have attempted to introduce various hypotheses to clarify this gap. As indicated by numerous hypotheses of development in the size of state-run administrations, the design and financial requirements change with the improvement of nations. Accordingly, the size of the government is impacted as well (Ojo et al., 2018). The advancement of a digital economy will significantly affect the practical improvement of an economy and society. The advancement of a digital economy would have a supporting impact on the progress of a local economy. Yet, the advancement of the advanced economy would achieve a gigantic advanced separation.

Thus, the worth added to yield at three levels of the undertaking, area, and nation will be expanded; eventually, it will prompt monetary development, work usefulness development, productivity, and the government assistance of the customer (Mastio et al., 2019; Khalil et al., 2021). Experimental examinations and hypotheses show that the connection between digital enterprise on economic development can be researched through three different ways: assuming the speculations of economic development have three variables, which include digitalization, digital marketing, and e-commerce, the impacts of these elements have been inspected by few business analysts.

Perhaps, in the wake of digitalization, the increasing debate about the economic progression of the countries has gained considerable height over the past few decades. At present, research shows that developing nations are still in the hope of achieving socioeconomic sustainability through digitalization (Jiao and Sun, 2021). In particular, technology is the prime economic driver that needs researchers' attention. However, in this face of gaining technological and economic development, this study formulates the goal of examining the mediating role of digital enterprises (e.g., digitalization) in accelerating the country's economic advancement.

The study's objectives are to measure the relationship among e-commerce, digitalization, and digital marketing on economic development. Second, it measures the mediation effect of digital enterprise among cultural support, academic standards, rules, and regulations on economic growth. Third, it analyzes the moderating effect of sustainability between political stability and economic development.

The significance of the study is that political stability in the development interaction is conclusive and significant as far as China's development is maintained. Digital enterprise has consequences for the monetary conduct of countries through the utility capacity on the interesting side, and it is additionally persuasive on the maker treatment on the sustainability. The connection among digital enterprise and economic development furthermore proficiency on the side of the economy is dictated by some integral elements that include association and the executive's experience, authoritative part, and administrative part and interchanges structure as a result on the stockpile side of the economy, among different variables going into the capital, consequently prompting the improvement of the creative interaction through capital developing, propels in innovation, and the nature of the workforce.

LITERATURE REVIEW

E-Commerce and Economic Development

E-commerce refers to the utilization of the internet to manage deals nationally and internationally. Internet business has come to take on two significant jobs; first, as a most successful and effective course and aggregator of data, and second, as a possible instrument for the substitution of numerous financial exercises once performed inside a business undertaking by those that should be possible by outside providers that rival each other to execute these exercises (Kabango and Asa, 2015; Sarfraz et al., 2021). Finally, a few researchers have examined the connection between E-commerce and economic development. A significant number of these investigations have inferred a positive connection between e-commerce and economic development.

Furthermore, the examinations in the context of firms show that e-commerce can expand effectiveness. Hanim (2014) focused on information sources and the advancement of e-commerce and economic development, which announces that online business expanded benefits for firms and prompted the improvement of countries. Their discoveries showed that e-commerce was significant in reconciling the economic development framework.

In this paper, the focus has been put on the issue of whether economic development changes can support e-commerce business. The outcomes showed that essentially, no presence of the public authority in the field of online business could prompt economic development and increment the portion of e-commerce business devices in online business.

The studies found that e-commerce has impacted capital efficiency, whereas economic development displayed a bigger efficiency upgrading impact. E-commerce in developing effective development has been perceived as many economic examination communities have been created, which shows the significance of public interest in the public legislative issues (Ginting et al., 2020). From the above literature, the following hypothesis is stated:

H1: The significant relationship was found between e-commerce and economic development.

Digitalization and Economic Development

Digitization and other innovative advancements decidedly affect the general creation cycle of any area. A study of Maiti and Kayal (2017) uncovers that the progression in the assembling area prompts its development and economic developmental areas. Vorontsovskiy (2020) studies whether there is any such connection between digitalization and economic development. Mosteanu (2020) observes that digitalization prompts more interest in labor and turn of economic development. Khan et al. (2015) look at emerging countries and track down the data correspondence of digitalization and its foundation; interchanges are the main economic development factors.

Myovella et al. (2020) propose that because of digitalization in business strategies, numerous non-tradable administrations become tradable these days through online platforms. Barinov et al. (2020) showed that digital improvement, strategies of assembling and worldwide qualities, and interest for administration with rising pay are the drivers for the worldwide exchange administrations of economic development. Afonasova et al. (2019) track down proof of the absence of online data for SMEs in emerging nations. Because of data unavailability in the digital industry and high observing expenses, organizations do not broaden funds simply based on economic models.

The study is one of the significant elements for every organization and country for digital platforms to improve and increase their GDP (Khalin et al., 2019). According to Frame and Woosley (2004), information transparency and economic development significantly impact digitalizing trading and financing.

Indeed, digitalization is a new buzzword that has transformed worldwide businesses. With the blessing of digitalization, more products had offered to customers. Through introducing new digital channels, conventional modes of business practices have changed, thereby increasing the sales of the businesses. In particular, the company's prosperity largely depends on digitalization. Given the articulation, the study states that digitalization intensified the economic impact (e.g., productivity, efficiency, sales) (Kohtamäki et al., 2020), thus encouraging enterprises to adopt digital technologies as the prime driver of economic prosperity. Low productivity, low capitalization, resources, and high hazard are likewise the purposes behind organizations not implementing technological advancements. It is a critical variable in economic development because of functional contrasts between organizations and digitalization. Large organizations enjoy similar conditional benefits whereas small organizations benefit from implementing digitalization. From the above literature, the following hypothesis is stated:

H2: The significant relationship was found between digitalization standards and economic development.

Digital Marketing and Economic Development

The previous studies showed digital marketing and its effect on economic development. In the new era of advancement, the cutting-edge society faces cardinal changes in all action circles. Digital marketing strategies have extraordinarily expanded the data field of individuals and researchers, which diminishes the expense of looking and handling data. The new development and rules of digital marketing have requested changes in the economy and their development, which has prompted the development of the expression "digital economy." In view of the digital economy hypothesis, the idea of "digital marketing" has turned into a significant development of the economy (Teixeira and Piechota, 2019).

