Artificial intelligence in the context of digital marketing communication

Santa Bormane* and Egita Blaus

Faculty of Social Sciences, Riga Stradins University, Riga, Latvia

The development of digital transformation both in the European Union and in Latvia is affected by a variety of regulations, laws, guidelines and programmes, the objectives of which determine the use of contemporary digital technologies (including artificial intelligence) and the development of digital skills for enhancing the operational efficiency and productivity of businesses. The goal of the article is to identify the disadvantages and risks associated with the use of AI in digital marketing communication. To complete the goal the use of AI was brought up to date, covering both concepts and applications, as well as advantages of using AI in digital marketing communication, because the advantages are the causes of any disadvantages and potential risks. In order to attain the goal, bibliometric analysis, monographic method and secondary data analysis was used, as well as scientific literature was analyzed. As a result, the following types of artificial intelligence were identified: machine learning, computer vision, robotics, speech recognition and natural language processing, as well as related technologies—cloud computing technologies and augmented and virtual reality. The possibilities of using artificial intelligence and integrating it into various digital marketing communication activities—search engine marketing, digital advertising, e-mail marketing, social media marketing, public relations, sales promotion, personal selling, as well as review marketing and in neuromarketing—were explored. The use of artificial intelligence presents many advantages—financial savings, easier processing and analysis of high data volumes, time savings, applicability in different spheres, non-stop operation (immediate response), and personalized marketing strategies. However, a number of disadvantages were found, too, as there are potential risks associated with feasibility studies, technology compliance, privacy and data protection, cybersecurity, psychological information manipulation attacks, competence, structural labor availability, automation and technology, and outsourced service providers or third parties.

KEYWORDS

artificial intelligence, digital communication, digital marketing, digital transformation, marketing communication, marketing risks

Introduction

Relevance

In the process of marketing communication, businesses communicate with their customers using different activities and distribution channels to reach their target audience—consumers of different groups of age, education level and so on. In recent years, marketing communication has also seen an increased use in the digital environment, spurred in particular by the COVID-19 pandemic and various digital transformation

initiatives by businesses (Gupta et al., 2022). As a result of a rapid development of technologies, new marketing tools have emerged and continue to develop in the digital environment (Komodromos et al., 2024). And the digital marketing communication facilities, which not only help businesses improve the communication process but also enable them to measure the results and return of marketing communication, give a number of benefits, such as financial savings, personalized content, data processing and analysis, and continuous communication process in time and place (Alkaya, 2023).

The development of digital marketing communication is affected by the increasing global use of smartphones, other digital technologies, and the internet (Degenhard, 2024). For instance, between 2018 and 2022, the number of internet users in the world grew by 43.2% (Petrosyan, 2023). In 2023, the proportion of those using the internet at least once a week in Latvia reached 91.4%—a 20.2% increase over the last decade. An increase in the number of internet users among older generations who use the internet on a daily basis for education, shopping or communication purposes has been observed as well. According to the 2023 data, 100% of people aged 16–24 used the internet regularly, as did 99.6% of those aged 25–34, 98.7% of those aged 35–44, 94.6% of those aged 45–54, 86.6% of those aged 55–64, and 68.7% of those aged 65–74 (Central Statistical Bureau Republic of Latvia, 2023). Despite the major role of digital marketing communication nowadays, one should not neglect other marketing communication activities outside the digital environment, as the point of the concept of integrated marketing communication is combining different activities and distribution channels to reach consumers from different sides. More specifically, there is a fraction of people who do not prefer the digital environment for making their buying decisions or acquiring information about product use, but there are also other problems related to digital environment.

Problematics

The availability of a large volume of information on the internet has also shed light on a number of negative trends. The most significant of those stem from the businesses' lack of knowledge and difficulties in implementing digital marketing communication activities, getting noticed, drawing attention, and building consumer memory. As the internet holds an immeasurable amount of information that is available free of charge, the more knowledgeable and skilled in technologies and internet use consumers become, the more difficult it becomes for businesses to compete in exchanging information in the digital environment. The differences in the behavior of the virtual consumer from that of the conventional consumer become more prominent. Furthermore, the development of ever new marketing tools in the digital environment and taking advantage of the possibilities of digital marketing communication affect the businesses' marketing communication strategy—the amount of funds spent on staff training, testing digital marketing communication tools, and employing professional (appropriately educated or skilled) personnel.

Although the number of internet users is growing both globally and in Latvia and digital marketing communication is developing,

there are challenges posed by the lack of digital skills. The European Commission has been monitoring the member states' progress in the digital domain and publishing annual Digital economy and society index (DESI) reports since 2014. The DESI ranks the member states by level of digitalisation and analyses their relative progress. Finland, Denmark, the Netherlands and Sweden have the most developed digital economies in the European Union (hereinafter—the EU), while Romania, Bulgaria and Greece have the lowest DESI figures. In 2022, Latvia ranked 17th among the 27 EU member states. In terms of integration of key digital technologies in 2021, Latvian businesses fared substantially below the EU average. The same goes for a number of key digital decade indicators, including the use of artificial intelligence (hereinafter—AI). In 2021, 51% of people in Latvia aged between 16 and 74 had at least basic digital skills (in the EU–54%) and 24% had above basic digital skills (in the EU–26%). This means that Latvia's figure was only slightly below the EU average. The level of digital skills depends on various factors—social, demographic, personal, economic and others (age, education, employment, place of residence, family roles and traditions, income and so on). For instance, the EU average percentage of people with basic digital skills in 2021 varied: (1) by generation–71% of individuals aged 16–24, 69% of those aged 25–34, 42% of those aged 55–64, and 25% of those aged 65–74; (2) by place of residence–61% of those living in cities, and 46% of those living in rural areas; (3) by education–32% of those with no or low formal education, and 79% of those with high formal education; (4) by employment status–77% of students, 62% of active labor force, 49% of unemployed persons, and 29% of pensioners (European Commission, 2022). It is clear that young people nowadays have a better knowledge of digital technologies than older people. While an increasing number of older people raise their knowledge and acquire digital skills through various life-long learning programmes, it is still easier for young people to learn digital technologies. This is especially the case with Generation Z and Alpha who are children of the digital age (Tafona et al., 2020). In respect of place of residence, there are two possible factors of influence—in rural areas, an insufficient internet coverage may prevent connection and a lower number of businesses, including those using digital technologies and active in the digital environment, means that there are simply no skills and knowledge. In respect of employment, the figures of students and pensioners correlate with the generational differences, while the differences between active labor force and unemployed persons are down to work experience or its absence. While the level of education affects the figures of basic digital skills according to the DESI study, it should be kept in mind that certain key functions are often learned through self-tuition by using various technologies, smartphones, digital television, state and municipal public services, or shopping. The above limits the options for businesses to operate in the digital environment, so they look for more effective ways.

Central argument

Businesses whose personnel has knowledge, skills or motivation are willing to invest in the deployment of new technologies and programmes. In this case, AI can be helpful in serving customers and implementing digital marketing communication. The use of

AI in digital marketing communication can help businesses in, for instance, creating graphics, writing text content or communicating with customers in a written or spoken format, thus enabling them to save time, labor and financial resources, especially in typical repetitive situations.

The target of the European Commission's Digital Decade policy programme is that over 75% of EU businesses should implement AI technologies by 2030. As at 2021, the overall AI technology adoption rate in the EU was rather low–8%, but it varied among member states. The list was led by three countries whose rate exceeded 10%: Denmark (24%), Portugal (17%) and Finland (16%). The countries with a rate between 5 and 10% were Croatia, Austria, Spain, Ireland, France, Italy and Slovakia. In other countries, the rate was very low and did not even reach 5%—Bulgaria, Estonia, Cyprus, Hungary and Poland had 3% each, Latvia did slightly better with 4%, while Romania's rate (1%) was the lowest in the EU (European Commission, 2022). One can assume that the use of AI by EU businesses has developed over these years, as AI itself has developed during this time, but there is still a lack of digital skills that prevents businesses from taking a full advantage of AI. However, there are different financing programmes and regulations that can help the development of AI.

