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Role of Artificial Intelligence and Machine Learning in E-commerce: a Literature Review

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KEYWORDS

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ABSTRACT

In an era where digital transformation is accelerating rapidly, artificial intelligence and *machine learning have emerged as transformative forces, especially in e-commerce. This paper presents a comprehensive literature review that delves into the fundamentals of e-commerce, artificial intelligence,* and *machine learning, highlighting their key advantages and practical applications. By examining a broad array of studies, this research evaluates the critical role of artificial intelligence* and *machine learning in reshaping e-commerce* and *explores the potential these technologies hold for enhancing customer engagement* and *driving sales. The paper underscores how e-commerce companies leverage artificial intelligence-driven innovations to influence customer behaviour, enhance personalised marketing,* and *streamline purchasing pathways. However, the path to successful artificial intelligence integration is not without obstacles. Challenges such as organisational resistance, skills shortages, technical limitations,* and *awareness gaps are notable barriers. Despite these hurdles, the findings suggest that adopting artificial intelligence* and *machine learning tools positions e-commerce companies for long-term success, offering significant competitive advantages* and *fostering sustainable growth in an increasingly digital world.*

1. Meaning of E-commerce, Artificial Intelligence and Machine Learning

Currently, a large amount of information is created as a result of the boom in information and communication technologies (Mouha, 2021). Reliable data must be generated, accessible and used in an appropriate way for them to make a basis for quick and accurate business decisions (Miklosik et al., 2018). New technology and software innovations can be used in various industries, including

marketing and business to support the creative thinking of companies and help improve the efficiency and quality of services provided. Information and communication technologies have a significant impact on the development of creativity and the business environment (Gburová, 2019; Khrais, 2020). Digital transformation and the importance of e-commerce are particularly significant in retail, where digital tools complement or replace brick-and-mortar stores (Hagberg et al., 2016).

Companies encounter numerous challenges in adopting new technologies and staying current with rapid technological advancements. The adoption of artificial intelligence in e-commerce has become a crucial driver of business success, as artificial intelligence tools enable companies to leverage data on products and customers to identify opportunities that enhance the promotion of goods and services. Modern innovations in information technology and artificial intelligence tools have significantly advanced e-commerce by offering solutions for product marketing, enhancing business performance, and deepening insights into customer behaviour. Artificial intelligence provides a wide array of tools that help meet diverse requirements and drive success in the e-commerce sector (Qi et al., 2023; He and Liu, 2024; Cubric and Li, 2024).

Considering that the issue of artificial intelligence and the issue of e-commerce are currently both very topical, the motivation of the paper was to link these areas and to highlight the possibilities of using artificial intelligence technology and machine learning in the process of e-commerce. The research problem for this study was to explore the importance of artificial intelligence and machine learning in e-commerce. It is the relative lack of comprehensive studies summarising the importance of artificial intelligence and machine learning in e-commerce that can also be considered as a research gap, and this study is intended to fill it. This research gap could be filled by answering the stated research question, «What is the importance of artificial intelligence and machine learning in the e-commerce process?". Thus, the aim of the paper is to describe the essence of e-commerce, artificial intelligence, machine learning and outline their advantages. This paper also discusses the importance of artificial intelligence and machine learning and points out the possibilities of their future use in e-commerce, in accordance with the studies available on this topic.

The introduction to this research explains e-commerce, and its benefits for sellers and consumers. In Subsection 1.2, the meaning and essence of artificial intelligence and its benefits are presented. In Subsection 1.3, the subcategories of artificial intelligence are described. Section 2 reviews previous research where the importance of using artificial intelligence and machine learning in the process of e-commerce is specified. This section also includes perspectives on the future use of artificial intelligence and machine learning in e-commerce. Lastly, Section 3 draws conclusions from the conducted research.

1.1. Understanding E-commerce

The development of information and communication technologies and digitisation has resulted in a change in consumer behaviour, which is manifested in the transition from traditional shopping in a brick-and-mortar store to online shopping on the Internet (Menaka and Seethal, 2018).

E-commerce means using the Internet, Internet portals, mobile applications, and browsers in the purchasing process. E-commerce facilitates business transactions between sellers and consumers using digital technologies. Online shopping is gradually becoming a common, everyday activity. Almost all Internet users are now also online shoppers (Laudon and Traver, 2021). This type of shopping has gained popularity in recent years, especially because it is convenient and easy for people to shop from the comfort of their homes (Prabha and Karunanidhi, 2017). Since the COVID-19 pandemic, the number of online shoppers increased. Jain (2023) and Ganapathi (2015) cite several advantages of online shopping over shopping in brick-and-mortar shops for both sellers and buyers. These advantages are shown in Figure 1.

