The Role of Artificial Intelligence for Value Creation in Digital Commerce

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Article Information	Abstract
	In the world of digital commerce, Artificial intelligence (AI) is starting to shift the game and transform how organizations run. AI benefits firms and consumers both in retail and digital commerce. This review provides a comprehensive analysis of the critical role AI plays in fostering value creation in the digital commerce industry, with a particular emphasis on the ways in which task and information complexity affect the application of AI technologies. The review then looks at AI possibilities in digital commerce from a variety of angles, such as supply chain efficiency, cost savings, product recommendation, enhanced customer experience and marketing plans. The aim of this review is to exploring how AI applications create value in e-commerce. The approach that was employed described the search technique for locating pertinent academic sources and was based on a survey of the literature on recent 15 studies about the effect of AI for Value Creation in Digital Commerce. Finally, the findings demonstrate that utilizing AI as an advanced instrument in the digital commerce sector appears to be a positive move since it applying AI may foster creativity, improve decision-making, and enhance overall marketing performance.

A. Introduction

Digital Commerce (E-commerce) is the buying and selling of things via the internet. E-commerce companies today compete for market leadership by using cutting-edge delivery and sales tactics [1]. However, the Artificial intelligence (AI) is revolutionizing corporate operations and customer interactions, and it has become a crucial component of the e-commerce value generation process. Therefore, it is crucial to comprehend how AI interacts with task and information complexity. In light of this, the research study makes an effort to examine the subtleties of value production and the development of value theory in relation to e-commerce and artificial intelligence technologies. Digital commerce and internet access have increased information overload, causing diversity and problems. Tools like Artificial Intelligence filter information before transmission, helping to develop digital commerce and address the issue of information overload. The development of digital commerce will be aided more by the convergence of artificial intelligence (AI) and its subsets, such as machine learning (ML) and deep learning (DL) [2]. This review shows the delves into the integration of AI with digital commerce processes, emphasizing various solutions such as catboats, virtual assistants, fraud detection algorithms, tailored suggestions and picture recognition technology. It focuses at the difficulties and uses of AI in e-commerce over the last years, taking into account industries like services, retail, fashion, and electronic market [3]. Finally, the study discusses and compare topics including supply chain management, data overload, enhanced marketing plans, heightened competition, acceptance of technology, and regulatory constraints in e-commerce using AI algorithm.

B. Methodology

To ensure we captured relevant existing reviews, we initially searched across multiple databases, including Scopus, Web of Science, and Google Scholar, using our key terms (E-Commerce, Artificial Intelligence, Application, Marketing).

2.1 Digital Commerce

Digital Commerce or (E-commerce) can be defined as the process of using electronic devices to promote things online. One of the most well-liked online activities these days is e-commerce, which is a trend that is expanding globally every day. Consumer behaviour has changed as a result of the growth of digital technology and the Internet. Nowadays, more and more people are making purchases online. Electronic commerce, or e-commerce for short, is the term used to describe business conducted online over the Internet, where the buyer and seller are connected via a single platform. Any website that is meant to make money that is seen on desktops, tablets, and mobile devices falls into this category [4]. E-commerce encompasses using browsers, mobile applications, Web portals, and the Internet to make purchases. Thus, these are business dealings between vendors and buyers made possible by digital means. Nowadays, nearly every Internet user shops online [5].