Digitalization

In this context, the European Union has set up a new financing programme—the Digital Europe (DIGITAL) with a purpose to ensure the availability of digital technologies to businesses, individuals and public administrations. The Digital Europe Programme will provide strategic financing in support of projects in five key capacity areas: supercomputing, AI, cybersecurity, advanced digital skills, and ensuring a wide use of digital technologies across the economy and society, including through digital innovation hubs. With a planned overall budget of 7.5 billion EUR, it aims to accelerate the economic recovery and shape the digital transformation of Europe's society and economy, bringing benefits to everyone, but in particular to small and medium-sized enterprises (European Commission, 2023a). In order to attain the digital decade objective, people need to develop their digital skills in the context of AI and other technologies, so it would be sensible for EU businesses to tap into this programme.

It is worth mentioning that fast development and reliance on modern technologies may not be such a successful factor at times, because there is a need to understand the technology itself and to create regulation in terms of usage (World Economic Forum, 2024). The development of digital transformation both in the EU and in Latvia is affected by a variety of regulations, laws, guidelines and programmes, the objectives of which determine the use of contemporary digital technologies and the development of digital skills for enhancing the operational efficiency and productivity of businesses. For instance, the European Commission's Digital Decade policy programme has a number of objectives—safe and secure digital world, everyone can participate in digital opportunities, start-ups and small and medium-sized enterprises have access to digital tech and can compete in the digital world

on fair terms and so on (European Commission, 2023b). The vision of Latvia's Digital transformation guidelines for 2021–2027 envisages that a favorable and modern life space has been created, involving the use of contemporary technologies and applying the capabilities of digital technologies. The lines of action include the development of digital skills (Cabinet of Ministers Republic of Latvia, 2021). The use of technologies plays a major role in different business processes, as well as in economic and social factors affecting human lives (Veit and Thatcher, 2023), including marketing as one of the key business management functions. In this context, the use of AI can be integrated purposefully into the implementation of digital marketing and communication. Using AI in digital marketing communication has a dual effect—in terms of process, integrating AI into various digital marketing communication activities improves productivity and efficiency (Kumar et al., 2024), and in terms of impact on consumers, it allows organizations to analyse how fast the audience can be reached and explore their conduct and behavior in the digital environment (Makki, 2023).

The goal of the article is to identify the disadvantages and risks associated with the use of AI in digital marketing communication. However, initially, in order to point out the disadvantages and risks, the types of AI, its usage in digital marketing communication, as well as the advantages of its use were identified.

Materials and methods

In order to identify the disadvantages and risks of using AI in digital marketing communication, a bibliometric analysis was performed using the Scopus database for the period 2019–2024. All articles were searched within article titles, abstracts and keywords in English covering such subject areas as Social Sciences and Business, Management and Accounting. In general ∼390 articles were reviewed. Figure 1 shows the main keywords that were used in this search. Risks can exist at any stage of business management, so much is written about risk management, therefore, the keywords—digital transformation risks and digitalization risks—were initially selected. Because they cover a larger area, which are also mostly general risks, many articles contained these keywords. Much is written about various risks in the fields of education, finance and manufacturing. The disadvantages and risks of AI are widely discussed in several European countries, such as Poland, Germany, Norway, Belgium, the Czech Republic, as well as outside Europe, such as in the UK, in the USA, Colombia, Chile and elsewhere. In order to be able to study the risks of digital marketing communication in depth, keywords were used—digital transformation risks in marketing, digitalization risks in marketing, digital marketing risks and digital marketing communication risks. In both cases AI appears as a risk a lot, so that's why keywords were also used—artificial intelligence risks, artificial intelligence barriers, artificial intelligence disadvantages, artificial intelligence risks in marketing, artificial intelligence barriers in marketing, artificial intelligence disadvantages in marketing.

A review was carried out to analyze scientific literature about AI definitions, types and use in general and especially in digital marketing communication, as well as advantages, disadvantages and risks of using AI in digital marketing communication.

FIGURE 1
Bibliometric analysis keywords.
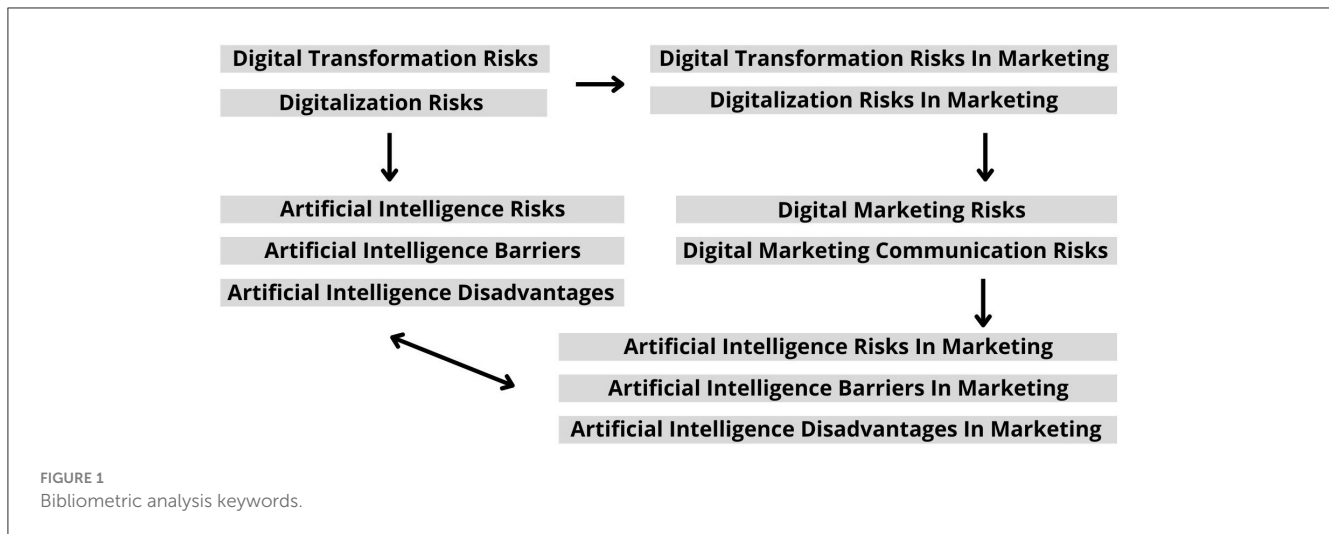
Secondary data analysis method was used to obtain previously collected data, which is reflected mainly in the introduction, but in the results as well. Data mostly included DESI overviews.

Results and discussion

Definition and types of artificial intelligence

AI is applied in various industries, in this context also in digital marketing. The development of AI is influenced by the rapid development of technology. The more qualified the staff, the more skilfully AI technologies can be used, which can bring many benefits, however, this also creates problems, because if the staff doesn't have the appropriate skills, then the use of AI can create risks. AI technology concepts were initially understood to describe how AI can be used in digital marketing communication.

British mathematician and computer scientist Alan Mathison Turing is regarded as the father of AI. In 1936, he introduced people to the Turing machine. In 1950, he created the Turing test for measuring the intelligence of a machine (whether it was as sapient as a human) (Grzybowski et al., 2024). However, the concept of AI only appeared in 1955 and was introduced by American computer scientist John McCarthy. He defined AI as a science and engineering that produces intelligent machines (Manning, 2020). Almost 70 years have passed since the appearance of the first definition, and research in this field has expanded rapidly, as has the practical use of AI in various business processes.

There is no single universally accepted definition of AI, but some of its definitions are presented below. AI is: the use of algorithms (this is not a particularly useful approach because algorithms predate AI and are widely used beyond this field), the imitation of all human intellectual capabilities through computers (Cox and Mazumdar, 2024), the imitation of various complex human skills through machines and a technology capable of correct and forward-looking operation in its own environment. It is difficult to clearly define AI since its operation is equated with an imitation or simulation of human intelligence (Sheikh et al., 2023). In 2018, the European Commission set up a High-Level Expert Group on Artificial Intelligence which explained that AI refers to systems that exhibit an intelligent behavior, analyzing their environment and performing actions with a certain degree of autonomy for reaching certain objectives. AI systems can only be software-based systems operating in the virtual world (such as voice assistants, image analysis software, search engines, speech and face recognition systems) and can be built into hardware devices (such as enhanced robots, autonomous cars, drones or Internet of Things applications) (The European Commission's High-Level Expert Group on Artificial Intelligence, 2018). In 2023, the European Parliament added that AI is the capability of a system to correctly interpret external data and model human-like behaviors, such as sapient conduct, learning ability, planning and creativity—this way, systems are capable of exhibiting an intelligent behavior, analyzing the impact of preceding actions and operating autonomously (European Parliament, 2023). There has not been a comprehensive definition of AI established over these years, it is developing very rapidly and is available in a multitude of forms. However, the operating principles of AI are based on mathematical modeling and the determination of statistical probabilities via technologies—systems and software, as well as devices.