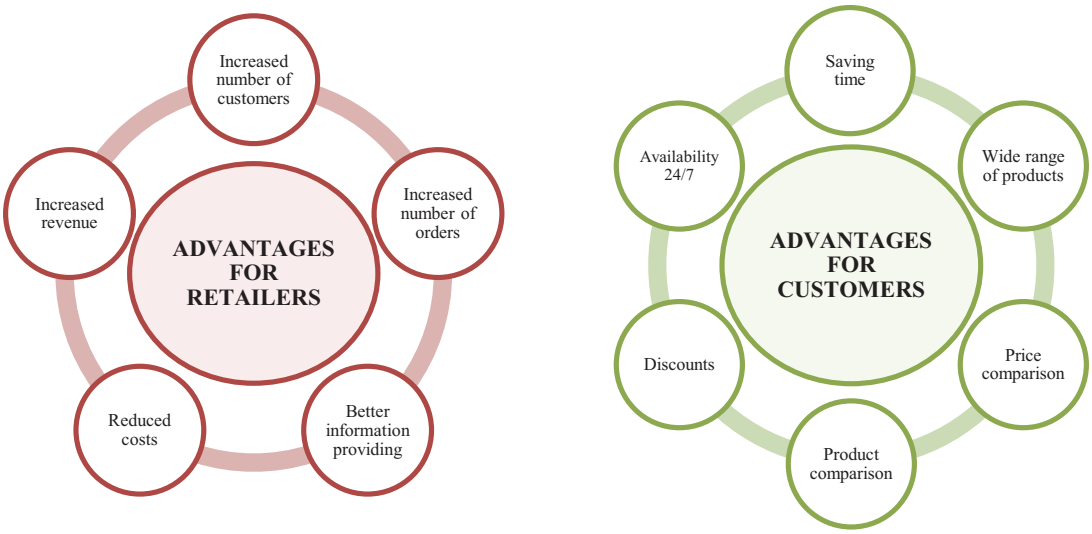

Figure 1. Advantages of e-commerce for online retailers and customers

E-commerce is the result of economic, scientific, technological, and cultural development. The development of e-commerce is changing not only the traditional ways of doing business but also consumer purchasing behaviour and is significantly contributing to the progress of the global economy (Song et al., 2019). The importance and thus the use of the Internet is growing. Therefore, online trading can be a source of competitive advantage for sellers. However, it is essential for businesses to monitor online shopping trends and changes in consumer purchasing behaviour and preferences in a dynamically evolving online environment. On the basis of thorough analyses, online sellers can adapt their product, and service offers to the purchasing habits of online consumers and satisfy their needs (Nisar and Prabhakar, 2017). In order to introduce the concept of e-commerce in the company, the current business models and activities need to be modified, and sophisticated digital technologies need to be purchased (Kim et al., 2017).

1.2. Understanding of Artificial Intelligence

Innovation and more efficient use of technology has led to the creation of intelligent systems that are able to manage and monitor business models with reduced human involvement (Europarl, 2020).

Artificial intelligence is considered a new interdisciplinary technological science that develops theoretical methods, technologies, and applications to simulate and extend human intelligence (Lu and Xu, 2018). The application of artificial intelligence has been explored in sectors such as healthcare, business, education, manufacturing, marketing, or financial management (Yoon and Baek, 2016; Ying et al., 2018; Pee et al., 2019). It is a compilation of computer science, logic, biology, psychology, philosophy and many other scientific disciplines, and it has achieved remarkable results in the field of speech and image recognition, natural language processing, automatic theorem proving and intelligent robots (Duan, 2019).

Russell and Norvig (2016) summarised various definitions of artificial intelligence systems from the perspective of two dimensions. The first dimension is the behaviour / reasoning dimension, under which artificial intelligence is considered to be any system that thinks and acts like a human. The

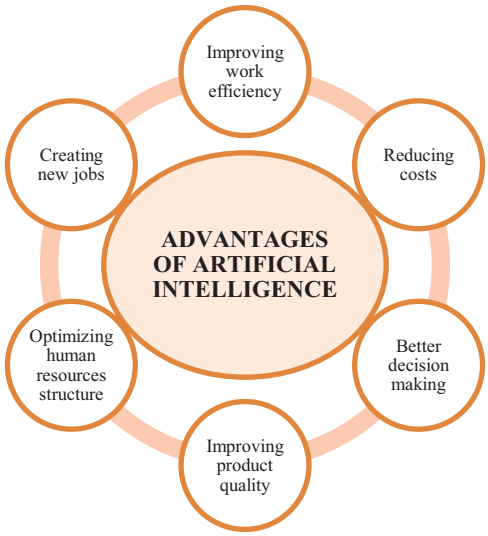

Figure 2. Advantages of artificial intelligence

second dimension is the rationality / human performance dimension, under which artificial intelligence is perceived as any system that thinks and acts rationally.