The primary motivation behind the logical article is the viable structure of promoting in the period of the digital economy. To accomplish this objective, the studies were recognized: an examination of brilliant advertising in the period of digital economic development — concentrating on the turn of events and advancement in the market utilizing digital marketing strategies—the chances for the globalization of digital marketing instruments all over the world. Digitalization of the economy and improvement in virtual space have become the fundamental elements of the economies of the central countries, which influence all circles of life. Expanding processes in the world requires new formats and adjusting the eyes on marketing (Brych et al., 2019).

The few studies composed that a lot of consideration has been centered around the huge chances digital advertising, with less consideration on the organizations, are confronting going digital. The studies have investigated the parts of promoting get new implications, and the new promoting correspondence channels offer better approaches for publicizing and new pointers to quantify the impacts (Kotane et al., 2019).

The digital change process covers four key business regions, advanced change, trade, content, local business area, and mutual effort. Other than promoting channel go-betweens, the digital change process influences the jobs and conduct of customers while doing their deals. It is composed that social advancements profoundly disturbed interchanges, promoting, and consumers (Kagermann, 2015). Digital marketing cooperates between consumers and suppliers by presenting computerized data, correspondence, and computerized advances. From a more extensive perspective, digital marketing is about promoting work with the execution of digital data, which figures on economic

development. Digital marketing is viewed as an important piece of digital advertising, which is grown along with it.

Undoubtedly, the industrial revolution of the 21st century has left the whole world to experience a new era of economic development (i.e., digital marketing). Digital marketing has emerged as a fundamental development to the information revolution. The significant developments in the ICT have extended the scope of the nations by quickly adapting to the changing market needs and customer's satisfaction. In particular, digital marketing has led to the new definition of marketing. Technological development has fostered the digitalization process, which makes that those digital enterprises reach the target customers. Indeed, the increasing importance of the ICT has radically enhanced the socioeconomic structure by making businesses to realize the importance of digital innovation and efficiency (Aydoğan, 2020).

H3: A significant relationship between rules and regulations and economic development was found.

The Mediating Role of Digital Enterprise

Digital enterprise centers around the conversation of the improvement system of China's digital economy and its correlation with different areas. In light of the fundamental structure of the digital enterprise, with the extending of digitalization, researchers accept that the mix of technological advancement and conventional businesses can accomplish and strong the digital enterprise: understand the green and fast advancement of the GDP, understand the change in the utilization structure, work on the nature of human resources, drive the digital economy from being work serious to becoming innovation concentrated, solidify framework development, make full and powerful utilization of information assets, the mechanical advancement, extend incorporated applications, and establish a casual setting to enable the digital enterprise (Gregory et al., 2019). In the new digital economy, innovation is the prime component driving the firms' technical progress, thus contributing toward economic development. The growing e-commerce application fosters firms' digital activities, thereby strengthening the impact of e-commerce digitalization on global economic advancement.

Accordingly, China ought to benefit from regions such as 5G, in advanced worldwide rivalry, further reinforcing key center advances' innovative work and fostering the entire business chain. Different researchers trust that there are a few issues in the advancement of China's digital enterprise, like the lopsided, insufficient, and ungraceful turn of events. These issues are primarily moved in the spaces including digital marketing, the level of redesigning of the advanced business, data network security, and the e-commerce sites and digitalization (Payne and Frow, 2004).

China's economy is in a time of the momentary turn of events and slow development. The improvement of the economy relies more upon the quality and effectiveness of monetary development than on amount and speed with the relationship among digitalization, digital marketing, and e-commerce. The quantitative signs of monetary development, such as GDP and public pay, are as of now not the main focal point of the public development, as the center has steadily moved from amount to quality to advance the development of assets of digital enterprises of China (Zhu and Kraemer, 2005).

Beginning with the e-commerce development of financial aspects, the business analysts have consistently seen the rise in profits such as the economy's development. With the assistance of the econometric model, attention to that, there is critical aspects of e-commerce benefits in China's digital enterprise. The economic development lies in buying selling goods on online platforms such as Ali-Express, Amazon, and eBay. The following hypothesis is stated:

H4: Mediation of digital enterprise exists between e-commerce and economic development.

To comprehend economic development, different researchers utilize different econometric models to investigate the particular impacts of driving variables such as digital marketing, political stability, direct investment, human resources, banking globalization and data, and correspondence innovation on the quantitative marks of economic development. By measuring digital marketing, promoting goods and service through online platforms and websites, a digital enterprise is here, which manage all functions to improve the economic development of any country (Duch-Brown et al., 2017).

In recent years, digital emergence has played a significant role in business marketing. With the evolution of e-commerce, marketing becomes increasingly essential for the development of firms. The establishment of digital enterprises mediates the relationship between digital marketing and economic development. Value creation through digital marketing supports the evolution of digitalization (Kumar et al., 2020), thus promoting economic advancement. Indeed, the digital revolution brought in the field of marketing has revolutionized consumer's behavior by strengthening the importance of the ICT, which has significantly changed the concept of traditional marketing (Shpak et al., 2020). Digital marketing has helped marketers to achieve enduring advantages, thus improving firms' economic performance.

Fundamentally, technology holds immense potential for organizations in the shape of higher financial returns. With respect to investigating the connection between digitalization and great financial turn of events, more researchers have concentrated on the effect of the digital enterprise on improvement according to the viewpoints of enormous information strengthening, the coordination of the digital enterprise and the economic development, shared economy, digital money, and strategy supply frameworks (Barua et al., 2001). For the most part, the advanced economy is following the new improvement idea of development, coordination, green, receptiveness, and sharing. China is turning into a significant vital improvement course, which will advance China's economic development.

The above research results show that the studies of researchers in the digital enterprise are generally broad, which include the meaning, attributes, sway impacts, record framework development and assessment, and different angles. There are

not many observational examinations on the advancement of economic development by the digital enterprise, and to concentrate on the unique changes of the advancement of the digital enterprise and its impact on the economic development of China, which prompts the restrictions of the assessment of the file framework and the absence of congruity in the perception of the improvement in a digital enterprise (Hornby et al., 2002).

Based on past studies of the digital economy, this paper chooses the center aspects and relationship of the digital economy. It attempts to take the improvement in the digital enterprise in China as the exploration object to assess the general changes and provincial contrasts in improving China's economic development. An econometric model is built to concentrate on the impact of the digital enterprise on the great financial turn of events. Economic development is presented as a delegate variable between the two angles; growing in this manner, an investigation of the impact of the digital enterprise to sustain consistency on the monetary turn of events is measured according to another point of view (Julian and Ahmed, 2005).

