frontiers | Frontiers in Environmental Science

TYPE Original Research
PUBLISHED 06 September 2022
DOI 10.3389/fenvs.2022.963549

OPEN ACCESS

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SPECIALTY SECTION
This article was submitted to Environmental Economics and Management, a section of the journal Frontiers in Environmental Science

RECEIVED 07 June 2022
ACCEPTED 09 August 2022
PUBLISHED 06 September 2022

CITATION
Zahrani AA (2022), Promoting sustainable entrepreneurship in training and education: The role of entrepreneurial culture.
Front. Environ. Sci. 10:963549.
doi: 10.3389/fenvs.2022.963549

Promoting sustainable entrepreneurship in training and education: The role of entrepreneurial culture

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The main purpose of this research was to investigate how universities may help Saudi Arabian students who are planning to become entrepreneurs promote sustainability development goals. The intersection of ecological development and entrepreneurship is referred to as "sustainable entrepreneurship." Entrepreneurs want to provide practical educational solutions. Thus, this study seeks to fill this gap by developing a new model for measuring the relationships between entrepreneurial culture, sustainability training, and sustainability education in Saudi Arabia. A quantitative research "survey questionnaire" found in the human relations theory of sustainable entrepreneurship was used to collect data. This study looked at the impact of three dimensions connected to the role of entrepreneurship in higher education using AMOS and Structural Equation Modelling (SEM). The data (n = 252) was examined using AMOS and SEM. Therefore, this study specifies 37 items, three of which are the most important. 1) a sustainable entrepreneurial culture, 2) sustainability training, and 3) sustainability education. The findings imply that a sustained entrepreneurial culture has a good influence on training and education. Furthermore, sustainability training has a good influence on sustainability education. As a result, this research supports the extended human relations theory of the function of a sustainable entrepreneurial culture by indicating that the model anticipates university students increasing their entrepreneurial culture *via* training and education in higher education.

KEYWORDS

entrepreneurial culture, training sustainabile, and education sustainabile, structural equation modeling (SEM), sustainable entrepreneurship (SE)

Introduction

Sustainable entrepreneurship instructors teach people how to successfully use current resources to achieve sustainability growth while not risking future generations' ability to access resources (Hermes and Rimanoczy, 2018). "Preservation of nature, intensive care, and society in the order to pursue of perception opportunity to bring into presence products in the future, processes, and services for benefit, where gain is broadly construed

to include financial and non-gains to individuals, the economy, and society," (Shepherd and Patzelt, 2011) define sustainable entrepreneurship. This definition highlights that sustainable entrepreneurship encompasses not only the creation of new sustainable businesses, but also the transformation and management of existing businesses to make them more sustainable. As a result, sustainable entrepreneurship can occur to varying degrees in start-ups, small and medium businesses (SMEs), and major corporations (Gast et al., 2017). Given its significance, (Hall et al., 2010) state that the goal of sustainable entrepreneurship is to build a more sustainable and equitable society. Several institutions throughout the globe have launched research and training programs on sustainable entrepreneurship in order to play a vital role in the development of sustainable societies (Décamps et al., 2017; Olalla and Merino, 2019). To give sustainable entrepreneurship education modules, educators frequently combine sustainability-related themes with entrepreneurship education (Gast et al., 2017). Sustainable entrepreneurial education and training, in general, helps graduates develop new relationships that will eventually aid them in their future responsibilities, in addition to increasing their skills (Chandra, 2016). Students, for example, can connect with a variety of networks and perhaps profit from them by affiliating with academic institutions. This is why the number of young people interested in attending sustainable entrepreneurship training programs is increasing (Hesselbarth and Schaltegger, 2014). According to (Chandra, 2016), sustainable entrepreneurship courses, extracurricular activities, and contests are becoming increasingly popular in Hong Kong. The intersection of sustainable development and entrepreneurship is referred to as sustainable entrepreneurship. Since the 1990s, sustainable development has been a major notion in policy, society, and industry. It is most generally characterized as "filling current demands without jeopardizing future generations' capacity to fulfill their own needs" (WCED: World Commission on Environment and Development, 1987). Thus, while acknowledging the connection of the natural environment, societal welfare, economic performance, and sustainable entrepreneurship, sustainable development must preserve intra-generational equity while simultaneously developing inter-generational equity. Although all of these labels describe the dynamic link between enterprise, society, and the environment, their market and profit orientations differ (Binder, 2017). According to (Binder et al., 2015) have highlighted five components that are typically included in sustainability entrepreneurship definitions. First and first, academics are interested in the process of identifying, developing, and exploiting possibilities. Second, the triadic link inherent in the notion of sustainable development to balance economic, social, and ecological effects is reinforced. Third, the transformational potential of future products and services is included in the definitions. Fourth, definitions incorporate the source of opportunities: resourceful entrepreneurs generate them, or an actor's vigilance reveals a market weakness that may be taken advantage of. Finally, some researchers expressly admit who takes advantage of chances (i.e., the entrepreneurs). Because researchers highlight the idea that sustainable entrepreneurship is a process beyond definitions, the chapter will show sustainable entrepreneurship in action, which is also useful for understanding how sustainable enterprises evolve in practice. Most entrepreneurship studies, including recent sustainable entrepreneurship research (Belz and Binder, 2017), focus on the entrepreneurial process. Also, according to Wang, (Wang, 2022) asserts that social entrepreneurship and innovation have an impact on value creation and sustained economic development. Noneconomic advantages and emotions often initiate the sustainable entrepreneurial process: it is the compassion to promote the well-being of others that develops a shared vision between the founders, the firm, and its members (Farny, 2016). The identifying of a specific ecological or social problem is the start of a sustainable entrepreneurship process (Belz and Binder, 2017). Entrepreneurs must have the skill and incentive to improve their community or social well-being in order to be sustainable (Muñoz and Cohen, 2018). Community-based entrepreneurship, ecopreneurship, environmental entrepreneurship, hybrid organizing, pro-social venturing, social entrepreneurship, societal entrepreneurship, and sustainable-ethical entrepreneurship are all similar but distinct concepts that emphasize entrepreneurial activity as a potential solution to environmental degradation and social inequality in academic discourse (Shepherd and Patzelt, 2011; Muñoz and Cohen, 2018). Additionally, according to Awan et al. (Awan et al., 2022), embracing Industry 4.0 and the circular economy is essential for internalizing knowledge flows among various value chain actors and achieving more sustainable growth. Therefore, in this research, the interest of students in starting their own businesses has increased as educators create their own internal ecosystems to support student driven entrepreneurship. Also, we discovered that educators lack a method for enticing their students to accept internships in sustainable businesses. Instead, they are required to carry out their own pilot projects to get real-world experience that will be helpful whenever they start their own businesses. In addition, the responders emphasize how the curriculum they developed is motivated by a blend of theory and experience, aiding graduates in undertaking business creation after the course. However, educators desired that graduates launch businesses after receiving their degrees. Furthermore, the outside world has been crucial in supporting student-led projects. As a result, the educators can support student-led sustainable entrepreneurship by leveraging both student and industry interest. Teachers encourage students to start sustainable businesses as soon as it starts their education. Students can narrowly focus on venture formation thanks to this