Artificial intelligence is the process of creating intelligent machines. In this case, intelligence is a property that allows the object to function correctly in its surroundings and to predict. Artificial intelligence is a process that integrates cloud technology, network equipment, robotics, digital media generation, as well as various business practices, technologies, and day-to-day operations (Boddu et al., 2022). It usually refers to the so-called artificial production of human minds that are capable of learning a natural language, planning, acquiring, analysing and processing information (Prabhu and Anbazhagan, 2014). Artificial intelligence is any computer system that acts like a human being and can generally perform activities requiring human intelligence (Manne and Kantheti, 2021). The goal is to enable computers to analyse, make decisions and solve various problems by understanding human communication (Agrawal et al., 2019; Xu et al., 2021). The core of artificial intelligence is intelligent technology. Using this technology, artificial intelligence is able to create and develop intelligent tools which operate on a similar basis to human mental work, which means they can react immediately after receiving a command (Song et al., 2019).

Artificial intelligence plays an irreplaceable role in social development and has brought revolutionary results in the form of increased work efficiency, reduced labour costs, optimisation of the structure of human resources and creation of new jobs (Davenport and Ronanki, 2018; Duan, 2019). The advantages are shown in Figure 2.

1.3. Understanding of Artificial Intelligence Subcategories

Generally, the concept of artificial intelligence can be further subdivided into three categories: Machine Learning, Deep Learning and Neural Networks. These concepts lead to the further development of data mining, natural language processing and control software. Artificial intelligence and machine learning may seem like interchangeable terms, but artificial intelligence is usually considered

a broader term, with machine learning, deep learning and neural networks being a subset of artificial intelligence (Verma et al., 2021).

The digital footprint of every Internet user includes a large amount of information that can be used as input for various surveys that businesses can use to their advantage. Businesses, but also individuals and government organisations use advanced artificial intelligence analytical tools such as machine learning and deep learning to understand past information and plan future actions (Heimbach et al., 2015; Manne and Kantheti, 2021).

Machine learning is a subcategory of artificial intelligence that allows a software application to predict and produce accurate results. This is a new field of data mining that allows a computer program to be as accurate as possible in predicting outcomes without being explicitly programmed to do so. These techniques are often divided into two types: supervised learning techniques that use labelled training data to infer patterns (e.g. classification, regression) and unsupervised learning techniques that use unlabelled data to identify hidden existing patterns (e.g. clustering). The goal of machine learning is to give machines the ability to learn a task without having a pre-existing code telling them what to do. They are exposed to certain problems and examples, which they gradually go through. By doing so, machines learn and adapt their strategy to carry out assigned tasks independently. Algorithms «learn» primarily by recognising patterns based on gathering as much data as possible. Subsequently, they analyse the information and look for trends or formulas that are embedded within it. Ultimately, the algorithm is «smart» enough to apply what it has learned to new data sets (Agrawal, 2019; Verma, 2021; Ganesh, 2021; Shaw, 2023).

Machine learning also has indisputable advantages (Figure 3). This includes maximum efficiency as machines always work at 100 %, automation of repetitive tasks, optimisation of daily complex activities, and personal digital assistants. Thanks to machine learning, it is possible to explore areas that humans do not have access to, as machine learning can react to virtually any situation and can perform even the most complicated mathematical and statistical processes. Machine learning also contributes to the elimination of errors that could arise as a result of human activity. It also contributes to faster

Figure 3. Advantages of machine learning for retailers

decision-making, as machines can make almost immediate decisions based on a short calculation and are also objective (Wymbs, 2011; Kumar and Trakru, 2020; Boddu et al., 2022).

