Emerging Roles of Artificial Intelligence in E-Commerce: Review Paper

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Abstract

The current study examines the role of artificial intelligence (AI) in e-commerce. The last few years have been characterized as the era of e-commerce, defined by its rapid growth. At the same time, technological advancements have brought about several platforms that use AI in e-commerce businesses, which have significantly changed how businesses operate and interact with customers, increasing efficiency and improving user experience. This study emphasizes the role of e-commerce and how it impacts improving customer experience, customer trust, and helps in decision-making. This paper consists of all secondary data collected from different sources such as journals, articles, posters, graphs, etc. This study concludes that there are changes in marketing strategies due to AI. By incorporating AI technologies, businesses can increase their scalability, agility, and competitiveness in the digital marketplace. The study emphasizes new trends and difficulties while highlighting the transformative potential of AI in e-commerce. By incorporating AI technologies, businesses can increase their scalability, agility, and competitiveness in the digital marketplace. The study emphasizes new trends and difficulties while highlighting the transformative potential of AI in e-commerce.

Keywords: - E-commerce, Artificial intelligence, Customer satisfaction, Customer trust, Decision Making, Customer experience

Introduction

Artificial intelligence is one of the most well-known subfields of computer science. In order to do tasks like learning, reasoning, and decision-making, computers imitate human intelligence. The artificial intelligence market is projected to reach a valuation of US$184.00 billion by 2024. According to the global comparison, the United States will be the most important market

(US$50.16bn in 2024). AI is being widely adopted; by 2022, 50% of organisations will have integrated it into their business processes, up from 20% in 2017. By 2030, artificial intelligence is expected to increase global GDP by over $15.7 trillion, showcasing its transformative potential (Arsenio, 2014).

Artificial intelligence (AI) in e-commerce refers to applying AI techniques, instruments, systems, or algorithms to facilitate online buying and selling goods and services. Artificial intelligence in e-commerce has been the research subject for the last three decades. Nearly 4,000 academic studies have been published on the subject in several disciplines, particularly about consumers.

Electronic commerce refers to the actions or services involved in purchasing and selling goods and services online. Since online services are in high demand by consumers and can give them a competitive edge, businesses are increasingly participating in e-commerce (Gielens & Steenkamp, 2019). However, because e-business integrates rapidly evolving, extensively used, and incredibly affordable information technology, businesses find it challenging to use. (Tan and others, 2019) The newest of these technologies is AI. It is revolutionising e-commerce by adapting to "accurately interpret external data, learn from that data, and apply those insights to achieve specific goals and tasks flexibly." (Page 15 of Kaplan & Haenlein, 2019)

AI transforms how people interact with technology in different sectors, from personalized online shopping experiences to smart home assistants. AI has been implemented in every industry, such as education, medicine, marketing, etc. There is hardly any domain left untouched by artificial technology, from self-checkout counters at grocery stores to advanced security systems in large shopping malls and airports. With each passing day, humans are increasingly adopting technologies powered and driven by artificial intelligence, reshaping how we live, work, and learn.

The study focuses on the present status of e-commerce AI research. E-commerce is quickly incorporating artificial intelligence (AI) into its operations. Automating procedures, enhancing productivity, and raising revenue may open new doors for e-commerce companies. Businesses may increase their efficiency and profitability by utilizing the many advantages of artificial e-commerce intelligence. By using enormous volumes of data from previous transactions and client interactions, businesses may use AI-driven solutions to obtain a deeper understanding of

the preferences and behaviours of their customers. Businesses can better customise their goods and services to match the wants of their clients thanks to this knowledge.

The study emphasizes its diverse contributions to various industries and attempts to explore the full scope of artificial intelligence's (AI) function in the e-commerce industry. It aims to show how AI technologies enhance customer experiences by personalizing shopping journeys, offering intelligent recommendations, and streamlining customer interactions through Chatbot and virtual assistants' thoughts by reviewing different journals, articles, and graphs. Additionally, the study seeks to understand how AI fosters customer trust by improving security measures, enabling transparent communication, and ensuring reliable and efficient service delivery. Overall, the study highlights AI's transformative potential in reshaping e-commerce practices and its impact on the future of online business.

Research methods

Artificial intelligence (AI) has been increasingly used in e-commerce. It includes reviewing the literature on how artificial intelligence (AI) impacts customer experience, builds customer trust, and enables data-driven decision-making in the e-commerce sector.

