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The Impact of Artificial Intelligence on International Trade: Evidence from B2C Giant E-Commerce (Amazon, Alibaba, Shopify, eBay)

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Abstract

This research paper aims to explore how major e-commerce companies employ artificial intelligence (AI). We will examine the impact of AI on their operations and customer service. Subsequently, in the long run, we investigate how this can have broader implications for international trade. Through this investigation, we aspire to gain insights into the transformative effects of AI on global trade dynamics. Here's our plan for the paper: To begin, we will explore the essential parts of AI and how it influences economic growth. Then in the future, we delve into the various ways AI is utilized in the e-commerce industry. After that, we will closely examine different examples like Amazon, Alibaba, Shopify, and eBay to understand how AI is practically implemented and how it affects these companies. Finally, we will try to look more closely at how the use of artificial intelligence can bring about significant changes in international trade and streamline business operations.

Keywords

AI, Trade, B2C, E-Commerce, Amazon, Alibaba, Shopify, eBay, Customer Engagement, Recommendations, Customer Behavior, Improve Sales, Improve Listings, Logistics, Prediction, Customer Service

1. Introduction

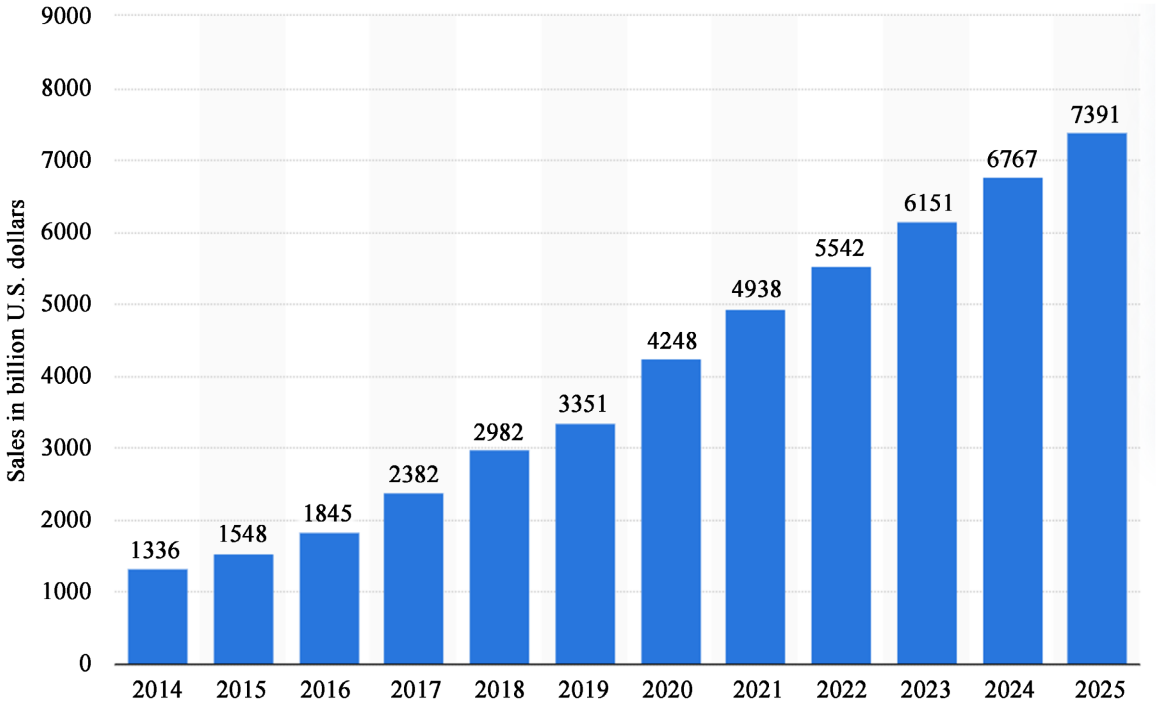
AI has had a significant impact on various sectors of the global economy, revolutionizing the way businesses operate and compete. McKinsey Global Institute (2017) predicts that by 2030, AI could generate an additional $13 trillion of econom-

ic activity globally (McKinsey Global Institute, 2017). The business-to-consumer (B2C) e-commerce industry has been greatly affected by AI. With the rise of the Internet, e-commerce has broken down geographical barriers and transformed international trade. AI technology has further advanced this shift, enabling enhanced efficiency, improved customer service, and personalized user experiences. E-commerce leaders such as Amazon, Alibaba, Shopify, and eBay have successfully used AI for product recommendations, Inventory management, customer behavior analysis, logistics management, etc. This is how easily it can grow customer engagement, satisfaction, and sales. AI helps to increase overall quality improvements. Even eBay, with its vast number of listings, utilizes AI for data management, accurate pricing suggestions, fraud detection, and ensuring customer satisfaction. First, let's explore some of the largest e-commerce companies worldwide. Before that, it's essential to understand the sales of global retail e-commerce from 2014 to 2025.

As shown in **Figure 1**, retail sales around the world were $5542 billion in 2022. And this number is projected to rise to $7391 billion by the year 2025 (Geyser, 2022).