The deep learning mechanism is based on the principle of artificial neural networks. It mimics the behaviour of brain cells. Neural network models work on the basis of layers. These models make use of artificial neural networks (these are based on biological processes), that run on mathematical principles, thus mimicking human brain processes. They analyse information received and try to identify it based on stored information. An artificial neural network integrates the processes of densely connected «brain cells", where these neurons or nodes are built from human code. Neural networks contain three layers: an input layer, a hidden layer, and an output layer. These layers contain thousands to millions of nodes. Artificial intelligence tries to imitate the human mind using the concepts of neural networks. It takes data connections between artificial neurons and modifies them according to a data pattern. The aim is to make machines think as a person would, and act accordingly when solving problems (Verma, 2021; Davis Babu, 2019).

Artificial intelligence also works with other means such as expert systems and decision support systems (Zhang and Yang, 2021). Fuzzy logic is also an important tool used by artificial intelligence. Fuzzy logic is a tool that is able to computerise human actions, process and interpret information and knowledge as if they were performed by a human. The correct use of fuzzy logic in combination with artificial intelligence enables better planning, objective evaluation and assessment of risks, rational decision-making and management. It can also contribute to the elimination of errors associated with the failure of the human factor (Kelemen et al., 2019; Polischuk et al., 2019).

2. Role of Artificial Intelligence and Machine Learning in E-Commerce

In order to design reliable methods of product quality control and look for new ways to reach and serve customers while keeping costs low, artificial intelligence tools need to be implemented. Nowadays, e-commerce is one of the industries that make the best use of artificial intelligence by creating a huge customer base, trying to understand customer needs, doing real-time research, coming up with ultimate solutions to problems and doing many other activities, with the aim of providing not only a better customer experience but also having effective supply chain management (Soni, 2020).

Table 1 points to previous studies that focus on the importance of artificial intelligence and machine learning in e-commerce. It contains basic data such as authors of the study, objective of the study, topics and main findings. Research studies were searched through the Google scholar database by typing in the terms «artificial intelligence in e-commerce» or «machine learning in e-commerce». Subsequently, relevant studies ranging from 2016-2024 were selected and presented. These are major studies published in international indexed journals or major conference proceedings.

Table 1. Selected studies about artificial intelligence and machine learning in e-commerce

Reference	Objective	Study theme	Findings
Kar and Haldar (2016)	To analyse specific integration of chatbots in Internet of Things systems	Applying chatbots to the internet of things	Chatbots can help consumers find products, check order status, compare products and connect them to the customer support service staff

Table 1. Selected studies about artificial intelligence and machine learning in e-commerce (Continued)

Reference	Objective	Study theme	Findings
Shankar (2018)	To present a framework for understanding artificial intelligence, outline applications of it in different facets of retailing and discuss the future of artificial intelligence in retailing	Artificial intelligence in retailing	Artificial intelligence will enable retailers better understand consumer psychology by getting them closer to what the human brain is thinking at any given moment
Martínez et al. (2020)	To develop a machine learning framework for predicting future purchasing	Prediction of online consumer behaviour by machine learning	Important characteristics are the number of purchases, mean time between purchases, time since last purchase, mean value of purchase
Makridakis (2018)	To present changes caused by artificial intelligence, contrasting with the industrial revolution, the impact on developed and developing countries, and the dominant firms in artificial intelligence	The potential effects of artificial intelligence on businesses, manufacturing, and commerce	The relationship between artificial intelligence and humans will strengthen, and companies will focus on creating value through collaboration between the human workforce and artificial intelligence tools
Nguyen and Sidorova (2018)	To examine customer experience through artificial intelligence use	Enhancement of customer experience through artificial intelligence	Customer experience was enhanced through an artificial intelligence-driven chatbot
Orogun and Onyekwelu (2019)	To develop a prediction model of consumer behaviour in digital market	Prediction of online consumer behaviour by machine learning	Important predictor attributes are invoice number, product code, description of product (item) name, quantity of purchase of each item per transaction, invoice date and time of each transaction., unit price, customer ID and country
Song et al. (2019)	To analyse the present situation of the application of artificial intelligence technology in the field of e-commerce	Artificial intelligence in e-commerce	Artificial intelligence will become an important driving force for the transformation of e-commerce
Sha and Rajeswari (2019)	To study the effectiveness of using artificial intelligence in e-commerce business	Advanced artificial intelligence in e-commerce	Advanced artificial intelligence-enabled machine could be able to track human senses and improve e-commerce business
Luo et al. (2019)	To study the impact of artificial intelligence chatbot disclosure on customer purchases	Impact of artificial intelligence on customer purchases	Prior experience with artificial intelligence induces more customer purchases and is helpful in reducing the negative disclosure effect

(*Continued*)