orientation so early in the program. An educator emphasizes that we encourage our students to start sustainable businesses along the learning curve by exposing them to social realities and the issues that occur in the community. In fact, several kids come to us with a list of ideas that they want us to address, this makes our job simple. According to the findings, educators who are motivated by the education issue can start training in sustainable entrepreneurship with the goal of inspiring students to start sustainable businesses focused on training and education. To do this, we first asked them about the skill shortages in the training and education they contribute to solve the problem at any level to promoting sustainable entrepreneurship in training and education by the role of entrepreneurial culture. Thus, the aim of this study was to develop a new model for measuring sustainable entrepreneurship in Saudi Arabia through education and training.

Problem background

It is controversial whether entrepreneurship should be included in academic courses or programs. As a result, (Abdullah, 2020) claims that entrepreneurship is strongly associated with Business and Economic studies in several European nations, such as Spain and the United Kingdom. Unlike traditional entrepreneurship, which focuses primarily on increasing profits, sustainable entrepreneurship is based on the premise that entrepreneurs have the ability to create economic, social, and environmental value through their business activities (Belz and Binder, 2017). The word encapsulates the dynamic interaction that exists between entrepreneurs as economic agents, society, and the natural world. "Sound investment is focused on the conservation of nature, life support, and community in the order to pursue of perceived opportunities to bring into existence products in the future, processes, and services for gain, where gain is broadly interpreted to include financial and non gains to individuals, the economy, and society," (Shepherd and Patzelt, 2011), offer a prominent definition. Rather than attempting to limit social and environmental harm, entrepreneurship should strive to regenerate the environment and promote constructive social change (Markman et al., 2016). As a result, sustainable entrepreneurship views entrepreneurship as a possible solution to environmental deterioration and social inequity (Cohen and Winn, 2007; Shepherd and Patzelt, 2011). At the moment, there are at least three perspectives on sustainable entrepreneurship in the literature, each with a different understanding of the confluence of economic, social, and environmental sustainability (Farny, 2016). The adaptation of Elkington's Triple Bottom Line (TBL) model (Elkington, 1994) into sustainable development entrepreneurship as a concept of intersection between both the economy, society, and the environment, which has been widely applied in entrepreneurship (Cohen and Winn, 2007; Hockerts and Wüstenhagen, 2010; Schaltegger and Wagner, 2011). Furthermore, Elkington asserts that balancing the requirements of the environment, society, and economy has largely become an accounting exercise for most businesses, rather than resulting in a sustainability economic reform (Elkington, 2018). The second way of looking at sustainability is to use Passet's Bioeconomy model (Passet, 1996), which culminates in a notion of embeddedness called sustainability entrepreneurship. The key argument is that, in light of previous negative consequences, entrepreneurship should be understood as rooted in, and so constrained by, the natural environment and society (Markman et al., 2016). As a result, it is necessary to emphasize that the environment comes first, since it is the ultimate basis for all human activity, and society comes second, as it is nested inside the economy (Markman et al., 2016). Simultaneously, sustainable entrepreneurship has structural tensions as a result of pursuing numerous goals, which are likely to lead to internal disputes (Binder, 2017). Conflicts arise primarily as a result of the degree to which numerous objectives are integrated or separated in organizational architecture, organizational activities, and organizational actors (Battilana and Lee, 2014). Highly integrated sustainability businesses must deal with a variety of organizational actors and competing interests.

The numerous aims of community-oriented sustainability firms preclude the rigorous application of market logic, necessitating the inclusion of a heterogeneous skillset with varied origins in its personnel makeup (Awan et al., 2022). Another, if less well-known, viewpoint sees sustainability entrepreneurship as a notion of integration, in which economic, social, and ecological entrepreneurship all come together to produce sustainability entrepreneurship (Schlange, 2009; Heikkurinen et al., 2019). The Anthropocene economic players have a collective obligation to organize in response to ecological boundaries, which has substantial repercussions for the connection between humans and other creatures, according to the integrated approach to sustainability (Heikkurinen et al., 2019). As a result, this methodology excludes weak examples of sustainable entrepreneurship, such as compliance-oriented business models, and only includes strong cases of sustainability, such as regenerative and co-evolutionary sustainability (Heikkurinen et al., 2019). Sustainable entrepreneurship research has progressed quickly and is diverse (Anand et al., 2021). The internally and externally forces drive sustainable entrepreneurship uptake in people and organizations (Ahmad et al., 2020); the abstract comprehension of entrepreneurial success as a construct and its difference from other forms of business organization (Schaltegger and Burritt, 2018); and the processes implied in entrepreneurial success, such as opportunity recognition and business model building (Schaltegger and Burritt, 2018). (Criado-Gomis et al., 2018).