Furthermore, this paper likewise inspects the cooperation between the digital enterprise and economic development to concentrate on the digital economy in advancing excellent financial turn of events. Also, this study clarifies the effect of the digital enterprise on economic development with e-commerce, digital marketing, and digitalization. The discoveries have great approach reference on incentive for China in endeavors to speed up the advancement of the digital enterprise (Al-Hyari et al., 2012).

H5: Mediation of digital enterprise exists between digital marketing and economic development.
H6: Mediation of digital enterprise exists between digitalization and economic development.
H7: A significant relationship exists between digital enterprise and economic development.

The Moderating Role of Sustainability

Sustainability models of economic development are progressively becoming more appropriate from digital enterprise and their factors of e-commerce, digital marketing, and digitalization in countries worldwide. The digital enterprise gives another impulse and course for the management of economic development. Focus on the "digital enterprise" showed up in a report by the Chinese government. Additionally, a report from 2019 proposed to "increase the development of another digital economy and industry groups, and significant relationship with digital enterprise and economic development" (Kshetri, 2007).

The studies show the need to extend the commitment of "digital enterprise and concerning the advancement of the economic development with the moderation of sustainability. The public, financial, and social advancement of the People of China and the layout of long-term objectives for 2035" and an objective to expand the additional value of China's digital economy and businesses (Lawrence and Tar, 2010). The previously mentioned studies show that it has a significant relationship to digital enterprise and economic improvement.

The digital enterprise has an impact on economic developing areas. Maintaining proper economic development and sustainability is the financial and social turn of events. The responses to these inquiries depend on the foundation of the sustainability framework for economic development. Research on the digital enterprise is as yet in its early stages; its connection, characterization, and estimation. In this way, there are somewhat not many hypothetical investigations and studies on the digital enterprising and their events and economic development.

H8: A significant moderation of sustainability exists between digital enterprise and economic development.

Economic suitability states the production and consumption with regard to future needs. The sustainability theory supports economic development and economic relief of the country. The study states that sustainability with economic development shows the technological advancements and perceives natural resources which sustain economic development. The developing size of the financial framework has stressed the normal asset base. An economic development considering the hypothesis of "monetary maintainability" is obliged by the prerequisites of "natural supportability." It controls assets to guarantee the "maintainability" of normal capital. It has become ordinary to call for replacing the predominant regulation of economic development with another precept of financial development for seeking after a type of subjective development rather than economic development (Ruttan, 1991). **Figure 1** shows the study theoretical framework.

METHODOLOGY

For analyses of the adopted variables and concepts, this section encourages using appropriate tools and techniques for analyzing the relationship among digitalization and economic development. The study has followed a quantitative approach and conducted surveys for data collection, and it has mainly focused on standards and statistics. It has used numerical values through questionnaire surveys and measured through SPSS and SmartPLS. The software (i.e., SPSS and SmartPLS) had brought colossal benefits that have helped the researchers to develop the analysis section. The SPSS is a statistical software tool that helps forecast future trends, whereas SmartPLS is a graphical tool that assists in recording the study results through regression algorithms. Perhaps, both the tools had enabled us to evaluate the data, thereby providing valuable results.

Accordingly, for this study, the data were collected from China customers. The data collection technique is primary, in which researchers have used survey analysis. The researcher has sued the purposive sampling technique to collect data. Purposive sampling adopted for data gathering helps to record the participant's responses. This non-probability sampling technique allowed us to choose the participant for the study survey. The objective of the study is to determine the mediating role of the digital enterprise, e-commerce, digitalization, digital marketing, and economic development. In support, this sampling technique helped in selecting the Chinese' customers as the sample for

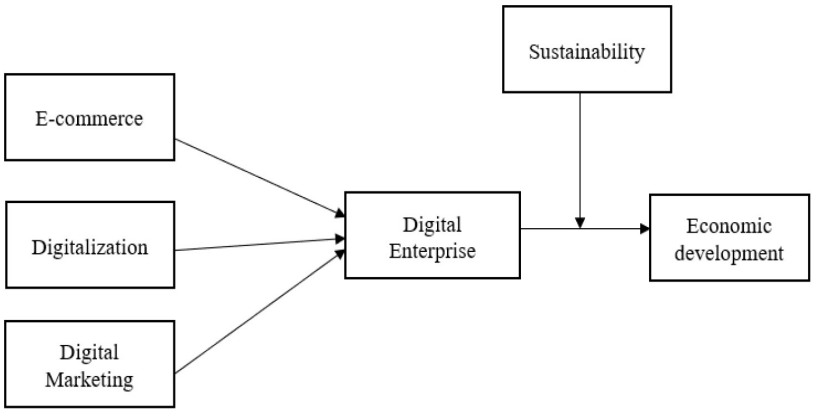

FIGURE 1 | Conceptual framework.

achieving the study objective. Given this, the study had floated 480 questionnaires, and out of that, 400 valid questionnaires were received for data analysis. A sample of 120 respondents led the pilot study to check the reliability of the items. Further, the data have been processed through SPSS and SmartPLS.

The scale for the construct of e-commerce consisted of three items and was adapted from the study of Saeed et al. (2005). The digitalization scale consisted of three items and was taken from the study of Meroño-Cerdan and Soto-Acosta (2005). The scale for digital marketing is taken from the study of Chen and Zhang (2015), and it has three items. In this study, Hu et al. (2011)'s three items scale of digital enterprise was adopted. Beheshti and Salehi-Sangari (2007)'s three items scale was adopted to measure the sustainability variable. Pechlaner et al. (2014)'s three items scale was adopted to measure economic development.

RESULTS

This study has used the structural equation modeling in the SmartPLS 3.3 latest version. Structure equation modeling (SEM) is used to measure the relationship among dependent, independent, and mediator. It is the most used method to measure the path coefficients. The construct has three independent variables: a mediator, a moderator, and a dependent variable. The SEM consists of two steps of analysis PLS algorithms and bootstrapping. PLS algorithms are the weighted vector-based regression analysis model, which shows coefficient values. Regression models generate from bootstrapping values. The total number of respondents was 400; 180 (45%) respondents were women, and 220 (55%) respondents were men. The education of the respondents is as follows: 60 respondents have diplomas (15%); among them, 65 (16.25%) had bachelor's degrees, 85 (21.25%) had master's degrees, 90 (22.5%) had MPhil., and 100 (25%) had Ph.D.