After reviewing various studies, journals, and articles on the usage of AI in e-commerce, several key insights have emerged. AI plays a significant role in enhancing customer satisfaction by personalizing shopping experiences and providing tailored recommendations. It improves customer trust through secure transactions and transparent communication. AI also aids decision-making by analyzing vast amounts of data to deliver actionable insights. These technologies assist businesses in understanding customer preferences, predicting trends, and optimizing operations.

The literature highlights how AI contributes to building long-term customer relationships and boosting overall efficiency in e-commerce. Additionally, it addresses challenges such as data privacy, ethical concerns, and the need for advanced infrastructure and skilled professionals. The database for review is chosen from Google Scholar, Scopus, Sodhganga, and many official websites that provide relevant data for AI. The search string was used to query the title, keywords, and abstracts of the collected data information:-

("E-commerce" or "electronic business " or " electronic commerce" or "e-business" or "e-business" or "customer behaviour" or " online shopping" or " internet shopping" or "e-purchase" or "customer decision making" or "store shopping").

And ("artificial intelligence," or "computer version" or "expert system" or "case-based reasoning" or "data privacy" or "computer learning."

Several documents emerged from the searches, which formed the study's original database. Only papers classified as articles, reviews, and proceedings were chosen to guarantee quality since they are more likely to have passed a stringent peer review procedure before publication. The phase of data gathering is summarised in Figure 1. The main data about customer satisfaction with online purchases and the trust they develop following AI are compiled in Table 1.

Table 1: Main information

Description	Results
Time Span	(2020 - 2025)
Sources (Journals, websites, etc.)	
Documents	
Authors	
Keywords	6
AI	2
E-commerce	5
Computer learning	2
Data privacy	1

To guarantee thorough coverage of pertinent literature, the data gathering process started with selecting important academic databases, such as Google Scholar, Shodhganga, journals, and articles. Search strings were carefully crafted by combining keywords associated with Artificial Intelligence (AI) and e-commerce. These search strings were applied to query the databases,

targeting titles, keywords, and abstracts to identify pertinent studies. This rigorous process resulted in the retrieval of certain documents. Subsequently, a thorough screening was conducted to select the most relevant documents, journals, and articles from this dataset for detailed analysis, ensuring the data's alignment with the research objectives.

Fig.1 An overview of the data-gathering phase
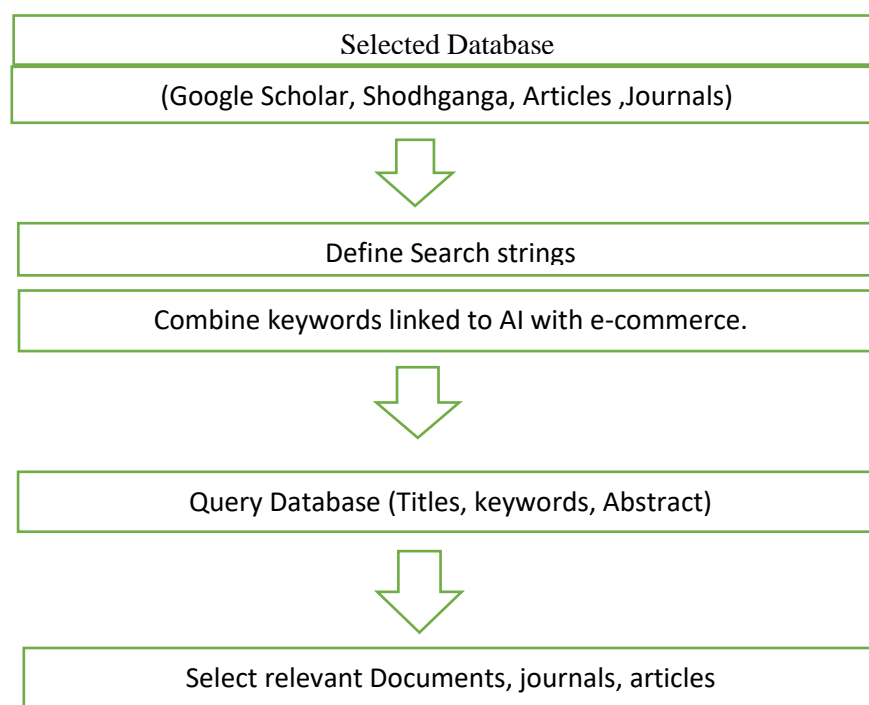
There is much discussion about the advancements in AI and their impact on jobs, skills, and society. However, few studies focus on how AI affects India's growing economy. The Indian government is actively working to develop human resources across the country, especially among its younger population, through initiatives like the Skill India program. At the same time, it is trying to attract global manufacturing to India through the Make in India campaign. India needs a well-planned strategy to promote AI innovation, adoption, and expansion across industries beyond consumer goods and IT services to benefit fully from the AI revolution. AI-powered tools and services are already widely used in India.