In the case of the internal and external aspects of sustainable entrepreneurship, research has focused on the antecedents of activities related to the formation of a sustainable business, which includes people's aspirations to do so (Agu et al., 2021). Despite the fact that there is a large body of literature dedicated to the study of conventional entrepreneurship's behavioral intents, research on entrepreneurial intentions when the sustainability component is at risk is still in its infancy (Arru, 2020). Even though there is a growing desire for social responsibility and environmental integrity in the corporate sector (Reyes-Rodríguez et al., 2016), research on sustainable entrepreneurship intentions and behavior is limited when compared to traditional entrepreneurship research (Vuorio et al., 2018; Arru, 2020; Agu et al., 2021). Closed concepts to entrepreneurial success have been developed, such as recycling and reuse (Kirchherr et al., 2017), social enterprise (Mair and Noboa, 2006), environmental entrepreneurialism or eco-entrepreneurship (Schaper, 2002), and self-sustaining entrepreneurship as a whole (Kirchherr et al., 2017). (Anand et al., 2021). However, there is still gap for study on sustainability entrepreneurial education and training. Therefore, the goal of this study was to develop a new model for measuring sustainable entrepreneurship in Saudi Arabia through education and training.

Research model and hypotheses development

Academic training is critical in all three domains because they all have the ability to help to achieving sustainability growth. Academic institutions, in particular, play a key role in teaching sustainable entrepreneurship (Dentchev et al., 2018). (Brock and Steiner, 2009), for example, found that 75% of the sustainable entrepreneurship courses they looked at were part of the academic curriculum. Prior sustainable entrepreneurship training-based research have found that sustainable entrepreneurship training improves fledgling entrepreneurs' self-efficacy and helps them start social companies (Smith and Woodworth, 2012; Hockerts, 2015). (Kummitha and Majumdar, 2015).

There has been an increase in scholarly interest in understanding students' intentions to engage in sustainable entrepreneurship (Kirby and Ibrahim, 2011; Vuorio et al., 2018), prosocial motives that influence their interest in sustainable entrepreneurship (Miller et al., 2012; Bacq et al., 2017), and the role of academic training in promoting sustainable entrepreneurship practice (Kirby and Ibrahim, 2011) (Vuorio et al., 2018), (Brock and Steiner, 2009; Miller et al., 2012). However, there has been little research on the motivations of academic institutions to teach sustainable entrepreneurship (Fichter and Tiemann, 2018). For the practice of sustainable entrepreneurship, education and training are critical. According to (Becker, 1994), these two are the "most essential investments in human capital" (p. 17). Individuals' inclinations to start businesses (Estrin et al., 2016) and firms' capabilities to engage in integrated value creation are heavily influenced by human capital (Battilana and Dorado, 2010). Although the distinction between training and education is sometimes overlooked and confused, the two are beneficial in different ways. While the former refers to general education obtained *via* schooling or university, the latter refers to any training that aids in the acquisition of skills (Becker, 1994) (see Figure 1).

Entrepreneurial culture on sustainability

Students from all higher education courses and all levels of education who need to acquire these abilities began to get entrepreneurship education in a way that made it feasible to include students from all higher education courses and all levels of education. As a result, entrepreneurial programs have been developed and implemented on every continent as a means of preparing and enabling people to face professional challenges, create jobs, and develop unique and valuable solutions to a variety of emerging social and economic issues, such as the environment, poverty, social exclusion, and sustainability. Furthermore, entrepreneurship education has taken on the goal of developing an entrepreneurial culture, with the abilities listed above serving as a framework (Plourde and Pelletier, 2007; Mwasalwiba, 2010; Römer-Paakkanen and Suonpää, 2017). Thus, an entrepreneurial culture can be disseminated to all, ensuring that the economy and market include not only those who are born into a family and socioeconomic context conducive to entrepreneurship, but also those who acquire the skills, competences, values, emotions, and tools of this culture through learning and training (Jardim, 2020). The development of entrepreneurial culture elements necessitates the construction of an educational environment conducive to the development of value propositions, distinctive semiprofessional initiatives, helpful goods, and creative services (European Commission, 2014). This teaching–learning process necessitates the application of a number of educational methods. They can be instructional games, entrepreneur biographies, group dynamics, or business models, and they can be digital or printed, virtual or in-person, individual or group. Similarly, the diffusion of entrepreneurial skills programs through worldwide educational networks underscores the importance of the entrepreneurial sciences, such as management, economics, and pedagogy, in promoting a global entrepreneurial culture (Jardim et al., 2021). More specifically, the findings of this study suggested that entrepreneurship-focused approaches had a significant impact on the promotion of a particular culture, as evidenced by the UKids initial teacher training program, which aims to make entrepreneurship, particularly social entrepreneurship, a

part of primary school curriculum (Rigg and van der Wal-Maris, 2020). In other countries, such as Brazil, Portugal, and Sweden (Dolabela et al., 2019; Lackéus and Sävetun, 2019), this option has been used. As a result, they are more valuable to participants who would have a harder time accessing the programs' resources and talents. As a result, in the logic of an inclusive education that fosters social ascension, the diffusion of this culture among all pupils becomes extremely important (Fiolhais et al., 2020; Franco, 2020). Entrepreneurial culture ideals will be enabled by the educator's active, inspirational, and distinctive presence in the most various promotional contexts of entrepreneurship. They should know how to utilize these and other tools to encourage an entrepreneurial mentality (Jardim et al., 2021).