Measurement Model Assessment

The measurement model has been analyzed in SmartPLS, and it shows composite reliability of the variables, average variance extracted values, and their factor loadings. The Cronbach's alpha values show the reliability and validity of the data and their consistency of scales. The average variance extracted (AVE) values are collected throughout the study and the quantity of variance in the statistical hypothesis. AVE values should be greater than 0.5; if any value is lower than 0.5, its item can be deleted or changed according to the study requirement.

The composite reliability (CR) values should be greater than 0.7, which shows the reliability and consistency of the data. AVE should be greater than 0.5, and CR value should be greater than 0.5 of one variable. It shows a high significance level. It ensures the threshold level of the study among sectors. The next step of the study is to check the discriminant validity of the data, which involves a few steps. Cross-loadings, heterotrait–monotrait (HTMT) ratio, and factor loading occur when one factor depends on more than other factors (Fornell and Larcker, 1981). It reflects the dependency of the data.

Heterotrait–monotrait ratios show the correlation among variables; its range is -1 to $+$ 1. It should be less than one, and it considers a strong relationship between two variables at a significance level of 0.01. Furthermore, this study has also measured effect size F- and R-square, which shows the significance and dependency of the data. The acceptable range of R-square is from 0.3 to 0.7. Cross-loadings, HTMT ratio, and factor loading occur when one factor depends on more than other factors (Fornell and Larcker, 1981). It reflects the dependency of the data. **Table 1** shows the study measurement model.

Table 2 shows Fornell–Larcker criterion values. The relationship between e-commerce and economic development is 0.672, which shows a strong relationship between them, and it is acceptable in the study above than acceptance criteria. The relationship between digitalization and economic development is 0.719, which has a solid and significant relationship between them, and it is more incredible than 0.5. The relationship between digital marketing and economic development is 0.679, which shows a strong relationship. The relationship between digital enterprise and economic development is 0.525, which shows a strong relationship between them. Sustainability has 0.711 values, which has a solid and significant relationship between them.

TABLE 1 | Measurement model.

	Items	Loadings	Cronbach's alpha	rho_A	CR	AVE
E-commerce	EC1	0.762	0.787	0.815	0.798	0.610
	EC2	0.816				
	EC3	0.772				
Digitalization	DIG1	0.817	0.813	0.818	0.767	0.663
	DIG2	0.709				
	DIG3	0.767				
Digital marketing	DM1	0.716	0.872	0.893	0.788	0.718
	DM2	0.890				
	DM3	0.811				
Economic development	ED1	0.819	0.709	0.845	0.812	0.734
	ED2	0.798				
	ED4	0.890				
	ED5	0.682				
	ED6	0.907				
Sustainability	SUS1	0.712	0.882	0.784	0.873	0.716
	SUS2	0.784				
	SUS3	0.715				
Digital enterprise	DEP1	0.801	0.893	0.787	0.815	0.722
	DEP2	0.829				
	DEP3	0.861				

TABLE 2 | Fornell–Larcker criterion.

	EC	DIG	DIM	DEP	SUS	ED
E-commerce	0.504					
Digitalization	0.581	0.505				
Digital marketing	0.459	0.518	0.632			
Digital enterprise	0.721	0.635	0.529	0.620		
Sustainability	0.490	0.720	0.711	0.669	0.711	
Economic development	0.672	0.719	0.679	0.525	0.741	0.572

TABLE 3 | Heterotrait–monotrait (HTMT).

	EC	DIG	DIM	DEP	SUS	ED
E-commerce						
Digitalization	0.418					
Digital marketing	0.605	0.635				
Digital enterprise	0.503	0.690	0.457			
Sustainability	0.516	0.465	0.562	0.615		
Economic development	0.711	0.513	0.718	0.506	0.617	

Table 3 presents HTMT ratios, which show the correlation among variables; its range is −1 to + 1. It should be less than one, and it considers a strong relationship between two variables at a significance level of 0.01. Furthermore, this study has also measured effect size F- and R-square, which shows the significance and dependency of the data. The acceptable range of R-square is from 0.3 to 0.7.

Using the HTMT as a criterion involves comparing it to a predefined threshold. E-commerce and economic development have 0.711 values, which state the relationship between them. Digitalization has a positive and significant relationship of 0.513 with economic development. Digital marketing has a positive and significant relationship with the economic development of 0.718, which lies within the criterion region. Digital enterprise has 0.506 values that show a strong relationship with economic development. Sustainability has 0.617 values that show a strong relationship with economic development.

Structural Model

The study structural model shows path coefficient values, which are beta value, *t*-value, *p*-value, standard error, and LLCI and ULCI (see **Figure 2**). The bootstrapping shows a significant value of *p*-value, which states acceptance and rejection of the hypothesis. Based on this study criteria, all hypotheses are accepted and supported as *p*-values are significant and *t*-values are greater than 1.96. All hypotheses are accepted and significantly found a relationship between them, and all hypotheses are supported. **Table 4** shows the impact between digitalization support and digital enterprise (*t*-value = 2.182, *p*-value = 0.001). The hypothesis is accepted and supported as e-commerce has a significant positive relationship with digital enterprise (t = 13.001, p = 0.000). Same as digital marketing has a positive and significant relationship with digital enterprise (t = 15.232, p = 0.000). The table below shows the impact between e-commerce and economic development (t = 3.161, p = 0.021). The hypothesis is accepted and supported as e-commerce has a significant positive relationship with digital enterprise (t = 12.139, p = 0.000). Digital marketing has a positive and significant relationship with digital enterprise (t = 6.719, p = 0.000).

The mediation of digital enterprise has a significant relationship between digital marketing and economic development (t = 12.081, p = 0.000). The mediation of digital enterprise has a significant relationship between e-commerce and economic development (t = 17.061, p = 0.001). The mediation of digital enterprise has a significant relationship between digital marketing and economic development (t = 5.812, p = 0.000). Also, digital enterprise has a significant relationship with economic development (t = 4.101, p = 0.000). The moderation of sustainability exists between digital enterprise and economic development (t = 3.782, p = 0.000).

DISCUSSION

In today's world of globalization, the transition of conventional business practices to e-commerce businesses has led the world to relish the colossal benefits of the information age. In the current period of internationalization, digitalization has overwhelmed global business activities, which makes the economic factors accelerate the business processes. The developing technologies have made the business adopt innovative techniques, boosting worldwide economic development. In particular, these accelerating trends have tremendously contributed toward achieving global sustainable development (Liu et al., 2018).