There are different AI classification systems in use. For instance, the types of AI are machine learning, computer vision, robotics, speech recognition and natural language processing (Sheikh et al., 2023). Still, they all operate coherently to achieve a particular result (Venkatesan and Lecinski, 2021) and are based on machine learning, which the rest of the types derive from. In most cases, AI types are combined to build a system/device, or some AI elements are combined to build different other technologies as can be seen in Figure 2.

In the following, the types of AI will be described, as well as the technologies related to it, providing an insight into the importance and possibilities of use. *Machine learning* is the use of algorithms for data modeling to reveal the "actual" performance of a complex system. Algorithms are used to define data elements and create appropriate performance models that describe the current performance and predict the impact of changes on the future performance (Moye, 2019). Machine learning refers to an automated determination of significant data models—it has
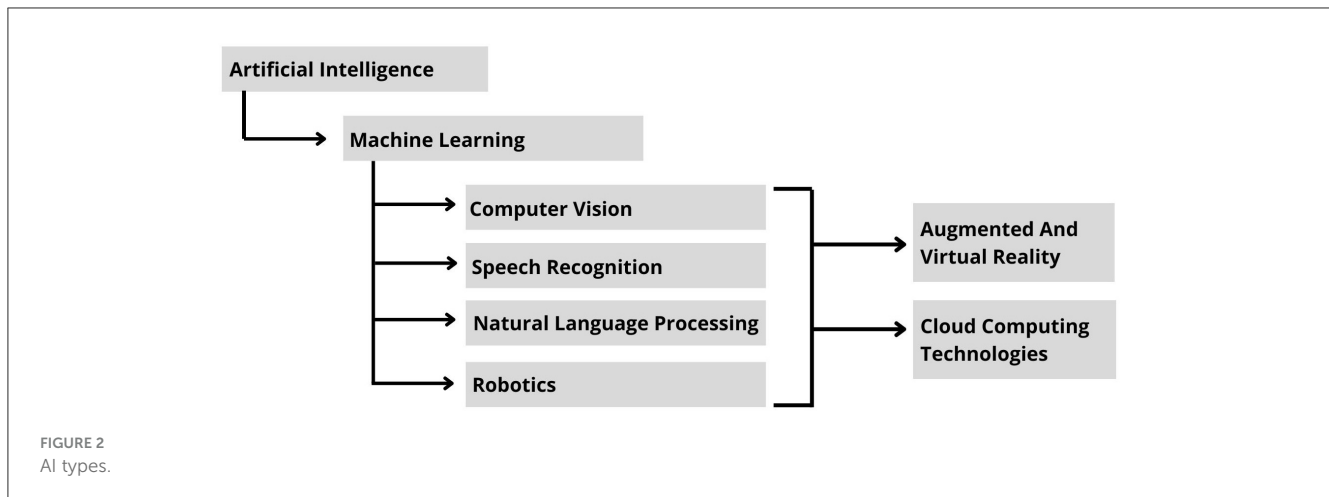
FIGURE 2
AI types.

become a widespread tool in almost any task that requires acquiring information from large data sets (Shalev-Shwartz and Ben-David, 2014). In simpler terms—the operation of the human brain and neural networks is imitated using large data sets, programming, and the latest technology advancements. As a result, the software is "trained" to recognize in data certain features and similarities which at some point lead the software into making an assumption like a human would (Cox and Mazumdar, 2024). Machine learning means that the machine learns by itself. Nowadays, we rely much on AI in data analysis, it is used in many industries, such as retail, stock markets, logistics and bank operations. Machine learning is also used in many daily activities that we might not even think about, such as weather forecasting.

Computer vision is the use of AI with digital photography (imaging) in order for computer systems to recognize the image content and understand its meaning (Marr and Ward, 2019). Image processing and recognition is the manipulation of digital images to enhance or modify them. Image recognition is a mechanism whereby the image to be processed can be compared with other known images and aligned with similar ones (Rahman, 2020). Computer vision has developed very much of late, there are many image (and even video) generation tools available and widely used specifically in marketing.

Robotics is the presence of intelligence in mechanical devices that move physically. The machine may even stay in one place, with motion taking place inside. Robotics includes machines that move under the control of AI, such as robotic vacuum cleaner or robot butler—AI is used to decide which part of the machine needs to move and how; for example, how many meters the vacuum cleaner needs to move before cleaning or where the robot butler needs to take a glass of beer to hand it to the human. Autonomous vehicles, too, are capable of moving, changing direction and stopping without human involvement (Rahman, 2020). Robotics is only at the very beginning of its development and there are many innovations yet to come. Cafes use robot butlers to serve customers, for instance, to collect the used dishes. As concerns autonomous vehicles, there are cars with a self-driving function, and self-driving taxis are already in use in many countries. Understandably, robotics cannot exist alone because an autonomous vehicle needs a combination of several types of AI to work, such as machine

learning, computer vision (which helps, for instance, to use a combination of computer vision algorithms to process data from cameras and take decisions on driving) and speech recognition (which helps, for instance, to trigger various functions with voice commands).

Speech recognition involves the use of algorithms to distinguish words and sentences in spoken language and convert them to text—speech-to-text translation. Like in other areas, advancements in machine learning have led to progress in speech recognition, as it has become possible to process a much higher volume of speech data to train algorithms with. Relatively successful practical applications of speech-to-text and text-to-speech conversion are now viable, providing that the speech is clear in both auditory and content terms (Sheikh et al., 2023). When *Apple* released *Siri*, it became the first widely used assistant powered by AI speech recognition and natural language processing to provide translation between 40 language pairs (Marr and Ward, 2019). This is another example of combining multiple types of AI, as it combines speech recognition with natural language processing because one cannot understand the voice without understanding the language first.

Natural language processing includes natural language generation, recognition and sentiment analysis. The main way of doing it is by using the word stock, sentence structures and synonym databases to rewrite text in new natural forms. The AI logics are used to derive the text purpose, find and create alternative ways of wording it, and select the best one (Rahman, 2020). Various text generation tools are widely used nowadays, such as ChatGPT which can help easily find out some necessary information or create texts required by the user.

In the context of AI, it is also worth mentioning cloud computing technologies and augmented and virtual reality. While each of these technologies is distinct, AI elements are used in implementing both cloud computing technologies and augmented and virtual reality.

Cloud computing technologies enable people to use digital resources stored in the virtual "room," share information and applications without restricting their physical location—a variety of AI tools help make it happen. "Cloud" is a virtual "room" that exists on the internet (Maurya and Damle, 2024). It is a

storage place where people can keep their digital resources, such as software, applications and documents. So, regardless of the users' location and time, the information placed on the cloud is available to them (Huawei Technologies Co., Ltd., 2023). For instance, an organisation's documents or customer data are stored not on individual computers but in a virtual room (on a single server within or outside the organization), enabling users to read, edit or approve them depending on competence and thus save on the infrastructure costs because with a cloud service one is normally only charged for the resources used—the server processor usage time or data volume stored (Goswami et al., 2024). Furthermore, by using cloud services for document preparation, one can substantially reduce the time spent on drafting a document and the drafters, editors and those whose interim or final approval is required can work on it simultaneously.