Training on sustainability

Sustainable entrepreneurship training assists enthusiasts in gaining the essential knowledge and abilities to launch sustainable businesses (Klapper and Farber, 2016; Ortiz and Huber-Heim, 2017; Warwick et al., 2017). Individuals who have been taught in sustainability, for example, are more likely to exhibit intents to start businesses, according to (Kuckertz and Wagner, 2010). Earlier, (Hansemark, 1998) stated that entrepreneurship training programs teach people how to acquire confidence in order to increase their motivation to start businesses. Individuals' attitudes toward sustainability and their perceived entrepreneurial attractiveness result in sustainability-oriented entrepreneurial goals, according to a recent research by (Vuorio et al., 2018). In fact, (Germak and Robinson, 2014) argue that enrolling in a sustainable entrepreneurship training program should be considered a beginning step toward practicing sustainable business. However, there are differing perspectives on the goals of sustainable entrepreneurship training, with some claiming that it strives to increase awareness and build a more educated community and others claiming that it aims to produce business ideas (Martin et al., 2013; QAA, 2018; Alamri et al., 2020a; Al-Rahmi et al., 2020). Scholars such as (Fayolle et al., 2006) demonstrate that entrepreneurship training should not be judged just on how well it increases a student's likelihood of starting a business. To put it another way, it should not be linked solely with venture development outcomes. According to a study produced by the (European Union, 2016), entrepreneurship should be viewed as a transversal skill that is beneficial in many aspects of human existence.

Education on sustainability

Integrating sustainability in academic curricula is a desideratum in order to achieve sustainability literacy. The positive correlation between the intensity of environmental education in higher education and students' environmental knowledge has been tested (Zsóka et al., 2013). Furthermore, a positive relationship has been found between sustainability knowledge and behavior for sustainability (Vicente-Molina et al., 2013). However, progress has been unequal across universities or countries. On one hand, students in North America and Lithuania have reported that the sustainability perspective is not much present in their introductory economic courses, irrespective of the course of study they are attending (Dagiliūtė et al., 2018). Romanian Business Administration students have expectations from their universities to equip them with sustainability entrepreneurial skills and knowledge that are needed for their future entrepreneurship career by including those topics in curricula, programs, and lectures (Badulescu et al., 2015). Knowledge on (Al-Rahmi and Alkhalaf, 2021) sustainable development is crucial for students' eco-entrepreneurial intentions, as shown by the results of studies in Asia (Nuringsih and Puspitowati, 2017; Al-Rahmi et al., 2020; Al-Rahmi et al., 2021; Hameed et al., 2021; Sayaf et al., 2022). Education on sustainability, with an environmental focus leads to green entrepreneurial support and behavior and to green venturing (Nuringsih and Puspitowati, 2017; Al-Rahmi et al., 2019; Alamri et al., 2020b; Al-Rahmi et al., 2021; Hameed et al., 2021; Sayaf et al., 2021). Entrepreneurship education aims to provide students the motivation, knowledge, and abilities they need to succeed as entrepreneurs in a range of situations (Cope, 2005). Traditional entrepreneurship education focuses on themes such as innovation, economics, management, and finance for new businesses. In comparison to issues like as innovation and strategy implementation, sustainability has not been heavily highlighted in entrepreneurship education programs. Entrepreneurship education teaches people a variety of abilities (Moses and Izedonmi, 2010), such as spotting business opportunities and launching new enterprises (Bell and Stellingwerf, 2012). The United Nations Educational, Scientific, and Cultural Organization has underlined the need of education for sustainable development (ESD) (UNESCO). In November 2014, during the World Conference on Education for Sustainable Development in Aichi-Nagoya, Japan, the Global Action Program (GAP) for ESD was announced. The GAP takes a two-pronged approach to ESD: 1) integrating sustainable development into education, and 2) integrating sustainable development into education (United Nations Educational, 2014). Furthermore, O'Brien believes that all three dimensions of societal transitions in terms of practical, political, and human components must be understood in order to achieve climate change mitigation goals.

Research methodology

A questionnaire was employed as a data collection method in this study using a quantitative approach. 272 students from

TABLE 1 Measurement model assessment.

No	Items		Factors	Estimate	CA	CR	AVE
1	ECS1	<---	Entrepreneurial Culture on Sustainability		0.783	0.921	0.783
2	ECS2	<---		0.830			
3	ECS3	<---		0.846			
4	ECS4	<---		0.818			
5	ECS5	<---		0.839			
6	ECS6	<---		0.857			
7	ECS7	<---		0.866			
8	ECS8	<---		0.840			
9	ECS9	<---		0.864			
10	ECS10	<---		0.858			
11	ECS11	<---		0.810			
12	ECS12	<---		0.853			
13	TS1	<---	Training on Sustainability	0.771	0.923	0.907	0.683
14	TS2	<---		0.888			
15	TS3	<---		0.761			
16	TS4	<---		0.841			
17	TS5	<---		0.739			
18	TS6	<---		0.789			
19	TS7	<---		0.789			
20	TS8	<---		0.801			
21	TS9	<---		0.795			
22	TS10	<---		0.768			
23	TS11	<---		0.840			
24	ES1	<---	Education on Sustainability	0.718	0.919	0.928	0.697
25	ES2	<---		0.804			
26	ES3	<---		0.713			
27	ES4	<---		0.749			
28	ES5	<---		0.790			
29	ES6	<---		0.856			
30	ES7	<---		0.814			
31	ES8	<---		0.743			
32	ES9	<---		0.762			
33	ES10	<---		0.842			
34	ES11	<---		0.864			
35	ES12	<---		0.851			
36	ES13	<---		0.765			
37	ES14	<---		0.772			

students took part in the study survey. This research was conducted at the start of the academic year 2021–2022. The participants were given an introduction to the research before completing the questionnaire, and their contribution was completely optional. The survey took about 10–15 min to complete. The participants were chosen from different departments and faculties using a convenience-sampling technique. After taking into consideration the missing data and questionnaires that were incomplete, 20 questionnaires were omitted. As a result, 252 questionnaires were considered for further analysis and coded into SPSS. Data collected was evaluated through AMOS for evaluating structural equation modeling (SEM). The data was processed in two steps, with each stage evaluating the measurement and structural model in the arrangement as suggested by (Hair et al., 2019). In addition, the authors decided to use AMOS for multiple reasons. First, SEM is generally used when a study's goal is to improve on an existing theory (Urbach Frederik and Ahlemann, 2010). Secondly, it allows for simultaneous analysis of both the measurement and the structural model, resulting in more

reliable estimations where samples are to be broken into sub-samples (males/females, juniors/seniors, etc.). A minimum sample size of 30 for each factor is necessary as recommended by (Sekaran and Bougie, 2016). Hence, AMOS-SEM was the appropriate tool for this study.