AI Is Transforming Marketing

AI has affected every industry differently, and marketing is no exception. "AI is fundamentally reshaping marketing, providing more efficient, personalised, and data-driven approaches to

customer engagement." The rapid adoption of AI in marketing substantially impacts how businesses target, engage, and predict consumer behaviour.

The significant trends listed below have revolutionised marketing and will continue to do so:

1. **Virtual assistant and chatbots-**

AI-driven chatbots assist in enhancing user engagement. AI can handle multiple inquiries at a time, which humans cannot. AI can also resolve issues and offer products according to their preference, which customers have mentioned.

2. **Predictive analytics for better decision making-**

AI also helps analyze a more extensive database and can easily predict the customer's future trends and purchase patterns. Marketers can use that database to make their strategies according to future trends.

3. **Enhanced Customer Segmentation and Targeting-**

The most challenging task for a marketer is segmenting customers and creating strategies according to them. AI helps formulate clusters of audiences based on different criteria. This helps businesses target the right customers according to their segments.

4. **Sentiment Analysis for Brand Reputation Management-**

AI helps monitor social media conversations with customers. It also helps provide and analyze customer reviews. It offers online feedback to analyze public sentiment, which helps build a reputation and secure goodwill. Thus, brands can adjust their marketing strategies based on customer choice.

5. **Voice Search and Visual Search Optimization-**

With the rise of new technologies in the market, voice searches and visual searches developed by AI have influenced customers to search for more relevant products. AI helps businesses optimize content from voice and image-based queries.

6. **Securities and fraud detection-**

Artificial intelligence helps detect fraud activities, such as fraud data, bot traffic, and fake customers, in the market, ensuring market stability. It also helps businesses prevent brands from wasting money on invalid clicks.

7. **Personalized marketing –**

AI helps brands deliver personalized products or services for better customer experiences. By analyzing customer behavior, such as purchase history and regular browsing patterns, AI automatically suggests relevant products or services to the customer

In the modern e-commerce era, AI plays a crucial role in reshaping businesses so that they can operate and easily engage with customers. AI helps companies quickly analyze large volumes of databases, allowing businesses to make data-driven decisions, optimize operations, and enhance customer experiences. AI-powered tools like chatbots and virtual assistants offer 24/7 customer support, which resolves queries instantly and improves satisfaction. In e-commerce, AI enhances personalization by recommending products based on individual preferences, increasing sales and customer loyalty.

In e-commerce, AI enhances personalization by recommending products based on individual preferences, increasing sales and customer loyalty. It also streamlines inventory management by predicting demand and automating restocking processes. Furthermore, AI boosts marketing efficiency through targeted advertising, ensuring the right audience receives relevant content. Fraud detection systems powered by AI safeguard online transactions, building customer trust. With improved route optimization and delivery tracking, logistics and supply chain management have also benefited from AI. Businesses leverage AI to gain a competitive edge, reduce costs, and improve operational efficiency. Its ability to automate repetitive tasks allows employees to focus on strategic initiatives, fostering innovation. As AI continues to evolve, its applications in commerce are expanding, making it an indispensable tool for businesses aiming to thrive in a dynamic and competitive marketplace.

Literature Review

Reference	Objective	Study theme	Finding
Balasubramanian, G. (2024).	The study investigates how the effective use of AI-based personalization techniques improves customer retention and conversion rates.	AI's contribution to improving personalisation: An analysis of customer happiness and participation in e-commerce	The study lays the groundwork for further investigating AI's growing contribution to digital personalization and long-term e-

			commerce expansion.
Nichifor, E. et al. (2021)	The study emphasizes how chatbots driven by AI affect online commerce, mainly how they interact with consumers. It seeks to ascertain their practicality and use.	Artificial intelligence in electronic commerce: Basic chatbots and the consumer journey	Chatbot interactions without influencing behavior. Poor chatbot responses hurt customer satisfaction,
Chie, L. A. et al.(2023)	The study investigates how e-commerce helps in customer happiness, which is affected by AI-driven technologies like shopping carts, recommendation systems, chatbots, and image search.	Customer satisfaction towards the application of artificial intelligence in e-commerce	Picture search and recommender systems significantly increase customer satisfaction. When customers are happy, they are more inclined to stick with AI-based e-commerce apps.
Gursoy, D.,et al. (2025).	This paper examines AI applications applicable to customer service experience, service failure, human resources, and	Artificial intelligence: An overview of research trends and future directions	AI significantly transforms the hospitality and tourism industry by enhancing customer service experiences, improving service failure recovery, and