Essentially, the increasing economic development in the digital enterprise has received considerable attention in the last few decades. Digital enterprises have largely improvised their productivity level, thus promoting economic advancement

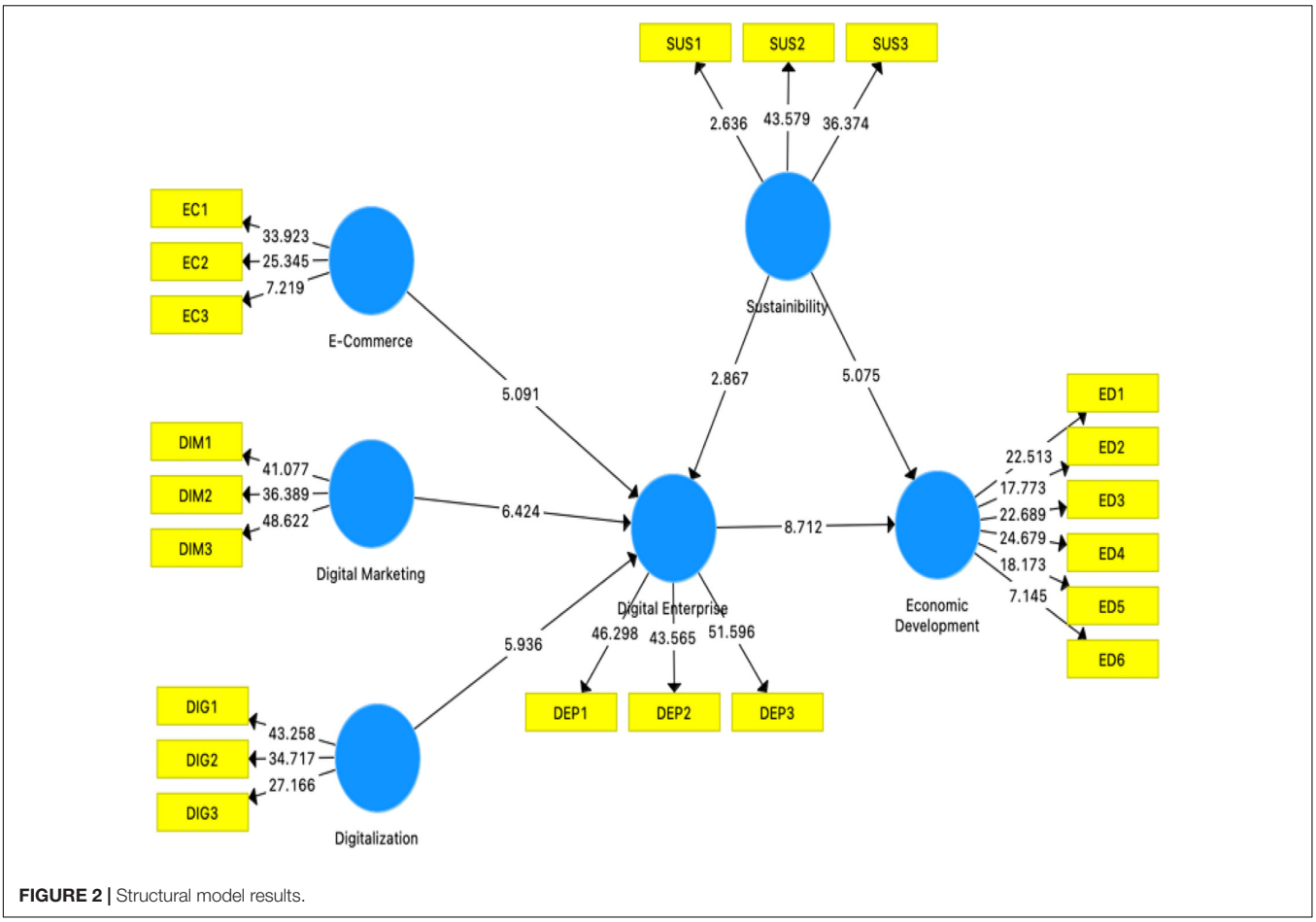

FIGURE 2 | Structural model results.

TABLE 4 | Hypothesis results.

Hypothesis	Std Beta	SD	*t*-values	*p*-values	ULCI	LLCI
Digitalization support— > Digital enterprise	0.311	0.221	2.182	0.000	0.112	0.435
E-commerce— > Digital Enterprise	0.243	0.325	13.001	0.000	0.101	0.411
Digital marketing — > Digital enterprise	0.232	0.312	15.232	0.000	0.103	0.315
Digitalization support— > Economic development	0.182	0.167	3.161	0.001	0.113	0.308
E-commerce— > Economic development	0.186	0.176	12.139	0.000	0.181	0.417
Digital marketing — > Economic development	0.189	0.187	6.719	0.000	0.141	0.328
Digitalization support— > Digital enterprise— > Economic development	0.182	0.125	12.081	0.000	0.121	0.232
E-commerce— > Digital enterprise— > Economic development	0.152	0.189	17.061	0.001	0.115	0.406
Digital marketing— > Digital enterprise— > Economic development	0.174	0.128	5.812	0.000	0.122	0.372
Digital enterprise— > Economic development	0.243	0.172	4.101	0.000	0.116	0.215
Political support— > Sustainability— > Economic development	0.281	0.177	3.872	0.001	0.122	0.256

(Intrieri et al., 2018). The increasing functions of digital enterprises have significantly modernized the country's economic structure, thereby reducing the cost of efficiency and innovation. In particular, this digital transition has improved the quality and development of the economic transformation, thereby accelerating the firms' growth. Given this, the study analysis shows that e-commerce and digitalization have a significant positive impact on economic development. Digitalization is an integrated network that provides immense benefits to organizations, society, and countries. The emerging information technologies (i.e., ICTs) transform business activities, reduce the ICT cost, facilitate information access, and enable firms' to achieve economic continuality (Palvia et al., 2018).

Consistently, the transformative effect of ICTs fosters firms' economic growth, with digital marketing playing a fundamental role in gaining business prosperity. Digital innovative marketing has contributed toward achieving economic progression by meeting the diverse needs of potential customers. The rapid digital growth in marketing has changed the way of commerce across borders, subsequently ensuring socioeconomic stability

(Aydoğan, 2020). In support, the study results have been found consistent with the prior literature, which indicated digital marketing as a prominent tool driving the firms' economic activities (Başyazicioğlu and Karamustafa, 2018).