Instrument factors

For this study, the authors developed a questionnaire. The first part includes questions intended to collect respondents' demographic information, such as age, gender, specialization, and year of study. The second section includes measurement items to assess the three variables. Entrepreneurial culture on sustainability was adapted 12 items from (Plourde and Pelletier, 2007; Römer-Paakkanen and Suonpää, 2017), training on sustainability was adapted 11 items from (Brock and Steiner, 2009; Chandra, 2016; Klapper and Farber, 2016), and education on sustainability was adapted 14 items from (Zsóka et al., 2013; Nuringsih and Puspitowati, 2017; Al-Rahmi et al., 2021), see Table 1.

Results and analysis

Measurement model assessment

Hair and his associates recommended considering the reliability (Cronbach's alpha and composite reliability) and validity of the constructs while evaluating the measurement model (including convergent and discriminant validity) (Hair et al., 2019). As seen in Table 1, they are both substantially over the required given threshold of 0.7, as required, the reliability of the construction was established on this basis (Gefen et al., 2000; Kannan and Tan, 2005). The factor loadings and average variance extracted (AVE) were investigated in order to determine convergent validity (Hair et al., 2019). Results in Table 1 show that all the factor loadings and AVEs are greater than the recommended minimum values of 0.7 and 0.5, implying that the measurement model possesses convergent validity. As well as, this study measurement the model through 37 items, and all are greater than the minimum values of 0.7 was recommended by (Hair et al., 2019).

Model fit evaluation

To find particular links among dimensions in the structural model, the statistical significances of total, direct, and indirect effects were further investigated. For model evaluation, a variety of goodness-of-fit indices for model fit were investigated. Statistical Package for the Social Sciences (SPSS) and Structural Equation Modeling were used to confirm the measurement model's validity and reliability (AMOS-SEM). Factor loadings were used to establish validity, convergent validity, Cronbach's alpha, and convergent validity again for model's goodness of fit, as shown by (Hair et al., 2019).NFI (0.932) is a valid value, RFI (0.922) is a valid value, IFI (0.935) is a valid value, TLI (0.928) is a valid value, CFI (0.935) is a valid value, GFI (0.933) is a valid value, and AGFI (0.952) is a valid value. Also, the RMR value below the threshold of 0.033 (0.05), as suggested by (Hair et al., 2019). Figure 2 show all items and factors values. This shows that the measure-mint model was acceptable and well-suited to the structural model. See Figure 2 and table 2.

Measurement validity convergent

The differences between sets of ideas and their measurements are referred to as discriminant validity. The discriminant validity of all constructs was investigated with values more than 0.50 and significant at $p = 0.001$, as stated by the authors. Hair et al. (Hair et al., 2012). As indicated in Table 3, the square root shared by objects in a single construct should be less than the similarities between items in the two constructions.

Structural model and path coefficient

Structured equation modeling was used to investigate the complex relationships between the direct and indirect effects of various research variables (entrepreneurial culture on sustainability, training on sustainability, and education on sustainability). The structural model specifies both the interaction and the influence of independent factors on the dependent variable (path coefficient). The maximum likelihood method, in particular, may be used to thoroughly examine complex models and uncover multiple linkages between multi-item parts, as well as the influence of moderating and moderating factors (Hair et al., 2019). Figure 3 depicts the direct influence of the route coefficient on the latent predictor variable anticipated variables.

Hypotheses testing results

Based on the results shown in Figure 3 and Table 4, the relationship between entrepreneurial culture on sustainability and training on sustainability ($\beta = 0.176$, C.R = 3.188, $p = 0.001$), thus, hypothesis number one was accepted. Also, the relationship between entrepreneurial culture on sustainability and education on sustainability ($\beta = 0.170$, C.R= 2.572, $p = 0.010$), thus, hypothesis number two was accepted. Finally, the relationship between training on sustainability, and education on