Augmented and virtual reality is a view of the physical real-world environment whose elements are augmented live by different kinds of digital content, such as sounds, video, graphic elements or GPS data, using suitable devices like smartphones, smart or virtual reality glasses and rooms. The purpose is to demonstrate an entirely modeled, actually non-existent environment or to supplement the existing real environment with substantial information, thus enabling the user to see something that does not exist in the real world (Rauschnabel et al., 2022). Augmented and virtual reality include displaying text, graphics and audio in the real world. This is made possible by computer vision, speech recognition, natural language processing and machine learning—types of AI—and usually implemented by showing information related to what the user is viewing, enabling them to interact with relevant data or systems. Users do not need any specialized technologies to use augmented reality—any current smartphone can provide an augmented reality experience, expanding the possibilities of public use.

As a result of the development of technology, it is possible to use different types of AI or combination of those in various industries and in several management processes. Namely, the use of AI has a wide scope and therefore, in the continuation of the article,

the possibilities of using AI in the context of digital marketing communication will be discussed.

Possibilities of using AI in digital marketing communication

Businesses are using AI to better understand consumers wants and needs, foretell future demand, optimize consumer service and improve the consumer experience (De Mauro et al., 2022). There is a growth in the use of AI-based solutions in different areas of digital marketing, from market segmentation to creative content creation (Gołąb-Andrzejak, 2023). Search engine marketing and digital advertising, social media interaction, mobile device tracking and engagement, online purchases and in-store shopping experience are increasingly provided with scalable and smart algorithms. Web social media and mobile devices have substantially expanded the interaction between businesses and consumers, as information is encoded in rich multimedia formats, such as text, image and video. AI tools powered by machine learning methods are used to create an insight and develop solutions in these interactive and media-rich environments (Ma and Sun, 2020). The creation of multimedia content (text, images, video, audio) is where using AI is particularly popular nowadays, but data analysis and algorithms underlie a number of branches that are very important in marketing, such as search engine marketing, digital advertising and social media marketing. Ultimately, the creation of multimedia formats (advertising materials) and data processing for advertisement placement go hand in hand.

The previous section suggests that the use of AI is possible in all digital marketing communication activities and Figure 3 reflects the broad scope that is further elaborated in this section. AI can be used to realize—search engine marketing, social media marketing, digital advertising, public relations, sales promotion, personal selling and e-mail marketing. Based on the possibilities of using AI, specific AI tools were identified—image generation and processing,
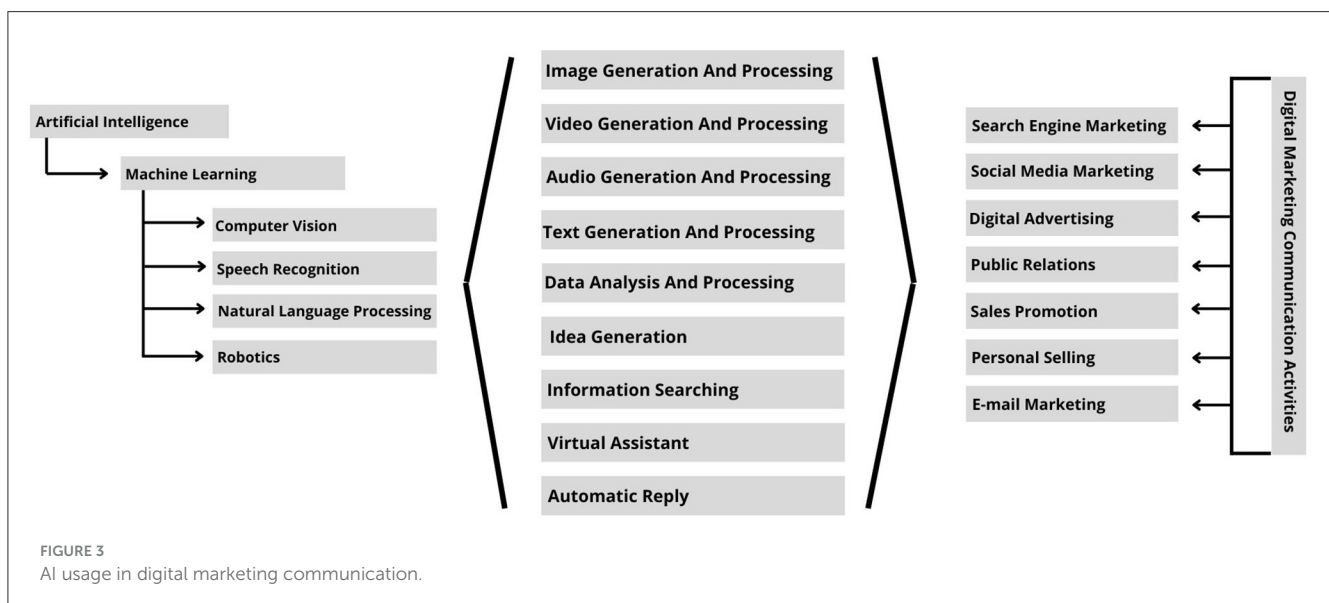

FIGURE 3
AI usage in digital marketing communication.

video generation and processing, audio generation and processing, text generation and processing, data analysis and processing, idea generation, information searching, virtual assistant and automatic reply. For example, idea generation and information searching can be implemented in all digital marketing communication activities, but data analysis and processing can be used in search engine marketing, digital advertising and social media marketing. It was important to understood in how many of these activities AI can be used and especially how AI can be used in those activities to classify advantages, disadvantages and risks of using AI in digital marketing communication.

For example, machine learning has become a widespread tool in almost any task that requires acquiring information from large data sets allowing marketers to obtain new understanding about consumers' behavior and to optimize marketing operations efficiency (De Mauro et al., 2022)—for instance, search engines learn to provide the best results whilst showing profitable advertisements (Shalev-Shwartz and Ben-David, 2014). In the media industry, machine learning helps adapt products and services to consumer wishes. The best-known examples are platform services, such as Netflix, YouTube and Spotify, which use AI to give appropriate recommendations based on the user's previous choices. Online retailers, such as Amazon, use AI to summarize user profiles and adapt their marketing (Sheikh et al., 2023). Facebook, too, uses AI to personalize users' feeds, providing them with information (and also advertisements) which it believes to be useful or interesting for them. Machine learning is used to analyse and segment the billions of platform users, typically based on the information provided by the users themselves—where they live and work, whom they are friends with, where they travel to, and what they search online. An example mentioned by Facebook is that the machine learning algorithms which "listen" to conversations among friends about a trip they should take can automatically generate links (advertisements) to trip services. Another example— Verizon's chatbot uses natural language processing and the neural network technology to answer customer questions using Facebook Messenger (Marr and Ward, 2019). AI technologies have paved the way for more progressive marketing methods—for instance, colloquial AI becomes increasingly important in digital marketing, as chatbots and virtual assistants are more widely used (Raju et al., 2022). We do not even realize on an everyday basis that a large part of marketing is AI. It is much applied in such digital marketing communication activities as search engine marketing and digital advertising. Algorithms are at the base of everything because, as already mentioned, Facebook shows advertisements (Meta Ads) that might be of interest to users based on what they search online or view on Facebook itself, and the same principle is used by Google Ads. Of course, search engine marketing, too, relies on the principle of data analysis and algorithms—for instance, when a certain keyword is entered in the Google search engine, the first website presented will be the one most visited by other users. In this context, it is also worth mentioning review marketing and neuromarketing. With the help of AI, businesses can automate and analyse customer reviews, saving their time and resources, and it becomes easier to analyse, for instance, customer behavior within a certain marketing campaign. Neuromarketing explores how the human brain responds to advertising and other marketing stimuli to predict consumers' decision-making behavior

(Millagala and Gunasinghe, 2024). AI can be useful for this in the digital environment, helping find out, for instance, what draws the customers' attention on a certain website. Businesses can receive immediate feedback on the effectiveness of campaigns and make the necessary improvements.

AI is also used in personal selling, which is another digital marketing communication activity, as proved by the example of Verizon, as well as in chatbots and virtual assistants to answer customer questions. This can help to increase customer interaction across different digital marketing distribution channels and improve market prediction and automation (Vlačić et al., 2021). For instance, chatbot software uses AI algorithms to communicate with people in an easy-to-understand language, answer their questions and provide the necessary information in written (chat) or voice format (Magno and Dossena, 2023). This use of AI is particularly advantageous in handling typical repetitive situations where people approach a public institution with questions on how to fill a submission form, certain documents, what to do to apply for a job and so on. Software can reply via dialogue or in writing or, in non-standard situations, refer to a competent specialist. An AI-guided smart assistant will improve contact with a customer who needs specific information to meet their needs. It is already possible to identify the customer questions asked most frequently and responded to by specialists by repeating the same answer. The solution might not completely eliminate the need for advice, but even a 50% decrease will contribute to efficiency and employees will be able to spend this time for other purposes.