Currently, one of the sectors using artificial intelligence most effectively is e-commerce, which does this by developing a sizable customer base, attempting to comprehend client demands, conducting research in real time, developing ideal solutions, and performing a host of other tasks. Artificial intelligence and e-commerce combined with retail has completely changed consumer and business shopping habits and brought many advantages to all. Moreover, personalization in e-commerce is becoming increasingly important, with AI analysing customer behaviour and information provided to the website to gather personal data for personalized experiences. Furthermore, AI comes in various forms. Software AI encompasses several technologies such as image analysis software, speech and facial recognition systems, search engines, and virtual assistants. Robots and self-propelled vehicles are examples of artificial intelligence integrated into material technologies [6]. As in (Figure.1) illustrate the benefits of e-commerce for both online retailers and customers.
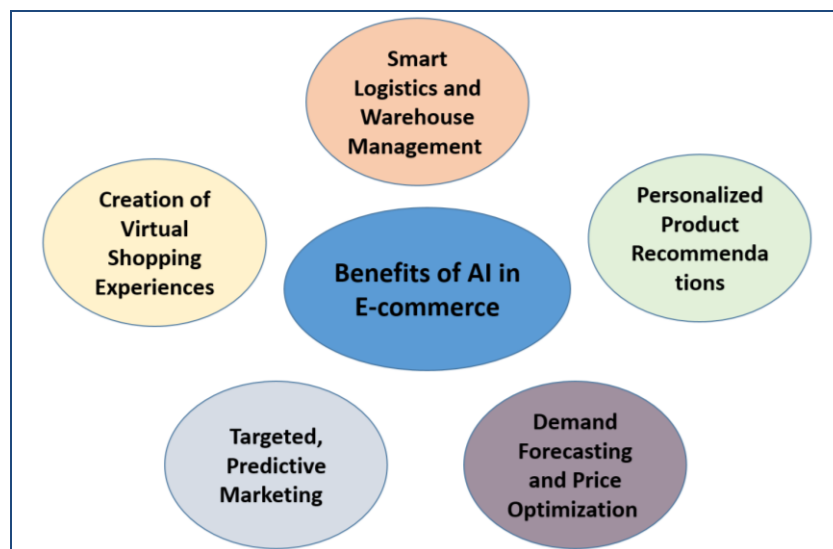
Figure1. Benefits of AI in E-commerce.

2.2 Artificial Intelligence

Artificial intelligence (AI) trains machines to understand and mimic human speech and behaviour. AI is capable of doing intricate and specialized tasks including problem-solving, speech and image recognition, robotics, and natural language processing. AI is a grouping of many technologies that can do jobs that require human intelligence. These technologies possess human-like intelligence in their ability to learn, act and execute when integrated into routine business activities. It saves us time and money in digital commerce by simulating human intelligence in machines [7]. AI has the ability to understand, analyse, and decide. These days, ML is used in the majority of AI marketing applications, which range from helping to find the most effective promotion channels to personalizing product recommendations and calculating churn rate or customer lifetime value [8]. It is used to forecast market trends and user behaviour based on user data that is already available. Alternatively referred to as data forecast, it is a tool used by organizations all over the world to optimize their marketing and sales strategy.

These days, AI is used in the majority of AI marketing applications, which range from helping to find the most effective promotion channels to personalizing product recommendations and calculating churn rate or customer lifetime value [9]. There are many AI algorithm using for digital commerce, in the table below some of them will be shown.

Table 1. Various types of AI algorithms use in Digital Commerce

AI algorithms	Use And Benefit
Decision Tree (DT)	It is a prediction task model that operates by dividing the predictor space into easy to analyse sections. It bases choices on feature values and employs a structure like a tree. The optimal feature and threshold for data splitting are determined at each internal node of the tree by applying a decision or splitting criterion [10].
Random Forest (RF)	It is an ensemble learning technique that creates predictions by combining several decision trees. By training many trees on different subsamples of the data set and aggregating the predictions of separate trees to improve accuracy and reduce over-fitting, it improves classification and regression tasks [11].
Support vector machine (SVM)	It is a regression and classification machine learning model. The way an SVM works is by using crucial data points called support vectors to find the best hyperplane that maximizes the margin between different classes. It use especially well for classification problems that are binary or multi-class [12].
Logistic regression (LR)	It is estimates the probability that inputs will belong to distinct classes by using the logistic or sigmoid functions. Regressions such as logistic and softmax offer simple, comprehensible methods for solving classification issues, enabling precise and probabilistic forecasts [13].
K-Nearest Neighbours (ANN)	It is a non-parametric approach that uses the test instance's similarity to its (K) nearest neighbours in the training set to predict the class label for classification or the target value for regression. Regression takes the average of the target values whereas classification uses the majority vote of the neighbours to decide the class label [14].
K-means Clustering	It is the most widely utilized clustering algorithm. Partitioning a set of data points into k segments that minimize the distance between the data is the aim of the k-means algorithm. Euclidean distance is typically employed, and it can be applied to image segmentation, document clustering, and recommendation engines [15].

2.3 Artificial Intelligence Use in Digital Commerce

Nowadays, using AI in Digital Commerce have been increased. The necessity for creative solutions and the changing needs of customers have made the incorporation of AI into digital commerce to have more crucial. Furthermore, AI technology helps digital commerce succeed in a cutthroat market by providing a host of advantages.