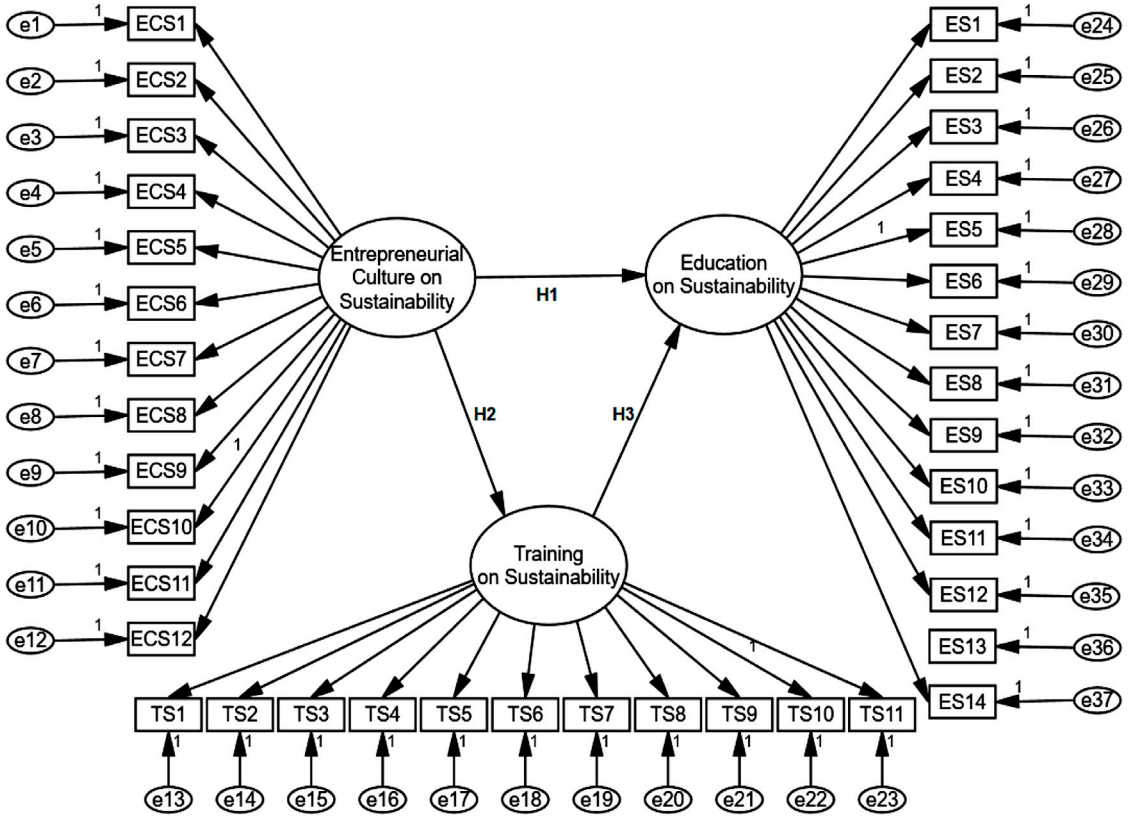

FIGURE 1
Research Model.

sustainability (β = 0. 554, C.R = 8.169, p = 0.000), thus, hypothesis number three was accepted.

Discussion and implementations

Sustainable entrepreneurship education offers a strong platform for students to learn about the practical value of sustainability, as well as entrepreneurship, in higher education. Integrating sustainability in entrepreneurship education in Saudi Arabia is beneficial in terms of both entrepreneurial culture and training instruction on sustainability for countries with a relatively high percentage of higher education. As a result, the current study examines the elements that impact the entrepreneurial culture, training on sustainability, and education on sustainability in order to investigate their learning of sustainable entrepreneurship.

The outcomes of this study suggest that entrepreneurial education for sustainable development is a pluralistic method that may connect the two paradigms of doing well (sustainability training) and doing well (doing well in general) (education on sustainability). This conclusion shows that educational entrepreneurs might benefit from being exposed to learning content related to sustainable entrepreneurship. As shown in our research, views of entrepreneurial culture have a role in sustainability training and education in order to maximize learning about sustainable entrepreneurship (see Figure 3).

Entrepreneurial culture is viewed as a sort of education that teaches the skills needed to start a new firm (Rahim et al., 2015). A few entrepreneurship education academics argue that existing entrepreneurship education is impeding the spread of entrepreneurial training and education on sustainability sustainability. As a result, entrepreneurial education includes more than just acquiring information. It is about instilling an entrepreneurial attitude in lecturers and students so that they can provide sustainability training and education. Entrepreneurial abilities are not just instilled through traditional lectures; alternative ways have also been employed to attain the intended learning outcome, notably through effective pedagogical practices that might improve the employability of its graduates. Entrepreneurship education equips students with a wealth of knowledge, a range of skills, and sustainability education in order to encourage entrepreneurial success. Entrepreneurship education and culture share the purpose of reinforcing

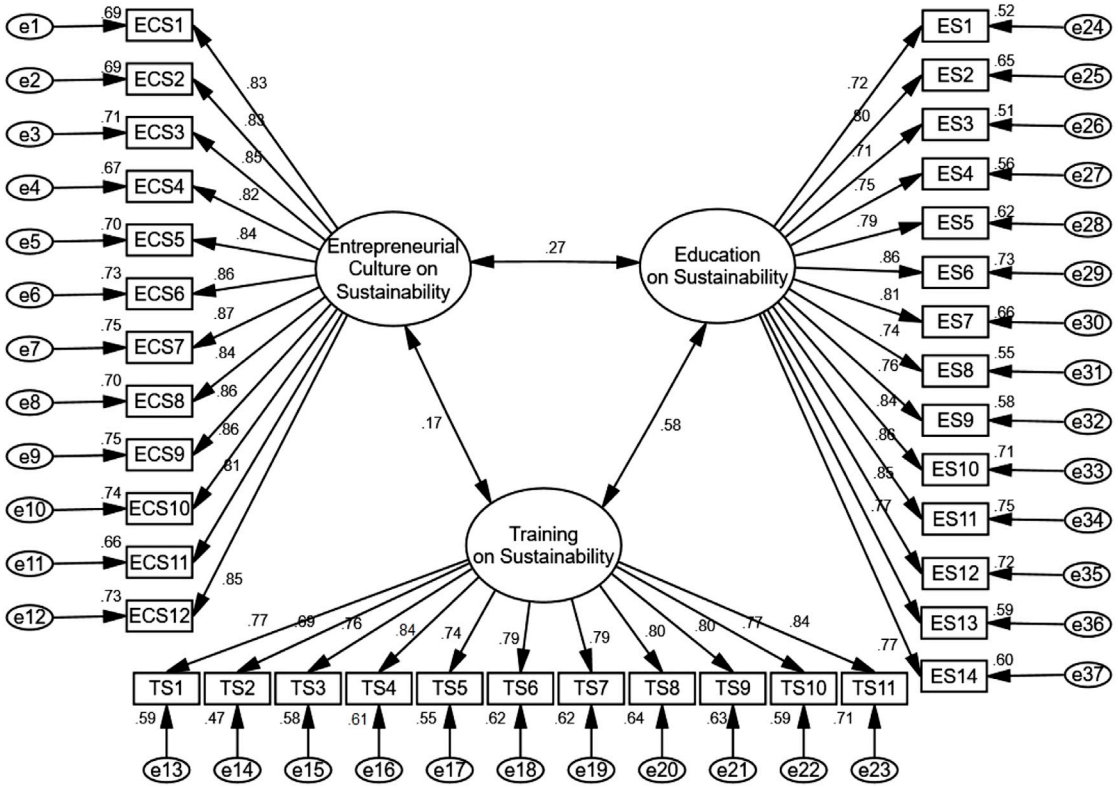

FIGURE 2
Model fit measurement.