While the origins of generative AI started with large language models, generative tools are capable of creating not only text but also images, videos and audios. Text generation and information searching tools (such as ChatGPT, Copy.ai, Bard) can help make slogans, e-mail messages, social media content descriptions, product descriptions, website section content and simply generate ideas for advertising campaign concepts. Image and video generation and enhancement tools (such as Dall-e, Adobe Firefly, Midjourney, Synthesia) can help create logos, advertising materials, new product designs and website designs, while audio generation tools (such as Amper Music, Otter.ai, Soundful) can help make soundtracks for games, films, podcasts and so on (Lu, 2023). Two examples—the US newspaper Washington Post uses AI to write stories, while the prescription glasses, lenses and sunglasses retailer Warby Parker uses AI to have the system automatically assign a topic to incoming e-mail messages and forward them to the corresponding customer experience specialist for a faster response to customer inquiries (Venkatesan and Lecinski, 2021). Information searching tools can help, for instance, in analyzing competitor actions or finding out the latest trends. AI can also be of great help for generating early drafts of regulations or laws where summarizing the existing regulatory framework normally takes a long time. AI can collect the necessary information within a few seconds. There are four more digital marketing communication activities where AI is used— social media marketing, e-mail marketing, public relations, and sales promotion. For social media marketing, AI can help generate advertisement texts, descriptions for posts, publications and stories, images and videos for the content itself; for e-mail marketing, it can generate texts, images and videos for e-mail messages, as well as

use an automatic reply. Generating texts, images, videos and audios is also relevant in public relations and sales promotion activities because AI can assist in the creation of podcasts, website sections and blogs for public relations purposes and both on the website and on social media, image and video format advertisements can be placed for sales promotion purposes. Idea generation and information searching can be used to implement all digital marketing communication activities.

Advantages of using AI in digital marketing communication

The use of AI in digital marketing communication has several advantages and it proves that thanks to AI, digital marketing communication can be improved, as well as save various resources, however, it also causes disadvantages and potential risks. For example, one of the advantages is that AI can be an assistant in the processing of large volume data, however the disadvantage related to that is data security and this disadvantage can create privacy and data protection risk, cybersecurity risk and risks of psychological information manipulation attacks. This proves that initially it is necessary to be aware of the advantages of using AI in digital marketing communication in order to assess the disadvantages and possible risks associated with them.

Marketing communication strategies often involve substantial manual effort in the conceptual creation and placement of campaigns which requires a large financial outlay. For digital marketing communication strategies, AI offers automated data access, simpler processes, accuracy and fast content creation, and ultimately *financial savings* (Soni, 2023; Fraiwan and Khasawneh, 2023). Admittedly, AI may bring additional costs of its own because using, for instance, generative AI tools is a paid service (while there are free tools available, they are typically less advanced). Still, it is possible to save funds in the long run by using AI.

AI is an outstanding *assistant in the processing of large volume data*, providing valuable insights into consumer behavior and trends. The automated optimisation function of AI can continuously monitor the performance of a campaign, automatically adapt variables, such as advertisement placements, content and target audience selection parameters, in real time to increase engagement and yield (Soni, 2023). The processing and analysis of large volume data is actually beyond human capacity because it is a very complicated process. Human presence is still needed to control processes and steer them in the right direction, but most of the work is done by AI.

The ability of generative AI to quickly create a wide variety of content, thus *saving time*, is a key driver for its implementation. The speed at which generative AI can generate content is unsurpassable, especially compared with manual creation. This enables marketing strategies to meet the continuous demand for a fresh and relevant content that resonates with the target audience (Soni, 2023; Kshetri et al., 2024). In the context of saving time, it is worth mentioning that AI has a fast response—for instance, virtual assistants can quickly reply to customers, which is important nowadays when customers want to receive information as soon as possible (demand an immediate response).

AI *can be applied in different fields*—as we found out before it is used to implement a variety of digital marketing communication activities, such as digital advertising, search engine marketing, e-mail marketing, social media marketing, personal selling, public relations and sales promotion. However, the development of AI technologies means not only that AI can be used in various industries, but also that new professions are emerging, for example, the fastest growing job between 2023–2027 will be AI and machine learning specialist (World Economic Forum, 2023).

AI systems and tools can be programmed to work for a long time. In other words, AI can *work all the time* because it does not become bored, tired or ill like a human would, it does not need vacations or breaks (Bhbosale et al., 2020). This advantage goes hand in hand with financial savings—for instance, an employee works 8 h a day, 40 hs a week, whereas AI can work 24 hours a day seven days a week, thus saving financial and human resources.

The use of generative AI in digital marketing communication campaigns can give businesses a substantial competitive advantage through *more personalized marketing strategies*—rich and contextually relevant content in different formats yields better customer attraction and retention figures. Using AI for content creation and campaign optimisation, businesses can position themselves as industry leaders, attracting technology-savvy consumers and setting new standards in digital marketing communication (Soni, 2023; Kshetri et al., 2024). However, while AI can create personalized content, it is essentially based on content already created by others and this may lead to issues—for instance, text and image generation may repeat—but generative AI is nevertheless widely used in digital marketing communication. It can prove highly useful if employees run out of ideas or are in a creative crisis.

Digital marketing communication can be studied and analyzed from two main aspects: as a process—how the company implements digital marketing communication activities, with what tools and in which channels it takes place, and from the aspect of impact on consumers—how the used digital marketing communication tools have influenced the consumer, influenced his action, behavior, attitude, etc. So it is obvious that disadvantages and risks associated with AI can be different, some more from the process itself and some more from impact on consumers, and nowadays social factors play an important role.

Disadvantages and risks of using AI in digital marketing communication

Figure 4 shows the disadvantages and risks associated with the use of AI in digital marketing communication from the bibliometric analysis as a result. Those boxes which are colored darker are the most popular findings: disadvantages—data security, ethical aspects, complex by nature and not faultless and risks—cybersecurity risk, privacy and data protection risk, risks of psychological information manipulation attacks, competence risk and technology compliance risk.

When implementing something new (in this case—integrating AI into digital marketing communication), one needs to conduct a feasibility study, because there is a *technology compliance risk* which refers to a possible incurrence of legal penalties, financial

FIGURE 4
AI disadvantages and risks in digital marketing communication.

and material losses in the event of failure to act in compliance with the industry laws and regulations, internal policy or established best practice (Machleidt et al., 2024). Organizations of all kinds and sizes are exposed to compliance risk regardless of whether they are public or private entities, for-profit or non-profit organizations, or public institutions. If an organization does not obey the applicable laws and regulations, its revenue may be affected and reputation may be lost. Its relationship with third parties inevitably involves such risk as well, so it needs to make sure that every vendor or service provider dealt with meets the compliance requirements. This is why feasibility study is so important in preventing failure to comply with any laws or regulations.

Marketing specialists are concerned over *data security* in AI systems and generative tools. If they enter sensitive, confidential customer data into systems, there are privacy concerns (Kshetri et al., 2024). *Privacy and data protection risk* is a risk of variable probability and severity involving the rights and freedom of individuals. It is associated with data processing which may result in physical, material or non-material damage, especially if data processing causes discrimination, fraud, financial losses or other damage. This type of risk depends on the organisation's ability to protect personal information (Khalifa and Sabry, 2024), including names and surnames, e-mail addresses, passwords, postal addresses and other personal data in its possession. Here one can also add *cybersecurity risk* which is associated with an insufficient protection of data and information systems against various threats in the digital environment. It includes a potential falling of information into unauthorized hands, loss of data, unwarranted access to systems, software disruptions and other digital attacks affecting the organisation's operations. Given the increasing scale of attacks amid an increasingly challenging environment, cybersecurity risk might now be one of the major risks connected with digitalisation. Cyberattacks are often carried out with a view to access sensitive information and then abuse it for extortion, identity theft or operational continuity disruption purposes (Huseynov and Ozdenizci Kose, 2024). Common types of cybersecurity threat

include ransomware, phishing, man-in-the-middle attacks, domain name system attacks. In this context, any system/tool needs to have some privacy policy in place because a cybersecurity incident as violation of data protection may not only inflict a sizeable financial burden that many organizations are unable to bear but also pose severe threat to their reputation. Legal consequences, such as fines, are possible as well. Relevant in this context are also *risks of psychological information manipulation attacks* carried out by, for instance, sending insidious e-mail messages to pull information from the victims or convince them to take a certain action (Naz et al., 2024). Examples include requests to change an account password, provide bank data, or share confidential company data.