	organizational behavior.		optimizing human resource management and organizational behavior.
Haidar, I. (2024).	To examine the transformative effects of AI on e-commerce, its influence on shaping workplaces and industries, and its capability to address the shifting demands of businesses and clients while promoting economic and social advancement.	Applications of Artificial Intelligence in E-Commerce	AI will significantly accelerate development in India's commercial industries, improve economic growth, and enhance the quality of life by addressing the needs of both businesses and consumers efficiently without requiring increased mechanical skills.
Sissodia, R. et al.	To explore the transformative impact of AI on e-commerce, its role in shaping workplaces and industries, and its ability to meet the evolving demands of businesses and clients while driving	Use of AI in E-Commerce	The focus is on the transformation, the Impact of AI on E-Commerce, and how it shapes workplaces and Industries while driving economic and social progress.

	economic and social progress.		
Joshi, M. A.(2024)	To analyze current AI applications in e-commerce. It identifies their benefits and challenges and provides recommendations for businesses to effectively integrate AI strategies for long-term growth and work efficiency.	Artificial Intelligence in E-commerce: A Comprehensive Analysis	AI significantly improves many e-commerce facts, such as customer experience, personalization, fraud detection, and supply chain optimization, by utilizing advanced technologies like machine learning, natural language processing, and predictive analytics.
Kshetri, N. (2024).	To analyze the impact of organizational structure on a buying decision	Generative Artificial Intelligence and E-Commerce	GAI significantly impacts organizational structure, search costs, and consumer buying decisions.
Song et al.	To examine the current use of AI technology in e-commerce.	Artificial intelligence in e-commerce	AI will drive the transformation of e-commerce

Role of Artificial Intelligence in E-Commerce

The e-commerce sector is changing due to artificial intelligence (AI), which improves user experiences, streamlines processes, and increases productivity. Businesses may analyse client

behaviour, personalise recommendations, automate procedures, and enhance customer service with AI-powered technologies. E-commerce businesses may build a seamless and engaging buying experience using AI. Additionally, it maximises expenditures and boosts profits. The following are some of the main functions of AI in e-commerce:

1. **Customised Shopping Experience:** AI facilitates the customisation of consumer-storekeeper interactions. To assist with problem-solving, product recommendations, and nearly everything else, AI chatbots examine consumer interactions, trends, and behaviours. To provide client-recommended goods or services, AI assists in analysing customer preferences, including all previous transactions and browsing the history.

2. **Virtual Assistants—**AI-powered virtual assistants provide round-the-clock customer service by answering questions and assisting customers in making product selections. These chatbots or virtual assistants enhance customer experiences by offering instant responses and reducing the need for human assistance.

3. **Supply Chain Management and Inventory**—AI also helps predict demand trends, directly or indirectly, allowing businesses to manage inventory efficiently. AI also enhances the supply chain logistics department by predicting delays and optimizing delivery routes.

4. **Fraud Detection and Prevention** – Artificial intelligence (AI) enhances security by identifying abnormalities and stopping unauthorized activity. It also assists in detecting fraud transaction patterns to identify suspicious activities, lowering fraudulent transactions and chargebacks.

5. **Price Optimization**—AI also examines rival pricing, market developments, and consumer behavior to provide the best price strategies. AI enables companies to modify prices instantly to increase sales and maintain competitiveness.

6. **Voice Commerce**—AI-powered voice assistants like Apple Siri, Google Assistant, and Amazon Alexa make voice-based shopping possible. These assistants make shopping more convenient for customers by enabling voice commands for product searches, order placement, and shipping tracking.

7. **Automated Product Descriptions**—AI-driven natural language processing (NLP) tools may automatically create product descriptions; this ensures uniformity across product listings and saves time by being based on features and specs.

8. **Predictive Analytics for Sales and Marketing**—Businesses can also anticipate future sales patterns and client demands with the aid of AI. AI is capable of efficiently analyzing both fresh and historical data. It also aids in evaluating market strategy, target markets, etc.

Findings

1. Over the past ten years, the number of scholarly papers in artificial intelligence (AI) has significantly increased. The number of AI publications globally grew from about 100,000 in 2010 to over 334,000 in 2021, representing a compound annual growth rate of roughly 11.6%, according to Stanford University's 2022 AI Index Report. (ourworldindata.org)

Fig.2 Number of publications on AI till 2021

Annual scholarly publications on artificial intelligence

English- and Chinese-language scholarly publications related to the development and application of AI. This includes journal articles, conference papers, repository publications (such as arXiv), books, and theses.