2.3.1 Streamlined Shopping Process

By optimizing a number of process elements AI powered technologies can improve the shopping experience. Virtual assistants can help consumers through the shopping process, making it more efficient and pleasurable, by offering

individualized recommendations, responding to client inquiries and guiding them [16].

2.3.2 Enhanced Customer Experience

AI tools like text and picture analysis software, that can improve product search and discovery. AI systems can provide personalized product recommendations by examining consumer behaviour and preferences, increasing customer satisfaction and loyalty [17].

2.3.3 Decreased Complaints and Returns

By refining product descriptions, photos, and reviews, AI-driven solutions can help alleviate problems with complaints and returns. AI-powered systems can assist consumers in making educated purchases by offering precise and comprehensive information, which lowers the possibility of returns or unhappy customers [18].

2.3.4 Cost Savings

By automating tedious activities and boosting productivity, the use of AI technology in e-commerce operations can result in cost savings. Also, consumer service expenses can be minimized and human participation required by using Catboats and virtual assistants to address consumer concerns [19].

2.3.5 Enhanced Marketing plans

AI-driven technologies can analyse enormous volumes of data to spot trends, forecast consumer behaviour, and improve marketing plans. This makes it possible for companies to more effectively target the right audience with the right message at the right time through marketing [20].

2.3.6 Automation of processes

AI is capable of automating a number of processes related to the digital commerce supply chain such as order processing, inventory management, and logistics. This helps organizations better manage growing demand by reducing manual labour and human error while simultaneously increasing efficiency and scalability [21].

C. Literature review

The use of AI in digital commerce has grown recently, and numerous authors are conducting studies in this area. Several will be displayed in this section.

Like authors in [22], proposed a model that show how digital assistants, along with technological attitudes and AI traits, influence consumers intentions to make purchases. They offered a conceptual model in which consumers attitudes and buying intents were influenced by perceived anthropomorphism, perceived intelligence, and perceived animacy, three important AI aspects. They show that this model using structural equation modelling on a sample of 440 participants and finds that the most significant factor influencing positive attitudes and purchase intentions towards digital assistants is perceived anthropomorphism.

While another researchers proposed a predictive neural network technique in electronic commerce to identify popular brands and analyse customer data in [13]. The significance of sentiment mining and classification is highlighted as critical elements in comprehending consumers' opinions of goods and brands. In the e-commerce industry, these insights can improve outcomes by providing valuable information for strategic decision-making processes. Same as in [23], The author

suggested a methodological strategy that combines the use of AdaBoost classifier algorithms and k-means clustering and Neural network to create a churn prediction model for B2C e-commerce businesses. According to the study, this method improves forecast accuracy and provides useful information for businesses looking to maximize their marketing efforts and keep clients. Compared to the BP neural network model, the AdaBoost model performs predictions more accurately.

However, another researcher proposed to use AI for image analytic in digital commerce like in [24], author suggested a machine learning-based method for an image-based recommender system, to overcome the drawbacks of text-based product searches. Principal Component Analysis (PCA) via Singular Value Decomposition (SVD) is used in the process to reduce dimensionality. K-Means++ clustering is then applied to discover related product groupings. The results highlight the potential of this strategy for improving image-based product recommendations in e-commerce.

Moreover, another framework proposed by the author in [25], combines mathematical, machine learning, and data mining techniques to forecast the purchase behaviour of online clients and suggest appropriate pricing ranges based on price trends. Positive outcomes from testing the framework on a sizable dataset from an online shop included reduced error rates and enhanced pricing strategies that benefited the company as well as its clientele. The outcomes pointing to major effects on day-to-day management functions, such as voucher distribution, which affects about 10% of total revenue, and the potential for AI-driven dynamic pricing optimization. In the same subject, like in [26], author proposed an e-commerce dynamic pricing model based on the theory and practices of reinforcement learning technology, With the goal of enhancing pricing strategies, improving consumer happiness, and increasing economic efficiency. In online retail environments, the model aims to improve both economic efficiency and customer satisfaction.