In order to avoid privacy and data protection risks, organizations need to implement stringent cybersecurity measures, including identity and access management, multi-factor authentication and password policy. In this regard, employees need to be regularly trained in preventing psychological manipulation attacks. Organizations can implement a cyber risk management plan based on their data, including regular personnel training on cybersecurity. Furthermore, data privacy rules need to be followed by implementing continuous monitoring to cover all areas. Here one can make use of tools like antivirus software, firewalls, multi-factor authentication where a mobile device is used as a key in addition to the usual password, and virtual private networks connecting employees to the organisation's digital infrastructure when working remotely, as if they were working in their office premises. In communication systems, one needs to use secure e-mail and spam filters, require multi-factor authentication, or even use e-mail encryption and signature encryption.

AI systems are *complex by nature* and require advanced understanding of both the technology and the field they are used in to get the benefits for business itself and consumers (Peltier et al., 2024). Furthermore, the requirement of human editing is very important. The content created by AI often needs human supervision to ensure that it meets the quality standards and strategic objectives. The need for human intervention comes with

additional time and resource investments which may prove a challenge for businesses, especially those with limited knowledge on AI or limited resources (Soni, 2023). This is highlighted by the statement in the introduction that people both globally and in Latvia lack digital skills which makes it difficult to work in digital marketing and specifically in the context of AI. *Competence risk* is a risk of the set of knowledge, skills and attitude toward one's job being insufficient for completing tasks and achieving goals, and as a result, effectiveness, quality and growth may be affected (Mahboub and Sadok, 2024; Zerfass et al., 2020). The following controls are therefore important for risk mitigation: promoting the enhancement of digital skills and knowledge in the society and improving the employees' professional competence. If businesses want to take a full advantage of the capabilities of AI, they need to learn—for instance, attend some courses or consult with industry professionals, or use outsourced services, such as those offered by digital marketing agencies. However, there are also *risks associated with outsourced service providers or third parties.* Nowadays, organizations in any industry deal with some third party—supplier, vendor, contractor or service provider. Regardless of the form of relationship, organizations rely on third parties in a number of critical functions. Yet any third-party service inevitably carries risk—legal, financial, strategic, or reputational, as third parties are trusted to perform their part of the contract—making organizations prone to a number of possible violations (Małkus and Tyrańska, 2019). For instance, in respect of intellectual property, data, finances, customer information or other sensitive information, third-party risk is posed by these third parties having access to your networks and systems. In order to avoid third-party risk, the general risk management programme needs to encompass a risk management policy and a detailed description of the procedure and policy in respect of each step of the process of managing third-party risk. There should be questionnaires sent to third parties on a regular basis to ensure that they implement proper cybersecurity measures and meet the regulatory requirements. It is also recommended to regularly review relationships with third parties and carry out continuous monitoring.

Here one can also add *structural labor availability risk* which pertains to the availability and sufficiency of skilled and talented employees—finding employees proficient with the latest technologies is already difficult but keeping those who are experts in their field may prove an even bigger challenge (Ortega-Bolaños et al., 2024). On top of the lack of skills and high staff turnover, the flexible workforce and hybrid work environment of nowadays means that employees can put forward more requirements as to their working life quality. Another facet of this risk is the diversity of technologies which occasionally leads to a situation where employees are proficient in the application of technologies, but the solution used so far is substantially different from the one that is set to be implemented.

Employees with access to the organisation's most sensitive data should be closely supervised to minimize the risk they may pose to the organization. In order to avoid labor risks, one should hold regular training for one's employees, covering such topics as cybersecurity, internal control, and provide an overview of all digital risks of concern. The better informed employees are, the less likely that mistakes will be made. Furthermore, one

should implement a principle that employees can only access the information necessary for their professional duties. Along with training on security aspects, there should be regular training held to address the specifics of the latest solutions implemented and the most effective ways of their application, and possibilities to combine them with other tools can reduce labor risks and improve staff chemistry and atmosphere.

While AI systems have been improved, they are *not faultless* and can make mistakes or content that is not completely accurate. This risk is of particular importance in digital marketing communication where disinformation can harm a brand's reputation and credibility. If the AI-generated content is erroneous (for instance, has grammatical mistakes), some employee has to correct it (Soni, 2023; Kshetri et al., 2024). *Automation risk* is a risk that systems or technologies might cause various problems and consequences if an automation system or process does not work correctly or is not properly managed. Due to lack of knowledge, some automation solutions may cause software incompatibility or excessive complexity of actions (Mazurova and Standaert, 2024). AI-based automation solutions may carry risks that are difficult to predict long term due to the changeability of the technology itself. Implementing such automation may cause erroneous actions and increase complexity and cyber threats. In order to contain this risk, one needs to have people capable of understanding and rectifying automation errors. It is no less important to keep in mind that digitalisation is not about implementing a specific tool but about making work easier, enhancing efficiency, and improving the quality of service, with technologies merely serving for these purposes.

Another one to mention is *technology risk* which refers to any possible disruption of an organisation's operations due to technology faults. Critical systems may become unavailable due to power outage, network damage, internet disruption or slowness, or issues with other related or supporting technologies (Patil and Malwatkar, 2024). In order to avoid technology risks, the operational continuity plan needs to consider all technologies that the organization cannot properly operate without, providing for an alternative solution in the event of failure of any of those. Also often used are minimum operation plans which specify the technologies that need to be in place for operations to proceed and clearly list the requirements as to the alternatives—power generators, alternative internet connections, third-party service response time (how long it takes to restore a service in the event of failure) and other needs. The same goes for making regular data backups in-house or outside to maintain access to key information in the event of technical disruption.

There are concerns over *loss of jobs* due to AI. According to the data of Challenger, Grey and Christmas, the use of AI by the firm resulted in a loss of ∼4,000 jobs in May 2023 alone (Kshetri et al., 2024). One can agree that the development of AI may lead to such professionals as graphic designers, photographers, videographers, video editors and copywriters losing their job. However, as pointed out earlier, AI has faults for now, which means that the presence of these professionals is still necessary and even essential.

Generative AI, despite its capabilities, still *has limitations in terms of creativity* and idea generation. AI algorithms essentially depend on the data they are taught on and may therefore be limited

to repeating existing ideas instead of generating truly innovative concepts. This limitation may be particularly restrictive in digital marketing communication where creativity and uniqueness are often the main competition factors (Soni, 2023). AI is essentially based on content already created by others, so it is logical for it to be limited in creativity. Still, the human brain together with AI can create new ideas, with AI serving as a muse.

There are *ethical aspects* about AI not only in the context of data security but also regarding information being used to manipulate self-consciousness and conscious choice. For instance, if there is enough data and interaction, an algorithm can target a specific person and give them the correct input data for influencing their behavior. Businesses do this to increase their profit using behavioral prejudice, false representation and addictions. There are ethical concerns surrounding not only advertising and its message delivered to customers but also excessive consumption and addiction to purchases (Gonçalves et al., 2023). Every individual should be aware of the risks associated with unconscious, excessive consumption and addiction to purchases, as nobody forces one to buy something—AI only recommends, and the final decision is up to the human.

Conclusion

Definition and types of AI

The use of AI is rapidly evolving, influenced by both technological advances and skilled human intervention and it is possible to use various types of AI or combination of those in different industries and management processes. Machine learning, computer vision, robotics, speech recognition and natural language processing, and the related technologies such as cloud computing technologies and augmented and virtual reality are a logical follow-up to the implementation of digital transformation initiatives in business, state and municipal, educational and other sectors.