TABLE 2 Model Fit Evaluation.

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI	GFI	AGFI	RMR
Default model	0.932	0.922	0.935	0.928	0.935	0.933	0.952	0.033
Saturated model	1.000		1.000		1.000	1.000	1.000	.000
Independence model	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TABLE 3 Discriminant validity.

No	Factors	Code	ECS	TS	ES
1	Entrepreneurial Culture on Sustainability	ECS	0.819		
2	Training on Sustainability	TS	0.354	0.880	
3	Education on Sustainability	ES	0.402	0.432	0.876

entrepreneurs' value orientation for a sustainable society (Lindner, 2018). The study's finding that environmental sustainability at universities has the potential to develop good attitudes toward sustainability entrepreneurship has already been proven (Hameed et al., 2021). As a result of this conclusion, environmental sustainability should be a component of the university's strategy, which will eventually have a good influence on the society's business environment.

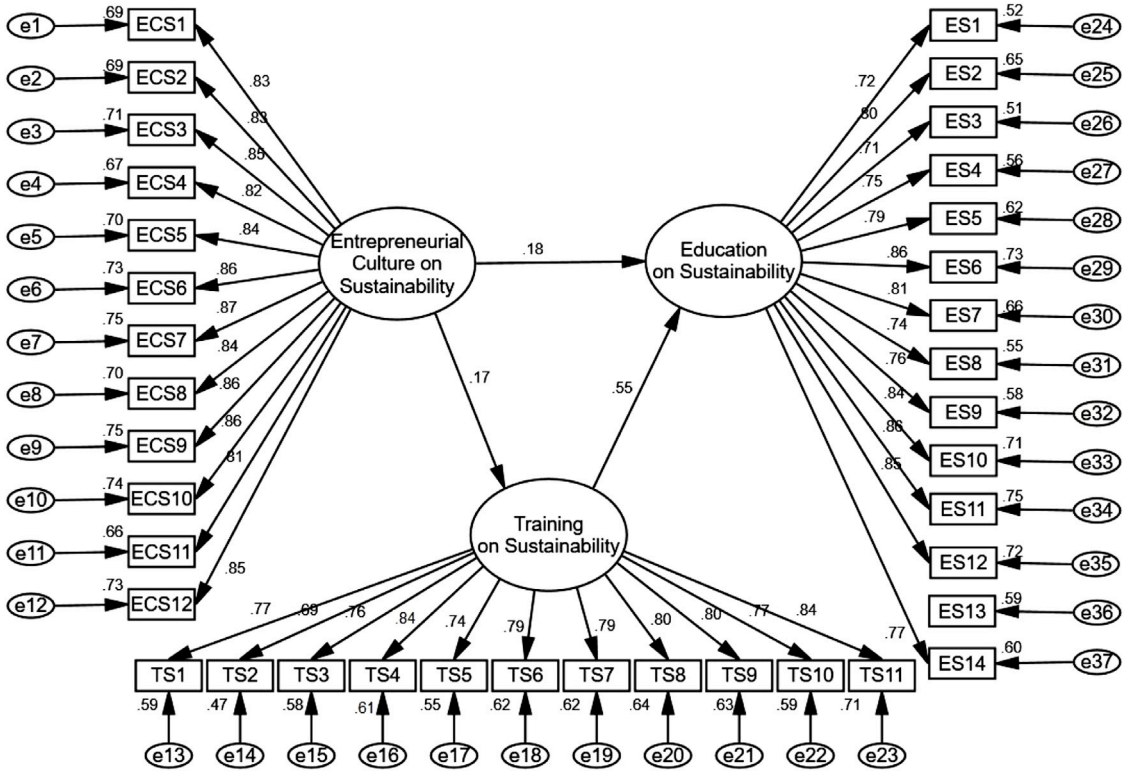

FIGURE 3
Structural Model (Path Coefficient).

TABLE 4 Hypotheses testing.

			Path	Estimate	S.E.	C.R.	*P*.value	Results
ES	<---	ECS	0.122	0.176	0.038	3.188	0.001	Accepted
TS	<---	ECS	0.143	0.170	0.056	2.572	0.010	Accepted
ES	<---	TS	0.457	0.554	0.056	8.169	0.000	Accepted

Higher education institutions play a critical role in societal adaption of sustainable practices, notably on campus. As a result, students must adjust their conduct on campus to conform to go-green culture (Zsóka et al., 2013; Hameed et al., 2021). It is hoped that this conduct will spread beyond campus, resulting in societal transformation. Sustainability practices on campus will not only result in changes on campus but will also result in a shift in the attitude of all persons involved with the institution to adopt them in their daily lives, such as entrepreneurial culture and sustainability training courses. Educators collaborate with practitioners to help students launch their own businesses. Such collaborations provide a source of funding for student-led, sustainability enterprises. Students are exposed to extreme societal problems as part of the process, which helps them develop compassion (Miller et al., 2012), altruism (Vuorio et al., 2018), and empathy (Cincera et al., 2018), all of which help them start sustainable businesses (Long et al., 2019). Furthermore, the academic model tried to develop internal infrastructure to encourage student interest in sustainable business (Chandra, 2016). The outcomes of this study demonstrate that establishing a complete entrepreneurial environment for students and workers is the first step in developing an entrepreneurial culture. To guide new entrepreneurs, teaching lecturers must be well-equipped and active in a variety of entrepreneurship-related projects. They must continue to expand their expertise, enhance their professions, and actively participate in creative and entrepreneurial activities. Research and consulting activities