However, the authors in [27], suggested using artificial intelligence algorithms to create a specific platform through the utilization of contemporary information technologies including big data analysis, cloud computing, and K-means algorithms, the suggested platform seeks to surmount current constraints and improve the e-commerce environment for tourism. Artificial intelligence can enhance travel and tourism e-commerce, leading to increased visit oration and local economy improvements, thereby meeting evolving consumer demands and boosting traveller experiences. In same subject [28], the authors outlined a research plan that used a variety of theoretical research techniques and machine learning algorithms, such as random forest, support vector machine classification, and Bayesian estimation algorithms, to investigate how tourist e-commerce affects personalized tourism in the EBD. The experimental results show that after using trip customization services made possible by big data technology, a sizable fraction of customers (79.84%) express readiness to repurchase connected products.

Furthermore, the authors in [29], presented a novel method for developing an artificial intelligence (AI)-based large data categorization model for e-commerce that integrates fuzzy logic, clustering, and ANN theories. The results of the simulation show that the suggested fusion technique performs better in terms of

clustering effectiveness, convergence time, and error rate reduction than the support vector machine (SVM) and fuzzy c-means (FCM) algorithms. This model can allow for more accurate data mining. Moreover, the author suggested a strategy that incorporates three machine learning technologies driven by AI with digital marketing tactics used by food delivery companies in [30]. Digital marketing methods have improved with the use of supervised learning methodologies such as Naïve Bayes, Nearest Neighbours and Decision Trees. These algorithms serve as the basis for data-driven choices like the launch of new products and promotional offers. The potential of AI and ML to accurately forecast client behaviour and preferences is demonstrated by the trained ML models, which yield findings that are more accurate than traditional marketing tactics.

Therefore, in [31], another authors suggested a risk management system based on artificial intelligence that is specifically designed for credit sales in online retail. In order to forecast the likelihood of default or late payment, this system uses machine learning algorithms to evaluate a variety of data sources including transaction history and behavioural tendencies. Testing on a sizable e-commerce dataset demonstrates the efficacy of the suggested method and demonstrates its capacity to reliably identify high-risk clients and avert monetary losses. Furthermore, author employs a variety of web analytics methods with machine learning classifiers and the KMP algorithm-based multivariate pruning method to extract patterns from transactional data that is gathered from e-commerce websites in [32]. It shows that, the novel machine learning-based assessment technique that uses log-based transactional data to accurately evaluate e-commerce site usability with 94.2% accuracy.

While in [33], author proposed to merger the BDM technology with the FDM based on IFT that is a noteworthy research technique for e-commerce fraud detection through the use of SVM and LRM in AI algorithms. This model provides useful insights on the likelihood of fraudulent behaviour by precisely analysing the financial and credit status of enterprises. The findings are crucial for detecting B2B e-commerce fraud and offer technological assistance to promote the sound growth of e-commerce platforms.

Finally, in another paper like in [34], authors presented a mobile application for multi-channel marketing that improves business intelligence by leveraging artificial intelligence algorithm using ANN, DT, and K-means. By integrating merchants' mobile channels, the system offers insights into brand classification, warehouse management, and sales prediction and adaption to changing market dynamics. Also in the same subject [15], the objective of the author is to create a strong framework and implement efficient methods that utilize machine learning algorithms to enhance pricing strategies on e-commerce platforms on mobile. The idea is to draw attention to how important it is to choose the best possible purchasing price as opposed to just providing the lowest option. By combining statistical and machine learning algorithms, the study aims to predict purchase decisions for individual products through adaptive or dynamic pricing tactics. By using these approaches, online retailers may better target specific consumer categories with price strategies, increasing their total profitability and market share.