Possibilities of using AI in digital marketing communication

AI is a solution toward improving productivity and can be integrated into a company's day-to-day processes and activities directed outside it, including marketing. Digital marketing communication in particular is one of the fields where it is sensible to integrate AI—search engine marketing and digital advertising (algorithms place the necessary information and advertisements), e-mail marketing (e-mail message generation and automatic reply), social media marketing, public relations and sales promotion (text, image, video and audio generation tools, including information search and idea generation tools), personal selling (chatbots, virtual assistants and robot butlers). AI can also be used in review marketing (measuring results after campaigns) and neuromarketing (analyzing the human behavior when shopping online).

Advantages of using AI in digital marketing communication

Using AI in digital marketing communication presents a multitude of advantages—financial savings, easier processing and analysis of high data volumes, time savings, applicability in different spheres, non-stop operation (immediate response), and personalized marketing strategies. However, some advantages go hand in hand with disadvantages and risks. For example, the advantages of easier processing and analysis of high data volumes can lead to privacy and data protection, cybersecurity and psychological information manipulation attacks risks if there is no proper management.

Disadvantages and risks of using AI in digital marketing communication

Using the bibliometric analysis the most popular findings for disadvantages were—data security, ethical aspects, complex by nature and not faultless and for risks—cybersecurity risk, privacy and data protection risk, risks of psychological information manipulation attacks, competence risk and technology compliance risk. The disadvantages and risks of using AI in digital marketing communication can be different, some more from the process itself and some more from impact on consumers. Nowadays social factors play an important role in the context of any risk. For example, disinformation was always playing a major role in today's Internet world. Amid the lack of basic digital skills, there are still consumer audiences who barely use the internet, digital technologies and various tools, and these audiences are the least protected against risks.

Further research

Further research is necessary, especially in respect of the regulatory framework governing the use of AI. It is important to have a single regulatory framework throughout the European Union, as digitalisation has no borders—we are working in an international environment and it would be easier for the controlling authorities to conduct supervision if common standards and conditions were in place. Since AI in combination with various technologies creates simulation and imitation, virtual consumers may rely on different impulses in their decisions when shopping in the virtual environment as a platform; in other words—it might be an illusion. In order for that not to be the case, it is necessary to indicate that AI is in place when using, for instance, generative AI, thus respecting the consumer rights protection, legal and ethical aspects to avoid misleading consumers. Further studies should explore in detail how augmented and virtual reality can be used for educating the society (for instance, on sustainable management, pursuing a healthy lifestyle). Also, further studies should explore especially the financial aspect of the use of AI—how many funds is needed to implement and maintain AI technologies, as well as to train employees to operate them. The most important thing is to understand whether the use of AI in digital marketing communication helps to save financial resources. The present study

can be of use to businesses for implementing AI in digital marketing communication, and to fellow scholars for further theoretical research in this field.

Author contributions

SB: Conceptualization, Investigation, Methodology, Supervision, Writing – original draft, Writing – review & editing. EB: Data curation, Visualization, Writing – original draft, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

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.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

Alkaya, A. (2023). *Management in the Digital Era: Different Perspectives*. Hauppauge, NY: Nova Science Publishers.

Bhbosale, S., Pujari, V., and Multani, Z. (2020). *Advantages And Disadvantages of Artificial Intelligence*. Available at: https://www.studocu.com/row/document/osun-state-college-of-technology/introduction-to-computer/advantages-and-disadvantages-of-artificial-intelligence/64860787 (accessed March 4, 2024).

Cabinet of Ministers Republic of Latvia (2021). *About the Digital Transformation Guidelines for 2021-2027*. Available at: https://likumi.lv/ta/id/324715 (accessed March 15, 2024).

Central Statistical Bureau Republic of Latvia (2023). *91.4% of population use internet on a regular basis*. Available at: https://stat.gov.lv/en/statistics-themes/information-technologies/ict-houseeholds/press-releases/14303-internet-usage (accessed February 14, 2024).

Cox, A. M., and Mazumdar, S. (2024). Defining artificial intelligence for librarians. *J. Librariansh. Inf. Sci.* 56, 330–340. doi: 10.1177/09610006221142029

De Mauro, A., Sestino, A., and Bacconi, A. (2022). Machine learning and artificial intelligence use in marketing: a general taxonomy. *Ital. J. Mark.* 439–457. doi: 10.1007/s43039-022-00057-w

Degenhard, J. (2024). *Number of smartphone users worldwide from 2014 to 2029*. Available at: https://www.statista.com/forecasts/1143723/smartphone-users-in-the-world (accessed February 16, 2024).

European Commission (2022). *Digital Economy and Society Index (DESI) 2022-Thematic chapters*. Available at: https://digital-strategy.ec.europa.eu/lv/library/digital-economy-and-society-index-desi-2022 (accessed February 14, 2024).

European Commission (2023a). *Europe's Digital Decade*. Available at: https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade (accessed March 25, 2024).

European Commission (2023b). *The Digital Europe Programme*. Available at: https://digital-strategy.ec.europa.eu/en/activities/digital-programme (accessed March 24, 2024).

European Parliament (2023). *What is artificial intelligence and how is it used?* Available at: https://www.europarl.europa.eu/topics/en/article/20200827STO85804/what-is-artificial-intelligence-and-how-is-it-used (accessed February 29, 2024).

Fraiwan, M., and Khasawneh, N. (2023). *A Review of ChatGPT Applications in Education, Marketing, Software Engineering, and Healthcare: Benefits, Drawbacks, and Research Directions*. Ithaca, NY: Cornell University: Computer Science, 1–20.

Gołab-Andrzejak, E. (2023). The impact of generative AI and ChatGPT on creating digital advertising campaigns. *Cybern. Syst.* 1–15. doi: 10.1080/01969722.2023.2296253

Gonçalves, A. R., Pinto, D. C., Rita, P., and Pires, T. (2023). Artificial intelligence and its ethical implications for marketing. *Emerg. Sci. J.* 7, 313–327. doi: 10.28991/ESJ-2023-07-02-01

Goswami, P., Faujdar, N., Debnath, S., Khan, A. K., and Singh, G. (2024). Investigation on storage level data integrity strategies in cloud computing: classification, security obstructions, challenges and vulnerability. *J. Cloud Comput. Adv. Syst. Appl.* 13. doi: 10.1186/s13677-024-00605-z

Grzybowski, A., Pawlikowska–Łagód, K., and Lambert, W. C. (2024). A history of artificial intelligence. *Clin. Dermatol.* 42, 221–229. doi: 10.1016/j.clindermatol.2023.12.016

Gupta, R., Pandey, A. K., and Bansal, S. (2022). "Strategic shift in marketing communication during COVID-19," in *Cases on Emerging Market Responses to the COVID-19 Pandemic*, eds. R. K. Kovid, and V. Kumar (Hershey, PA: IGI Global), 40–58. doi: 10.4018/978-1-6684-3504-5.ch003

Huawei Technologies Co., Ltd. (2023). *Cloud Computing Technologies*. Singapore: Springer Nature. doi: 10.1007/978-981-19-3026-3

Huseynov, F., and Ozdenizci Kose, B. (2024). Using machine learning algorithms to predict individuals' tendency to be victim of social engineering attacks. *Inf. Dev.* 40, 298–318. doi: 10.1177/02666669221116336

Khalifa, M., and Sabry, M. (2024). "The challenges of the artificial intelligence of law in the context of technological development," in *2024 ASU International Conference in Emerging Technologies for Sustainability and Intelligent Systems (ICETSIS)* (Manama: IEEE), 1–5. doi: 10.1109/ICETSIS61505.2024.10459547

Komodromos, M., Harkiolakis, T., Khoshtaria, T., and Vassiliou, M. (2024). Adoption of digital technology and investigation of the impact in the marketing industry for marketing communication professionals: the case study of Cyprus and Greece. *Int. J. Technol. Enhanc. Learn.* 16, 173–191. doi: 10.1504/IJTEL.2024.137650

Kshetri, N., Dwivedi, Y. K., Davenport, T. H., and Panteli, N. (2024). Generative artificial intelligence in marketing: applications, opportunities, challenges, and research agenda. *Int. J. Inf. Manage.* 75, 1–10. doi: 10.1016/j.ijinfomgt.2023.102716

Kumar, V., Ashraf, A. R., and Nadeem, W. (2024). AI-powered marketing: what, where, and how? *Int. J. Inf. Manage.* 77:102783. doi: 10.1016/j.ijinfomgt.2024.102783

Lu, J. (2023). *Using Generative AI to Spark Creativity in Marketing: Through the Lens of Open Innovation*. Available at: https://www.cmu.edu/intelligentbusiness/expertise/generativeai_marketing_creativity.pdf (accessed March 4, 2024).