In particular, the study shows that digital transformation has a significant positive impact on firms' sustainability and growth (El Hilali et al., 2020). The digital transformation ensures organizations' sustainability by radically enhancing the firms' innovation process. The digital enterprise capability makes the businesses transform their marketing activities by implementing modern digitalized tools that allow firms to achieve sustainable development (Gil-Gomez et al., 2020). This digital transformation continuously ensures that the company delivers better customer service than the competitors. The digital marketing media manifest the incorporation of digital technologies in fostering economic progress. Perhaps, to survive in the competitive market, digital marketing is a valuable phenomenon driving the business operations toward sustainability growth (Duffett et al., 2019). According to the data results and findings, the study has found a significant impact between variables, and all hypotheses are accepted. The study contributes toward digital enterprise and is moderated by sustainability by measuring the impact of digitalization support, economic development, and digital marketing on economic development. The change that accompanies growth is natural, and most of it is welcome, but providing some mechanisms to protect the company's identity and serve as some guidance for renewal and change is necessary. The corporate brand may present such a mechanism.

The study has found a significant and positive relationship as *t*-values are greater than 1.96, and all hypotheses are supported. The study found a significant mediating relationship of digital enterprise among digitalization support, economic development, and digital marketing on economic development, and findings are consistent with the study of Tesfom and Lutz (2006). Same as it is found that moderation of sustainability exists between digital enterprise and economic development, and the *t*-value is greater than 1.96, and *p*-values are significant. It has increased the country's digital enterprise in China (Ferguson et al., 2005). All the findings are consistent with previous studies.

The consequences of the assessment affirmed that political shakiness (both inward and outside) altogether affects monetary execution. Precisely, the paper has verified the view that inward political flimsiness, as proxied by the quantity of CR, adversely affects financial execution. These outcomes are reliable with past local and global investigations (Van der Eng, 2006). Further, the review uncovered the consequence of the level of opportunity on China's economic development. At last, the examination has also shown a positive effect of outside digital enterprise on economic development, which has been credited to the development of capital (both physical and human) and worldwide help.

CONCLUSION

This review examined the effect of e-commerce, digitalization, and digital marketing on economic development with the mediation of digital enterprise. The study covered that e-commerce, digitalization, and digital marketing use with GDP per capita had a since quite a while ago run sway dependent on the test results; additionally, all e-commerce, digitalization, and digital marketing consumption were found to decidedly affect economic development, yet e-commerce, digitalization, and digital marketing had a more grounded improvement upgrading impact. Likewise, different factors such as government size and well-being consumption also affected GDP per capita.

Along these lines, the approach this review suggests is that in view of the significance of e-commerce, digitalization, and digital marketing in the monetary turn of events and social government assistance, states ought to take on proper strategies and give the essential conditions to the turn of events and economic development. For this reason, as per the discoveries of exact exploration, it is suggested that the public authority gives further consideration to monetary preparation to develop further e-commerce, digitalization, and digital marketing, and mediation of digital enterprise, and it could ultimately prompt financial advancement in the country.

Theoretical Implications

This review examines the effect of digital enterprise on economic development for country-explicitly China. This cross-sectional study also examines GDP development's subareas such as horticulture development, modern, and administrations. Economic development has so many economic, social, and political divisions. Digital Enterprise has many other factors that are not taken in the study. It adds to the literature; digital enterprise affects economic development for China alongside macroeconomic factors.

The primary commitment of the review is to research the effect of digital enterprise on the subarea development of China. The outcomes show that digital enterprise emphatically affects GDP and subarea development in China because political dependability upgrades the nature of administration and works on the nature of law and order. Economic development decidedly affects financial development and subsectors of GDP aside from modern area development. This outcome shows that economic development is so high because of arrangements by the political foundations. Economic development improvement affects the most extraordinary outcomes against farming development in China.

Practical Implications

This study shows that the developmental area is less beneficial for the economy for many reasons. Economic development moves quicker with the assistance of digital enterprise on markets. An economic development area has sustainability for advancing and economic development. This study concentrates on experimentally digital enterprise areas, the idea that economic development with digital enterprise is the element that leads to economic development. It ought to work on digital enterprise and improve the country's credibility. Mainly, it is stated with developments and a more impressive and maintainable digital enterprise that can help the exercises for practical economic development.

Furthermore, digital enterprise plays a fundamental role in the development of society. The study suggests that the digital economy cultivates entrepreneurial opportunities through accelerating innovative ideas and information. It aims to meet diverse customer needs, thus promoting economic growth. Hence, to achieve socioeconomic sustainability, the researchers should ensure the continuous widespread of knowledge and information for promoting the establishment of digital enterprises in developing countries. This innovative thinking makes the entrepreneur to realize the significance of digital technologies, thereby accelerating new momentum to innovation-driven economic development. In particular, the digital revolution technologies ensure the development of healthy social welfare.

Limitations and Future Work

It desires to additionally talk about the disintegration of digital enterprise exchanges into deals and obtainment (e-commerce, digitalization, and digital marketing), alongside the connection between information factors, at the point when more itemized information would open up. Likewise, it would be intriguing to recognize various channels (decrease the exchange cost among purchasers and dealers or solid productivity improvement in the creation and supply of chain processes) through which digital enterprise can raise GDP and improve economic development.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

REFERENCES

Afonasova, M. A., Panfilova, E. E., Galichkina, M. A., and Ślusarczyk, B. (2019). Digitalization in economy and innovation:the effect on social and economic processes. *Polish J. Manag. Stud.* 19, 22–32.

Ajaz, A., Shenbei, Z., and Sarfraz, M. (2020). Delineating the influence of boardroom gender diversity on corporate social responsibility, financial performance, and reputation. *Logforum* 16, 61–74. doi: 10.17270/J.LOG.2020.376

Al-Hyari, K., Al-Weshah, G., and Alnsour, M. (2012). Barriers to internationalisation in SMEs: evidence from. Jordan. Mark. Intell. Plan. 30, 188-211.

Aydoğan, S. (2020). "Marketing and digital marketing strategies in the information age" in *Data, Information and Knowledge Management* (Istanbul: Nobel Akademik Yayıncılık Eğitim Danışmanlık Tic. Ltd.), 145–175.

Barinov, V., Kulapov, M., Rakauskienė, O. G., Karasev, P., and Uraev, N. (2020). Challenges of Russian Economy Digitalization in the Context of Socio-economic Development. *Montenegrin J. ECON.* 16, 17–30.