Table 1. Selected studies about artificial intelligence and machine learning in e-commerce (Continued)

Reference	Objective	Study theme	Findings
Soni (2020)	To analyse the use of artificial intelligence in e-commerce business	Artificial intelligence in e-commerce	Artificial intelligence can help people excel in their high sales and customer relationships in the e-commerce business
Cui et al. (2020)	To build a good data-driven model to predict product return volume in the future	Prediction by machine learning	Predictor variables were sales, time, product features, retailer, production process and resources, multi-product order and historical returns. Sales are the most significant variable
Kumar and Trakru (2020)	To present the impact of artificial intelligence in e-commerce	Artificial intelligence in e-commerce	Integration of artificial intelligence in e-commerce companies can help create sophisticated solutions and will impact transactions, customer retention, satisfaction, and efficiency
Loureiro et al. (2021)	To provide an overview of state-of-the-art research on artificial intelligence in the business context and propose an agenda for future research	Artificial intelligence in business	Future trends in artificial intelligence are the development of advanced automated systems, integration of neurostimulators and nanochips into the brain, smart devices connected to artificial intelligence systems
Pallathadka et al. (2021)	To discuss machine learning and artificial intelligence applications in e-commerce, corporate management, and finance	Artificial intelligence in business management, e-commerce and finance	The most common applications include sales growth, profit maximisation, sales forecasting, inventory management, security, fraud detection, and portfolio management
Zhang et al. (2021)	To explain how artificial intelligence technology, people, and processes should be managed to successfully create value	Artificial intelligence in e-commerce	The key artificial intelligence capabilities generated include forecasting, planning, and learning. They are not independent – they interact and coevolve with human capabilities to create business value
Yingzi and Zhaoji (2022)	To analyse trust of online consumers using artificial intelligence	Artificial intelligence in e-commerce	It is appropriate to use artificial intelligence systems to investigate the trust of online consumers
Wang et al. (2023)	To examine how artificial intelligence can be more effective and profitable in e-commerce	Acceptance of artificial intelligence in e-commerce	Trust building is crucial in consumers' acceptance of artificial intelligence in e-commerce
Grünbichler (2023)	To analyse implementation barriers of artificial intelligence systems in companies	Implementation barriers of artificial intelligence in companies	Main barriers are at the level of management, employees, organisation, and data. External factors (lack of skilled workers, technical infrastructure, lack of knowledge) also play a significant role

Table 1. Selected studies about artificial intelligence and machine learning in e-commerce (Continued)

Reference	Objective	Study theme	Findings
Shobana et al. (2023)	To examine how to prevent customer churn by using artificial intelligence	Artificial intelligence in e-commerce	E-commerce retailers can prevent future customer churn by using artificial intelligence to suggest reasonable offers or services
Aljarboa (2024)	To explore how the adoption of artificial intelligence by small and medium enterprises contributes to the business performance of organisations	Adoption of artificial intelligence in e-commerce by small and medium-sized enterprises	The study confirmed the significant role of artificial intelligence adoption in e-commerce in enhancing the business performance of small and medium enterprises

2.1. Artificial Intelligence and Machine Learning Use in E-commerce

Artificial intelligence technology is currently one of the driving forces of innovation in e-commerce. The use of artificial intelligence in e-commerce means a significant competitive advantage in terms of decision-making. Due to the Covid-19 pandemic, retailers have had to implement and rely on artificial intelligence technologies to provide quality customer service remotely (Forbes, 2020). The high quality and variety of data generated by artificial intelligence, including machine learning algorithms, have greatly helped in personalising and improving customer shopping experiences, analysing data, predicting trends, and managing supply chains (Loureiro et al., 2018; Banerjee et al., 2020).

Artificial intelligence can take many forms – in terms of software, it can act as virtual assistants, image and text analysis software, search engines, speech and face recognition systems, in terms of devices, it can take the form of robots, self-driving cars and drones (Europarl, 2020).

Multicriterial Text Analysis and **Machine Translators.** The advanced text analysis analyses and processes texts from all publicly available user reviews. The principle is as follows: the user enters the name of the product or service in the application and receives a summary of the most important information they need to know about the matter without having to search for reviews themselves. Text analysis is also an important tool in processing customer requests and their feedback as it can easily decipher the essence of the request, whether it is a question directed at the help desk, a message in the chat, or an e-mail. Today, phrase translators are gradually being replaced by solutions based on neural networks, with the best results achieved by specialised models that are trained using machine learning for specific areas (TouchIt, 2019).