Ma, L., and Sun, B. (2020). Machine learning and AI in marketing–connecting computing power to human insights. *Int. J. Res. Mark.* 37, 481–504. doi: 10.1016/j.ijresmar.2020.04.005

Machleidt, P., Mráčková, J., and Mráček, K. (2024). Perception of the risks inherent in new AI technologies. *J. Technol. Assess. Theory Pract.* 33, 42–48. doi: 10.14512/tatup.33.2.42

Magno, F., and Dossena, G. (2023). The effects of chatbots' attributes on customer relationships with brands: PLS-SEM and importance–performance map analysis. *TQM J.* 35, 1156–1169. doi: 10.1108/TQM-02-2022-0080

Mahboub, H., and Sadok, H. (2024). Barriers to digital transformation the case of moroccan companies. *J. Telecommun. Digit. Econ.* 12, 261–277. doi: 10.18080/jtde.v12n1.814

Makki, A. (2023). Application of artificial intelligence technology in digital marketing systems. *Proc. Eng. Sci.* 5, 609–616. doi: 10.24874/PES05.04.003

Małkus, T., and Tyrańska, M. (2019). Reaction to risk in logistics cooperation–results of empirical research. *Acta Logist.* 6, 77–84. doi: 10.22306/al.v6i3.124

Manning, C. (2020). *Artificial Intelligence Definitions*. Available at: https://hai.stanford.edu/sites/default/files/2020-09/AI-Definitions-HAI.pdf (accessed February 29, 2024).

Marr, B., and Ward, M. (2019). *Artificial Intelligence in Practice: How 50 Successful Companies Use Artificial Intelligence to Solve Problems*. Newark, NJ: Wiley.

Maurya, H., and Damle, M. (2024). "Next-generation enabling technology in cloud computing: an advantage for businesses," in *3rd International Conference for Innovation in Technology, INOCON 2024* (Bangalore IEEE). doi: 10.1109/INOCON60754.2024.10511690

Mazurova, E., and Standaert, W. (2024). Implementing artificial intelligence across task types: constraints of automation and affordances of augmentation. *Inf. Technol. People*. doi: 10.1108/ITP-11-2022-0915

Millagala, K., and Gunasinghe, N. (2024). "Neuromarketing as a digital marketing strategy to unravel the evolution of marketing communication," in *Applying Business Intelligence and Innovation to Entrepreneurship*, eds. K. Kankaew, P. Nakpathom, A. Chnitphattana, K. Pitchayadejanant, and S. Kunnapapdeelert (Hershey, PA: IGI Global), 81–105. doi: 10.4018/979-8-3693-1846-1.ch005

Moye, J. N. (2019). *A Machine Learning, Artificial Intelligence Approach to Institutional Effectiveness in Higher Education*. Bingley: Emerald Publishing Limited. doi: 10.1108/9781789738995

Naz, A., Sarwar, M., Kaleem, M., Mushtaq, M. A., and Rashid, S. (2024). A comprehensive survey on social engineering-based attacks on social networks. *Int. J. Adv. Appl. Sci.* 11, 139–154. doi: 10.21833/ijaas.2024.04.016

Ortega-Bolaños, R., Bernal-Salcedo, J., Germán Ortiz, M., Galeano Sarmiento, J., Ruz, G. A., Tabares-Soto, R., et al. (2024). Applying the ethics of AI: a systematic review of tools for developing and assessing AI-based systems. *Artif. Intell. Rev.* 57. doi: 10.1007/s10462-024-10740-3

Patil, M. S., and Malwatkar, G. M. (2024). A compressive study on fault detection and diagnosis for reliable operation of HVAC, energy buildings and machineries. *Reliab.: Theory Appl.* 19, 631–649.

Peltier, J. W., Dahl, A. J., and Schibrowsky, J. A. (2024). Artificial intelligence in interactive marketing: a conceptual framework and research agenda. *J. Res. Interact. Mark.* 18, 54–90. doi: 10.1108/JRIM-01-2023-0030

Petrosyan, A. (2023). *Number of internet users worldwide from 2005 to 2022*. Available at: https://www.statista.com/statistics/273018/number-of-internet-users-worldwide/ (accessed February 14, 2024).

Rahman, W. (2020). *AI and Machine Learning*. New Delhi: Sage Publications India Pvt. Ltd.

Raju, P. V. M., Prudhvi Raj, K., Navya, D., Peddintlu, K., Zareena, M., Akbar Basha, S., et al. (2022). Role of artificial intelligence in digital marketing: a review. *Neuroquantology* 20, 4188–4194. doi: 10.14704/nq.2022.20.8.NQ44452

Rauschnabel, P. A., Felix, R., Hinsch, C., Shahab, H., and Alt, F. (2022). What is XR? Towards a framework for augmented and virtual reality. *Comput. Human Behav.* 133, 1–18. doi: 10.1016/j.chb.2022.107289

Shalev-Shwartz, S., and Ben-David, S. (2014). *Understanding Machine Learning: From Theory to Algorithms*. Cambridge: Cambridge University Press. doi: 10.1017/CBO9781107298019

Sheikh, H., Prins, C., and Schrijvers, E. (2023). *Mission AI: The New System Technology*. New York, NY: Springer International Publishing. doi: 10.1007/978-3-031-21448-6

Soni, V. (2023). Adopting generative AI in digital marketing campaigns: an empirical study of drivers and barriers. *Sage Sci. Rev. Appl. Mach. Learn.* 6, 1–15. Available at: https://journals.sagescience.org/index.php/ssraml/article/view/108 (accessed February 29, 2024).

Tafona, T., Saputra, S., and Suryaningwidi, R. (2020). Learning media and technology: generation Z and alpha. *Indones. J. Instr. Media Model* 2, 89–100. doi: 10.32585/ijimm.v2i2.954

The European Commission's High-Level Expert Group on Artificial Intelligence (2018). *A definition of AI: Main capabilities and scientific disciplines*. Available at: https://ec.europa.eu/futurium/en/system/files/ged/ai_hleg_definition_of_ai_18_december_1.pdf (accessed February 29, 2024).

Veit, D. J., and Thatcher, J. B. (2023). Digitalization as a problem or solution? Charting the path for research on sustainable information systems. *J. Bus. Econ.* 93, 1231–1253. doi: 10.1007/s11573-023-01143-x

Venkatesan, R., and Lecinski, J. (2021). *AI marketing canvas: a five-stage road map to implementing artificial intelligence in marketing*. Stanford, CA: Stanford Business Books. doi: 10.1515/9781503628045

Vlačić, B., Corbo, L., Costa e Silva, S., and Dabić, M. (2021). The evolving role of artificial intelligence in marketing: a review and research agenda. *J. Bus. Res.* 128, 187–203. doi: 10.1016/j.jbusres.2021.01.055

World Economic Forum (2023). *Future of Jobs Report 2023: Insight Report May 2023*. Available at: https://www3.weforum.org/docs/WEF_Future_of_Jobs_2023.pdf (accessed July 23, 2024)

World Economic Forum (2024). *The Global Risks Report 2024, 19th Edition: Insight Report*. Available at: https://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2024.pdf (accessed July 23, 2024)

Zerfass, A., Hagelstein, J., and Tench, R. (2020). Artificial intelligence in communication management: a cross-national study on adoption and knowledge, impact, challenges and risks. *J. Commun. Manag.* 24, 377–389. doi: 10.1108/JCOM-10-2019-0137