Data source: Center for Security and Emerging Technology (2024)
OurWorldinData.org/artificial-intelligence | CC BY
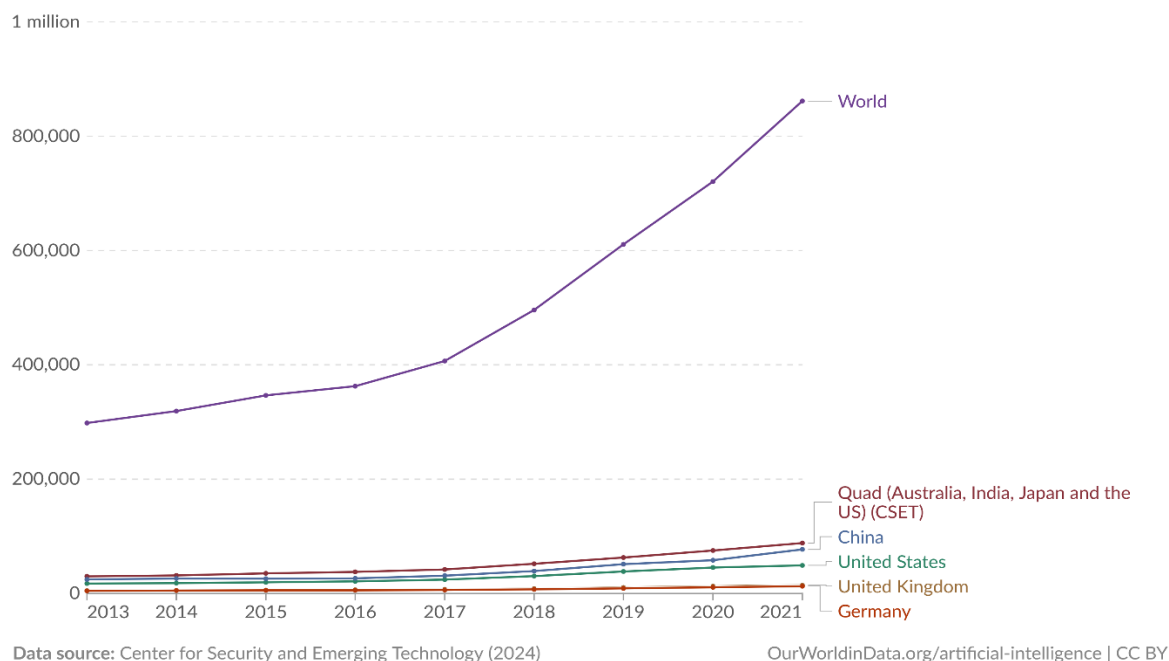
2. **Improve the client experience**

AI systems examine consumer behaviour to provide tailored product recommendations. A study by (Zhang & Xiong, 2024) found that AI-driven product recommendations in e-commerce platforms significantly enhance user engagement and sales. It increases conversion

rates by 30-50% by suggesting relevant products based on browsing and purchase history. (Bawack et.al. 2022)

3. **Operational Efficiency -**

AI predicts demand fluctuations, helping businesses optimize inventory levels and reduce overstocking or stockouts. A study by (Bawack et al., 2022) discusses AI's role in optimizing inventory management in e-commerce.

4. **Fraud Prevention & Cybersecurity –**

Machine learning algorithms detect fraudulent transactions with an accuracy of 95-99%. They also help reduce financial losses in e-commerce and provide security in payment processing by ensuring online transactions, by identifying suspicious activities.

Suggestions

After thoroughly evaluating numerous research papers, other scholars have made specific recommendations for additional study. Firstly, AI-powered voice assistants make shopping more engaging, which attracts more customers. Second, AI aids in analyzing consumer data to improve the efficacy of marketing initiatives. It increases client loyalty and conversion rates. Additionally, AI systems can assist in real-time fraud detection and transaction monitoring. AI can also spot trends that point to fraud and initiate countermeasures.

Conclusion

The conclusion drawn from a survey of numerous papers and publications is that artificial intelligence is revolutionising e-commerce by emphasizing the consumer experience and boosting sales. AI offers chatbots and virtual assistants so customers can easily decide what to purchase. These services are offered 24/7 to the customer for their support; this enhances the customer's engagement and satisfaction and helps identify frauds, which improves securing transactions and leads to easy identification of suspicious activities. In this new era, e-commerce and AI are not two different things; they both revolve around each other, which makes it more consumer-centric.

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