Artificial Intelligence Assistants - Chatbots. Websites and their customer support (virtual assistants and chatbots) are available to customers 24/7. The main function of the online customer service chatbot system is to communicate with users and automatically reply to users' questions, provide a response to simple voice commands, and offer product recommendations using a natural language processing system. Chatbots are basically software applications that use artificial intelligence to lead a conversation with consumers online via text or voice. Chatbots are developed using artificial intelligence and machine learning technology. They are able to behave like people and respond to customers' questions and requests. They can help with finding suitable products, checking the status of the order, comparing different products and paying for the order. In case of complaints or questions, they direct

customers to the customer support service staff, who will attend to them further. Most e-commerce websites use chatbots to improve customer satisfaction and provide better services (Kar and Haldar, 2016; Soni et al., 2019; Song et al., 2019; Kumar and Trakru, 2020; Nandhini and Marseline, 2020).

Recommendations Tools. Machine learning algorithms are able to analyse customers' purchasing decisions and behaviour based on the data provided. They can effectively predict the purchasing decisions of customers and can suggest or recommend the most suitable products to the customer. Based on the recent searches of potential customers, the algorithm is able to record the key information of the searched product. The recommender system then generates relevant suggestions for the browser and displays them to customers, ultimately helping customers find the product quickly. The power of data and machine learning enables companies to increase sales by implementing recommendation systems on their websites. Recommender systems aim to predict users' interests and recommend product items that quite likely are interesting to them (Ricci et al., 2011; Song et al., 2019; Kumar and Trakru, 2020; Srivastava et al., 2020; Pallathadka et al., 2021).

Visual and **Voice Search.** Using artificial intelligence and machine learning, companies can implement visual, and audio search based on image and sound processing algorithms on their websites. Customers do not need to enter keywords in the search, instead, they can search for the product using an image or voice (Kumar and Trakru, 2020; Nandhini and Marseline, 2020; Pallathadka et al., 2021). When searching with an image, customers use an image or photo as input instead of a classic text search. The search engine analyses the input (either a photo or a text in the form of an image) and shows the most relevant search results (Klačko, 2020). Voice search applications enable users to make queries using their voice. Voice search works on the basis of intelligent natural speech recognition and processing technologies. The output is either a spoken answer or relevant results in the form of text or images (Pastierová, 2023).

Customer Relationship Management. Customers are an integral part of e-commerce. Before, employees were tasked with collecting large amounts of data for the purpose of customer relationship management. Nowadays, artificial intelligence systems are becoming more and more popular in this regard. Artificial intelligence is able to predict which customers will buy what, what is their shopping behaviour like, what products they buy and what are the best ways of building and maintaining relationships with customers. Artificial intelligence can assess a company's goals along with multiple data sources and suggest the most relevant customer acquisition options. With artificial intelligence, a business can gain information about customer satisfaction and carefully plan how to respond to customer needs and demands regardless of time and situation. Artificial intelligence can also be used to help determine trends and plan future actions based on the latest trends. Artificial intelligence helps people build a balanced environment where man and machine work together to achieve profit and sales (Soni, 2020; Kumar and Trakru, 2020; Nandhini and Marseline, 2020; Pallathadka et al., 2021).

Customer data processing. Advanced customer relationship management can be improved over time using machine learning methods. Online stores have a large amount of associated data available at hand. Machine learning algorithms are capable of analysing past data on sales, human resources, marketing and customer purchasing behaviour. This analysis can help maximise profits and sales, optimise resources, refine products for a specific type of customer (Kumar and Trakru, 2020; Nandhini and Marseline, 2020).

Machine Learning plays an important role in e-commerce in price optimisation, customer segmentation, personalisation and targeting of potential customers, search optimisation, product recommendation systems, customer behaviour analysis and prediction, search auto-completion, A/B testing, inventory management, customer support, strengthening omnichannel marketing, cyber protection and image and sound recognition and processing (Haponik, 2021; Vekony, 2023).