Barua, A., Konana, P., Whinston, A. B., and Yin, F. (2001). Driving e-business excellence. *MIT Sloan Manag. Rev.* 43, 36.

Başyazicioğlu, H. N., and Karamustafa, K. (2018). Marketing 4.0: impacts of technological developments on marketing activities. *Kırıkkale Üniversitesi Sosyal Bilimler Dergisi* 8, 621–640.

Beheshti, H. M., and Salehi-Sangari, E. (2007). The benefits of e-business adoption: an empirical study of Swedish SMEs. *Service Bus.* 1, 233–245.

Brych, V., Borysiak, O., and Brych, B. (2019). "Digital marketing of energy service companies' personnel in the context of socio-economic development," in *Strategies for Sustainable Socio-Economic Development and Mechanisms Their Implementation in the Global Dimension*, ed. M. Bezpartochnyi (Sofia: VUZF).

Chen, Q., and Zhang, N. (2015). Does e-commerce provide a sustained competitive advantage? *Sustainability* 7, 1411–1428.

Di Nardo, M., Clericuzio, M., Murino, T., and Sepe, C. (2020). An economic order quantity stochastic dynamic optimization model in a logistic 4.0 environment. *Sustainability* 12:4075. doi: 10.3390/su12104075

Duch-Brown, N., Grzybowski, L., Romahn, A., and Verboven, F. (2017). The impact of online sales on consumers and firms. Evidence from consumer electronics. *Int. J. Ind. Organ.* 52, 30–62.

Duffett, R., Petroşanu, D.-M., Negricea, I.-C., and Edu, T. (2019). Effect of YouTube marketing communication on converting brand liking into preference among millennials regarding brands in general and sustainable offers in particular. Evidence from South Africa and Romania. *Sustainability* 11:604. doi: 10.3390/su11030604

El Hilali, W., El Manouar, A., and Idrissi, M. A. J. (2020). Reaching sustainability during a digital transformation:a PLS approach. *Int. J. Inno. Sci.* 13, 52–79.

Ferguson, C., Finn, F., and Hall, J. (2005). Electronic commerce investments, the resource-based view of the firm, and firm market value. *Int. J. Account. Inform. Syst.* 6, 5–29. doi: 10.1016/j.accinf.2004.08.001

Fornell, C., and Larcker, D. F. (1981). *Structural Equation Models with Unobservable Variables and Measurement Error: Algebra and Statistics*. Los Angeles, CA: Sage Publications Sage CA.

Frame, W. S., and Woosley, L. (2004). Credit scoring and the availability of small business credit in low-and moderate-income areas. *Financial Rev.* 39, 35–54. doi: 10.1111/j.0732-8516.2004.00066.x

Gil-Gomez, H., Guerola-Navarro, V., Oltra-Badenes, R., and Lozano-Quilis, J. A. (2020). Customer relationship management: digital transformation and sustainable business model innovation. *Econ. Res.* 33, 2733–2750. doi: 10.1080/1331677x.2019.1676283

Ginting, B., Saidin, O. K., and Azwar, T. K. D. (2020). "Applying e-commerce marketing for global economic development in Medan", *IOP Conference Series: Earth and Environmental Science* (Bristol: IOP), 12072.

Gordon, A. (2019). *Charting the Economy: Early 20th Century Malaya and Contemporary Malaysian Contrasts*. Oxford, UK: Oxford University Press.

Gregory, G. D., Ngo, L. V., and Karavdic, M. (2019). Developing e-commerce marketing capabilities and efficiencies for enhanced performance in business-to-business export ventures. *Indus. Market. Manag.* 78, 146–157. doi: 10.1016/j.indmarman.2017.03.002

Hanim, L. (2014). Perlindungan hukum bagi para pihak dalam E-commerce sebagai akibat dari globalisasi ekonomi. *J. Pembaharuan Hukum* 1, 191–199. doi: 10.26532/jph.v1i2.1476

Hornby, G., Goulding, P., and Poon, S. (2002). Perceptions of export barriers and cultural issues:the SME e-commerce experience. *J. Electron. Commer. Res.* 3, 213–226.

Hu, Q., Yang, J., and Yang, L. (2011). "The impact of e-commerce on organizational performance:the role of absorptive capacity and integrative capability" in

Workshop on E-Business, (Oxford, UK: Oxford University Press), 261–273. doi: 10.1007/978-3-642-29873-8_25

Hutter, F., Kotthoff, L., and Vanschoren, J. (2019). *Automated Machine Learning: Methods, Systems, Challenges*. Berlin: Springer Nature.

Intrieri, E., Gigli, G., Gracchi, T., Nocentini, M., Lombardi, L., Mugnai, F., et al. (2018). Application of an ultra-wide band sensor-free wireless network for ground monitoring. *Eng. Geol.* 238, 1–14. doi: 10.1016/j.enggeo.2018.02.017

Jiao, S., and Sun, Q. (2021). Digital Economic Development and Its Impact on Econimic Growth in China:research Based on the Prespective of Sustainability. *Sustainability* 13:10245. doi: 10.3390/su131810245

Julian, C. C., and Ahmed, Z. U. (2005). The impact of barriers to export on export marketing performance. *J. Glob. Market.* 19, 71–94. doi: 10.1300/j042v19n01_05

Kabango, C. M., and Asa, A. R. (2015). Factors influencing e-commerce development:implications for the developing countries. *Int. J. Inno. Econ. Dev.* 1, 64–72.

Kagermann, H. (2015). *Change Through Digitization—Value Creation in the Age of Industry 4.0. In Management of Permanent Change*. Berlin: Springer, 23–45.

Khalil, M., Khawaja, K. F., and Sarfraz, M. (2021). *The Adoption of Blockchain Technology in the Financial Sector During the era of Fourth Industrial Revolution: a Moderated Mediated Model*. Berlin: Quality & Quantity, 1–18.

Khalin, V., Chernova, G., and Yurkov, A. (2019). Digitalization and its impact on the development of Russia. *Прикладная Информатика*. 14, 41–52.

Khan, S., Khan, S., and Aftab, M. (2015). Digitization and its impact on economy. *Int. J. Digit. Libr. Serv.* 5, 138–149.