across disciplines should be undertaken to examine the success of the present model and to identify methods to enhance the current state of entrepreneurship education quality. Entrepreneurship education is said to be a crucial component of sustainability training and education development. As a result, entrepreneurship is a dynamic process including vision, change, and creativity. For the creation and implementation of new ideas and creative resolves, the process need an enthusiastic and passionate individual. Entrepreneurial activities, according to researchers, create jobs, generate income, and stimulate economic progress (Zamberi Ahmad and Xavier, 2012). Entrepreneurship is regarded as critical in the political and socioeconomic transformation of nations (Matlay, 2005). Entrepreneurship education combines experiential learning, skill development, and, most importantly, a shift in mindset (Potter, 2008); in fact, entrepreneurship culture is listed as a key competence in the European framework on key competences for lifelong learning (2013), and includes creativity, innovation, and risk-taking. According to Neck, Greene, and Brush (Neck et al., 2014), challenge-based learning is a practically focused approach to entrepreneurship education that is built on the learning cycle "challenge, feedback, training, education and reflection" (Kolb, 1983; Sternad and Buchner, 2016). This instructional strategy combines a reflection- and action-oriented pedagogical approach. Therefore, this research defined a challenging task as one that is difficult to do, that is complex, targeted to the target audience, and representative of their everyday situation. The task for students is to generate and put into action solutions for the given scenario (sometimes in partnership with others). To deal with it, we must adopt a process of inquisitive learning that closely links theory and practice. By connecting cognitive, personal, training, education, and social competencies to entrepreneurial content and situations, entrepreneurial challenge-based learning focuses on practical competences and entrepreneurial culture (Jambor and Lindner, 2018). The development of fresh ideas and their imaginative and conceptual application are the main foci of entrepreneurial education (Faltin, 2013). Therefore, this research aimed to investigate how universities may help Saudi Arabian students who are planning to become entrepreneurs promote sustainable development goals. According to proponents of experience-based learning (Dewey, 1933), competencies are most effectively learned through demonstration and practical application. Entrepreneurship education encourages a hands-on, exploratory learning method that closely links theory and practice, combines training and education with creativity, and fosters teamwork (Faltin and Zimmer, 1995). Consequently, in entrepreneurship education, critical and communicative learning is realized through interaction between professors and students that is characterized by respect, empathy, and encouragement. The cultivation of respectful relationships with others that promote cooperation, as well as instruction and training that encourage group creativity, are the main areas of attention (Rosenberg, 2013). This is consistent with the main objective of this research. This entrepreneurial culture strategy helps people in their daily lives and at work by enabling them to seize possibilities in an environment that encourages sustainability training and education. Therefore, the following study implications have been determined based on the theoretical framework and hypotheses findings:

- Adopting sustainable entrepreneurship in training and education for learning, which will strengthen students' skills and knowledge concerns.
- • Higher education institutions are urged to learn about sustainable entrepreneurship in training and instruction.
- • Two key concerns for sustainable entrepreneurship in training and education are technology and the influence of entrepreneurial culture.

Therefore, this research contributes to the literature by suggesting a model that promotes sustainable entrepreneurship in training and education through the role of entrepreneurial culture theory, which is demonstrated to be a beneficial model to understand the following:

- The sustainability entrepreneurial culture influences sustainable training and education.
- Sustainable training on sustainability influences the entrepreneurial culture and education on sustainability.
- Sustainable education influences the entrepreneurial culture of sustainability and training.

Additionally, this research contributes to the development of a theoretical model addressing how Saudi higher education's sustainability entrepreneurial culture influences sustainable training and education. Therefore, the major practical implications and contributions of this study were achieved.

The limitations of this research

There are two major limitations to this study that we think future research might resolve. First of all, we haven't looked at the students' real actions or their plans to start sustainable businesses after they complete their training. As a result, we support additional study to comprehend student enthusiasm after they complete academic programs in sustainable business. Second, while the Saudi scenario is intriguing, academic institutions in affluent nations might have other reasons for starting sustainable entrepreneurship-based teaching. Due to the comparatively mature socioeconomic backdrop in industrialized nations, there are resources available to help student-led sustainable firms. Therefore, conducting additional research in wealthy nations with a comparable research goal would be great.

Conclusion, and future works

In Saudi Arabia's higher education, the current research provided 37 items for analysis, including three primary factors: sustainable entrepreneurial culture, sustainable training, and sustainable education. The study models postulated all items and hypotheses were demonstrated to be significantly connected. As a result, this study offers evidence of the significance of a sustainable entrepreneurial culture in developing students' entrepreneurial cultures, which, in turn, has an influence on students' training and education in higher education. Especially in light of the COVID-19 epidemic, countries with diverse societal origins may face a variety of obstacles when it comes to incorporating sustainability into entrepreneurship education. As a result of the current study's findings, the following are some proposals for future research topics: 1) studying the considerable advantages of sustainable in entrepreneurship education: from spreading awareness to behavioral change and improving sustainability, and 3) encouraging academic institutions to continue training sustainable, which will impact education self-sustaining. Tus, this research feel that further research could resolve two shortcomings in our study. First, we haven't looked at the students' actual behavior or intents to engage in sustainable entrepreneurship once they complete their training. As a result, we urge more study to better identify student interest after they complete the sustainable entrepreneurship academic program. Second, while the Saudi story is intriguing, academic institutions in wealthy nations may have distinct motives for launching sustainability entrepreneurial training programs. Because the societal framework is more advanced in industrialized nations, the resources available to assist student-led sustainable firms are quite limited. To build on the findings of prior research, more work has to be done on the essential competences required for entrepreneurial success through entrepreneurship education (Sargani et al., 2021; Chen et al., 2022; Huang et al., 2022; Joensuu-Salo et al., 2022; Naderi et al., 2022). Future cross-cultural studies also should place a greater emphasis on accurately measuring enviro knowledge and attitudes among entrepreneurship higher education students, as well as an examination of the didactic tools and methods used to instruct entrepreneurship in order to achieve sustainable development. As a result, doing more study in developed nations with a comparable research goal would be desirable.

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

Ethics review and approval/written informed consent was not required as per local legislation and institutional requirements.

Author contributions

If the author has included a statement such as "I wrote this article" "I am the author of this manuscript" the statement should be changed to the recommended one and a query posted to the author on the proof.

Funding

The author would like to thank Deanship of Scientific Research at Majmaah University for supporting this work under Project Number No. R-2022-263.

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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