In the study by Martínez et al. (2020), the authors focused on the development of a machine learning framework, the purpose of which was to predict the purchasing behaviour of customers within one month. The main important parameters used in the analysis were the number of purchases, the average time between purchases, the time since the last purchase and the average value of the purchase. The aim of the study by Cui et al. (2020) was to create a model using machine learning that could predict the volume of future product returns. The variables examined were sales, time, product characteristics, vendor, production process and resources, multiple product ordering, and revenues, with sales emerging as the most significant variable. In their research, Orogun and Onyekwelu (2019) worked on a model based on machine learning that would predict consumer behaviour. Invoice number, invoice date, transaction time, product code, product description, price, customer ID, and country emerged as the most significant variables. Sha and Rajeswari (2019) addressed the advancement of artificial intelligence and machine learning in conjunction with tracking human senses (sight, hearing, taste, smell, and touch). Their findings indicated better consumer-brand association and product-brand association in e-commerce. The study of Nguyenet al. (2020), in turn, pointed to a significant improvement in customer experience thanks to a chatbot controlled by a machine learning algorithm that incorporated natural language processing.

2.2. Perspective of Artificial Intelligence and Machine Learning in E-commerce

Humans often seem to be limited in performing certain tasks in e-commerce. This concerns in particular the forecasting of demand and supply chain mechanisms. These might prove quite challenging for business entities and as such, artificial intelligence together with machine learning proved to be suitable tools to address that (Soni et al., 2019). Artificial intelligence helps increase the profitability of e-commerce through all available tools and helps improve personalised recommendations and payments. It also improves customer relationship management, logistics management and inventory optimisation (Shankar, 2018).

Artificial intelligence technologies have been integrated into the field of marketing, retail sales and e-commerce, where big data serve to personalise profiles of potential and existing customers and predict their purchasing behaviour. Understanding and predicting consumer demand through integrated supply chains have become extremely important, as artificial intelligence and machine learning technology are likely to become a crucial integral element in doing so (Zhang et al., 2021). The process of developing and introducing artificial intelligence requires a high level of adoption of this technology in the future as well. Sellers can use artificial intelligence technology to match product information with the requested information that customers are looking for in order to ensure the efficient consumption of products and services (Sterne, 2017; Sunstein, 2016).

The growth of artificial intelligence has a significant impact on both business entities and consumers. The value of the global artificial intelligence market in 2019 was USD 39.9 billion. The value is expected to grow at a compound annual growth rate of 42.4 % between 2020 and 2027 (Grand View Research, 2020). Artificial intelligence and machine learning systems are used to improve a business entity's ability to create value and satisfy customer needs. In retail, service industries, and e-commerce, these systems are increasingly used for personalisation, customer interaction, and innovation (Huang and Rust, 2018; Grewal et al., 2020). Business entities are increasingly replacing call centres with chatbots. Every day, customers use artificial intelligence voice robots (e.g. Alexa and Siri) as virtual personal assistants not only to answer simple queries or control smart lights but also to get recommendations and help with the purchase of various products (Klaus and Zaichkowsky, 2020).

Juniper Research (2019) had reported that the demand for the use of artificial intelligence would grow significantly between 2019 and 2023. The study emphasised that business entities would make significant investments in artificial intelligence and machine learning systems in order to improve trend analysis, logistics planning and inventory management. Innovations based on artificial intelligence (e.g. Virtual Mirror and Visual Search) were projected to improve interactions with customers and eliminate the differences between the traditional and virtual shopping experience. According to a new report from Juniper Research (2023), consumer retail spend over chatbots will reach $142 billion by the end of 2024, rising from $2.8 billion in 2019.

Consulting company Gartner (2021) reported that the majority of e-commerce businesses that used artificial intelligence and machine learning technology were most likely to achieve at least a 25 % increase in customer satisfaction by 2023. This forecast was fulfilled, but paradoxically a large number of consumers had fears and prejudices towards artificial intelligence used, for example, in customer service (Stamford, 2024). It is also widely expected that by 2025, 70 % of e-commerce businesses will be forced to focus on small data instead of big data.

Experts say artificial intelligence is no replacement for human workforce. On the contrary, artificial intelligence systems will likely act as a support to human activities. The ideal AI-human partnership is based on mutual cooperation where artificial intelligence analyses and predicts and humans explain, make decisions and take actions (Wang and Wang, 2016; Kumar, 2017; Makridakis, 2018).