Kinelski, G. (2020). The main factors of successful project management in the aspect of energy enterprises' efficiency in the digital economy environment. *Polityka Energetyczna* 23,5–20 doi: 10.33223/epj/126435

Kohtamäki, M., Parida, V., Patel, P. C., and Gebauer, H. (2020). The relationship between digitalization and servitization:the role of servitization in capturing the financial potential of digitalization. *Technol. Forecast. Soc. Change.* 151:119804. doi: 10.1016/j.techfore.2019.119804

Konopczyński, M. (2014). How taxes and spending on education influence economic growth in Poland. *Contemp. Econ.* 8, 329–348. doi: 10.5709/ce.1897-9254.149

Kotane, I., Znotina, D., and Hushko, S. (2019). Assessment of trends in the application of digital marketing. *Sci. J. Polonia Univ.* 33, 28–35.

Kshetri, N. (2007). Barriers to e-commerce and competitive business models in developing countries: a case study. *Electron. Commer. Res. Appl.* 6, 443–452. doi: 10.1016/j.elerap.2007.02.004

Kumar, B., Sharma, A., Vatavwala, S., and Kumar, P. (2020). Digital mediation in business-to-business marketing:a bibliometric analysis. *Indus. Market. Manag.* 85, 126–140.

Lawrence, J. E., and Tar, U. A. (2010). Barriers to e-commerce in developing countries. *Inform. Soc. Justice J.* 3, 23–35.

Liu, Y., Ma, M., Liu, X., Xiong, N. N., Liu, A., and Zhu, Y. (2018). Design and analysis of probing route to defense sink-hole attacks for Internet of Things security. *IEEE Trans. Netw. Sci. Eng.* 7, 356–372. doi: 10.1109/tnse.2018.2881152

Maiti, M., and Kayal, P. (2017). Digitization: its impact on economic development & trade. *Asian Econ. Financ. Rev.* 7:541. doi: 10.18488/journal.aefr.2017.76.541.549

Mastio, E., Chew, E., and Dovey, K. A. (2019). The learning organization as a context for value co-creation. *Learning Org.* [Epub online ahead of print]. doi: 10.1108/tlo-12-2018-0219

Meroño-Cerdan, A. L., and Soto-Acosta, P. (2005). Examining e-business impact on firm performance through website analysis. *Int. J. Electronic Bus.* 3, 583–598. doi: 10.1504/ijeb.2005.008537

Mohsin, M., Zhu, Q., Naseem, S., Sarfraz, M., and Ivascu, L. (2021). Mining Industry Impact on Environmental Sustainability. *Processes* 9:972. doi: 10.3390/pr9060972

Mosteanu, N. R. (2020). Finance digitalization and its impact on labour market. *Technium. Soc. Sci. J.* 8:598. doi: 10.47577/tssj.v8i1.804

Myovella, G., Karacuka, M., and Haucap, J. (2020). Digitalization and economic growth: a comparative analysis of Sub-Saharan Africa and OECD economies. *Telecomm. Policy* 44:101856.

Ojo, O. O., Shah, S., Coutroubis, A., Jiménez, M. T., and Ocana, Y. M. (2018). "Potential impact of industry 4.0 in sustainable food supply chain environment,"in *2018 IEEE International Conference on Technology Management, Operations and Decisions (ICTMOD)* (Morocco: IEEE), 172–177

Palvia, P., Baqir, N., and Nemati, H. (2018). ICT for socio-economic development: a citizens' perspective. *Inform. Manag.* 55, 160–176. doi: 10.1186/s12913-016-1423-5

Pan, T., Hu, T., and Geng, J. (2020). "View Learning Organization in a Situational Perspective," in *IOP Conference Series: Earth and Environmental Science* (Bristol: IOP), 22026.

Payne, A., and Frow, P. (2004). The role of multichannel integration in customer relationship management. *Indus. Market. Manag.* 33, 527–538.

Pechlaner, H., Kozak, M., and Volgger, M. (2014). Destination leadership: a new paradigm for tourist destinations? *Tourism Rev.* 69, 1–9. doi: 10.1108/TR-09-2013-0053

Pervez, T., Khawaja, K. F., and Sarfraz, M. (2022). An empirical investigation of value co-creation on customer loyalty: mediating role of customer trust. *Int. J. Econ. Bus. Res.* 23, 56–67.

Ruttan, V. W. (1991). *Sustainable Growth in Agricultural Production: Poetry, Policy and Science. Sustainability, Growth, and Poverty Alleviation*. Minneapolis, US: University of Minnesota.

Saeed, K. A., Grover, V., and Hwang, Y. (2005). The relationship of e-commerce competence to customer value and firm performance: an empirical investigation. *J. Manag. Inform. Syst.* 22, 223–256.

Sarfraz, M., Ivascu, L., Belu, R., and Artene, A. (2021). Accentuating the interconnection between business sustainability and organizational performance in the context of the circular economy: the moderating role of organizational competitiveness. *Bus. Strategy. Environ.* 30, 2108–2118. doi: 10.1002/bse.2735

Shah, S. G. M., Sarfraz, M., and Ivascu, L. (2021). Assessing the interrelationship corporate environmental responsibility, innovative strategies, cognitive and hierarchical CEO: a stakeholder theory perspective. *Corp. Soc. Responsib. Environ. Manag.* 28, 457–473. doi: 10.1002/csr.2061

Shpak, N., Kuzmin, O., Dvulit, Z., Onysenko, T., and Sroka, W. (2020). Digitalization of the marketing activities of enterprises: case study. *Information* 11:109. doi: 10.2196/20579

Tang, X., and Wang, G. (2020). Design and analysis of e-commerce and modern logistics for regional economic integration in wireless networks. *EURASIP J. Wirel. Commun. Netw.* 2020, 1–15.

Teixeira, T. S., and Piechota, G. (2019). *Unlocking the Customer Value Chain: How Decoupling Drives Consumer Disruption*. Redfern: Currency.

Tesfom, G., and Lutz, C. (2006). A classification of export marketing problems of small and medium sized manufacturing firms in developing countries. *Int. J. Emerg. Market.* 1, 262–281. doi: 10.1108/17468800610674480

Van der Eng, P. (2006). *Accounting for Indonesia's Economic Growth: Recent Past and Near Future*. Brisbane: University of Queensland.

Vorontsovskiy, A. V. (2020)."Digitalization of the economy and its impact on economic development and social welfare," in *Global Challenges and Prospects of The Modern Economic Development*. (Samara: Samara State University of Economics). doi: 10.1016/j.hlpt.2020.08.005

Zhu, K., and Kraemer, K. L. (2005). Post-adoption variations in usage and value of e-business by organizations: cross-country evidence from the retail industry. *Inform. Syst. Res.* 16, 61–84. doi: 10.1287/isre.1050.0045

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