Table 2. Comparative between AI application in Digital Commerce

Ref.	Year	Dataset	Technique	Algorithm	Findings
[22]	2021	Containing 8000 interactions with respondents one-on-one	Structural Equation Modelling (SEM)	Using AI qualities combining quantitative and qualitative data.	It offer valuable contributions to several fields including Information Systems, analytics, retail operations, and marketing
[13]	2020	The data consists of various types of information related to customer interactions e-commerce sector.	Predictive modeling & recommendation systems in the e-commerce industry	ANN	Contribute to informed decision-making and strategy development to drive business growth and improve customer satisfaction.
[23]	2022	Various type of data (Customer Behaviour Data, Temporal Data Customer Attributes, Transaction Data, Product Data)	Forecasting customer attrition and providing B2C e-commerce businesses with retention solutions.	Classification (AdaBoost ANN), k-means	It show that AdaBoost model performs predictions more accurately
[24]	2020	40,000 fashion product images from Kaggle	A combination of machine learning and image processing techniques	PCA-SVD for dimensionality reduction, K-Means++	Enhance the accuracy image-based product in e-commerce.
[25]	2024	Data from online marketplace	AI-driven pricing algorithms	LR	Improved business performance and profitability
[26]	2020	Pricing of product data	Dynamic pricing-assisted decision-making using AI	Reinforcement learning	Improve pricing decisions in e-commerce
[27]	2022	Tourist Behaviour Data	Tourism E-Commerce Platform	K-means, cloud computing, big data analysis	Improving accuracy when integrating AI into travel-related e-commerce to meet changing consumer demands and promote economic expansion.
[28]	2021	Tourist Behaviour Data	Tourism E-Commerce Platform	RF, SVM	Increase consumer satisfaction and spur innovation in the travel and tourism sector by customizing travel services.
[29]	2023	Data take from customers who have shopped on an e-commerce platform	an AI-based BD categorization model for e-commerce	FL, ANN	DM techniques provide faster convergence and a greater clustering impact.
[30]	2023	Various types of data related to the food delivery business	AI to power digital marketing tactics for the food delivery industry	NB, ANN, DT	AI and ML can predict customer behavior and preferences with high accuracy
[31]	2023	Large e-commerce dataset	AI risk management system tailored for credit sales in e-commerce	DT, KNN	Effectively identifies high-risk customers, prevents financial losses, enhancing cash flow and customer relationships.

[32]	2022	Shipping data, sentiment data, purchasing rate	Association rule with machine learning and collaborative filtering	LR, KNN	The system accuracy increased as 94.2%
[33]	2022	30,000 e-commerce behaviour samples	B2B e-commerce	SVM, LR	Model exhibits higher accuracy with larger sample sizes, 84.10% accuracy compared to training samples 75.20%
[34]	2019	Various type of data	Mobile Multi-Channel Marketing Application	ANN, DT, K-means	Enhance and provide a flexible environment for innovation and adjustment in response to changing market conditions.
[35]	2023	Tow dataset from an online marketplace	Online customer purchases	K-means, LR	AI used to optimize dynamic pricing in e-commerce, providing useful information on customer segmentation and pricing tactics.

D. Findings and Discussion

This review main objective is to show the wide range of applications that AI and machine learning can have in the field of digital commerce, also it shows the most AI algorithms that have been used such as (ANN, K-Means, LR, DT, SVM, RF). These applications include digital marketing, tourism e-commerce, risk management systems for online retail, forecasting purchase behaviour and pricing, mobile applications for multi-channel marketing, and many more. Additionally, it provides insightful advice and useful tools to leverage AI to improve customer experiences, business operations, and profitability. These tools and insights may be used for everything from fraud detection and decision-making processes optimization to user experience enhancement in digital commerce. The main findings highlight the importance of elements such as perceived anthropomorphism in shaping consumer perceptions of digital assistants, the efficacy of predictive neural networks in brand analysis, and the enhancement of churn prediction models accuracy by incorporating AI algorithms. Furthermore, through this review, that explore the effectiveness of AI in the field of e-Commerce, for dynamic pricing models and image-based recommender systems are two examples of AI-based techniques that show promise in overcoming conventional constraints and improving commercial results. Finally, it shows how using AI can spur innovation, better decision-making and improve overall business performance in the context of digital commerce.

E. Conclusion

Digital commerce is significant in the world of business and digital technologies that we live in today. A growing number of business scientists and specialists are interested in the use of AI in e-commerce. This study offers a thorough examination of the critical role AI plays in promoting value generation in the digital commerce industry. The objective was to provide an overview of the key concepts of AI in digital commerce as well as their advantages. It has become apparent from a thorough examination and comparison of AI potential in digital commerce across a range of dimensions, such as supply chain efficiency, product recommendation and personalization, that AI technologies are essential for improving consumer experience and operational

efficiency. An evaluation a summary of the main conclusions of how AI is affecting things like customer experience have been discussed in this review. accentuate the potential of AI for e-commerce's future expansion and innovation. Also, the investigations limitations of this review there was no data, but we can add a quantitative or qualitative approach later on the future. A digital commerce operation will surely benefit from ongoing research and the strategic application of AI, which will drive the sector growth, innovation, and ability to fulfil changing customer expectations in a more digital environment.

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