Artificial intelligence and machine learning have unquestionable potential. However, there is still a number of challenges that need to be overcome in order for these systems to be put into practice without major problems. According to Shankar (2018), it is necessary to analyse the impact artificial intelligence systems might have on customers, with special attention being paid to those unintentional and even unpredictable impacts. Luo et al. (2019) state that research is necessary to improve chatbots and eliminate errors they make in order to increase customer trust in them. Wang et al. (2023) researched the acceptance of artificial intelligence by online consumers and found that trust is the most important element. Yingzi and Zhaoji (2022) confirmed that it is appropriate to use artificial intelligence systems to investigate the trust of online consumers. According to Luo et al. (2019), business entities should also focus on making artificial intelligence systems more efficient when it comes to creating content on social media. According to Chatterjee et al. (2019), no e-commerce business can do without artificial intelligence - it analyses customer habits analysis, purchasing decisions, product popularity and customer satisfaction. Shobana et al. (2023) in their research pointed out that by using artificial intelligence to analyse consumer behaviour, e-commerce sellers can prevent customer churn. Artificial intelligence systems will help them create personalised offers. Moriarty (2020) recommends that research in this area should focus on the possibilities of connecting artificial intelligence systems with virtual reality applications. According to Tousignant (2017), future research should focus on exploring the relationships between artificial intelligence, machine learning and online customer reviews in order to successfully identify fake reviews.

However, there are also various threats related to artificial intelligence that need to be addressed. Kumar and Trakru (2020) draw attention to the potential threats and challenges artificial intelligence poses for e-commerce businesses. These threats may limit the effectiveness and efficiency of artificial intelligence/ machine learning in fulfilling the businesses' expectations. It is therefore necessary to explore possibilities and opportunities also in view of the ever-changing demands of customers in e-commerce. Research by Grünbichler (2023) clearly demonstrated that even the very implementation of artificial intelligence in an organisation is a challenge. Most of the barriers in this case are at the level of management, employees, organisation, and data. However, external factors such as the lack of skilled workers, technical infrastructure and lack of knowledge also play a significant role in

the implementation of artificial intelligence systems. To support advances and the implementation of artificial intelligence in the business sector, it is important to research the effectiveness of artificial intelligence systems in a multidisciplinary context (Loureiro et al., 2021).

The adoption, development and implementation of artificial intelligence and machine learning technology are crucial for the future initiatives of an e-commerce business, be it marketing or sales. Business entities use artificial intelligence and machine learning systems to optimise their operations, minimise costs, shorten delivery times, and increase production and efficiency. Technologies are evolving rapidly these days and vendors who have implemented artificial intelligence in their enterprises have a unique advantage over those who have not done so yet (Stone, 2014). The results of the study by Aljarboa (2024) support the role of dynamic capabilities and entrepreneurial orientation in facilitating the adoption of artificial intelligence in e-commerce. The study also confirmed the significant role of artificial intelligence adoption in enhancing the business performance of small and medium enterprises.

3. Conclusion

The aim of the paper was to describe the essence of e-commerce, artificial intelligence, machine learning and outline their advantages. The paper also discussed the importance of artificial intelligence and machine learning and pointed out the possibilities for their future use in e-commerce in accordance with studies available on this topic. In conclusion, it can be stated that the objective of the paper has been met. The research gap has been filled by answering the stated research question. In addition, the importance of artificial intelligence and machine learning in the e-commerce process was highlighted.

The development of digital technologies and e-commerce is currently progressing at a rapid pace. People use the Internet on a daily basis, they like to try new products and brands. However, with a constantly growing offer, they are becoming more critical than ever before and have high expectations from products. Thus, electronic trading appears to be a suitable option to satisfy their requirements. The use of artificial intelligence and machine learning methods in e-commerce has become the subject of interest among many scientists and experts in the field of business. Further research in the field of artificial intelligence is needed to fully understand the potential artificial intelligence might bring to e-commerce. In order to be successful, e-commerce businesses will have to adopt artificial intelligence technology to succeed in their endeavours. Therefore, it is expected that e-commerce businesses will implement artificial intelligence and machine learning methods more frequently as these will become a new norm in the world of online business. In conclusion, when combined with user behaviour analysis and process automation, artificial intelligence technology can bring a significant competitive advantage to e-commerce operators.

The main contribution of the paper is to fill the research gap by creating a comprehensive review of studies regarding the importance and use of artificial intelligence and machine learning in e-commerce. This paper has contributed to enriching the theoretical background of the researched topic, thus broadening the theoretical basis of not only e-commerce issues, but also artificial intelligence issues. A possible limitation of the paper may be the fact that it is a general overview study in the context of the importance and use of artificial intelligence and machine learning in the e-commerce process. On the other hand, there is an opportunity for future research in several directions. Future research can focus on creating an overview study within this topic, but with a more specified area of e-commerce. Alternatively, a review of studies from different countries, e.g. Europe and overseas, could be developed and the results could be compared. Further, the overview study could be enriched by primary research, e.g. in the area of consumer perceptions of artificial intelligence in e-commerce.

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