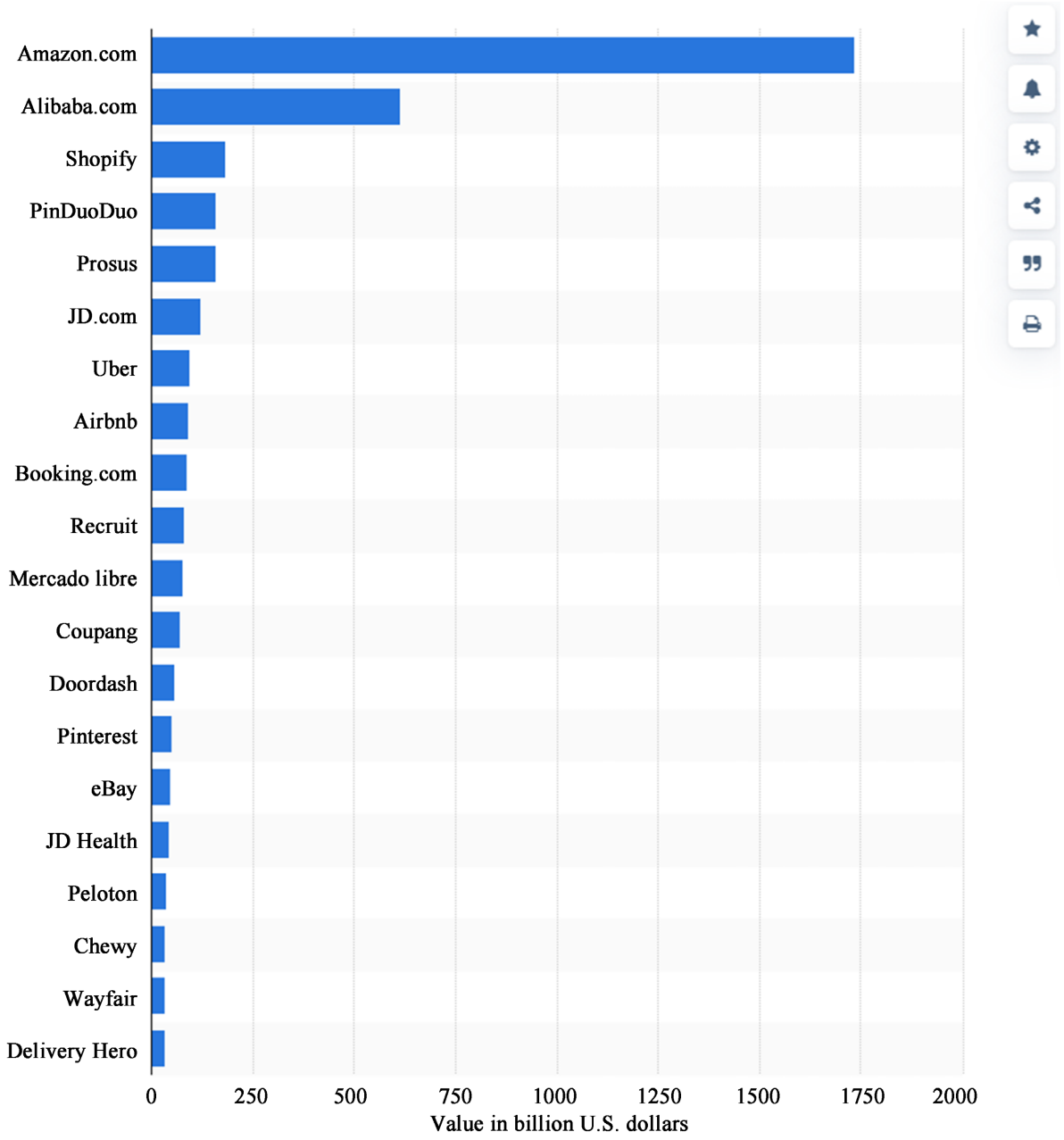
Now, let's delve into a breakdown of the prominent e-commerce companies in the world.

As we can see in **Figure 2**, research conducted by Statista reveals the market capitalization of leading consumer internet and online service companies worldwide as of June 2021 (Chevalier, Market cap of leading consumer internet and online service companies worldwide as of December 2022, 2023). The effects



Source: statista.com.

Figure 1. Breakdown of the biggest e-commerce companies.



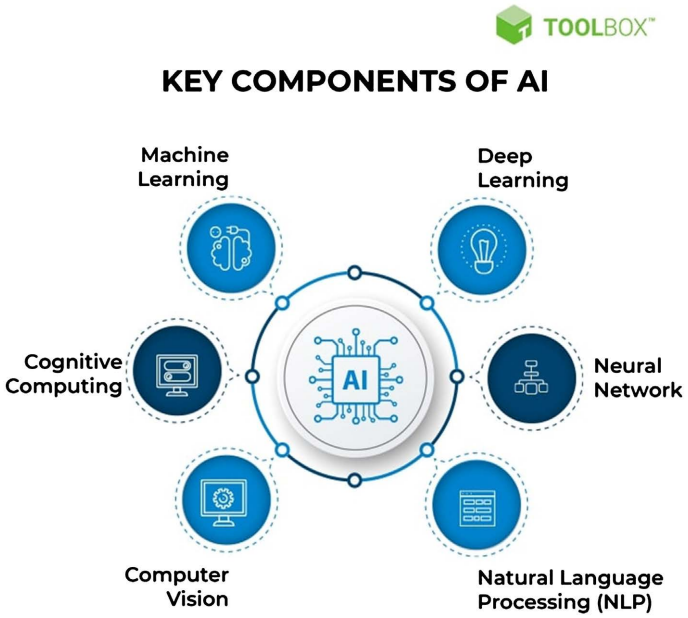
Source: statista.com.

Figure 2. E-commerce companies' market capitalization.

of AI on these companies go beyond improved operational effectiveness. It's no surprise that these companies reshape the international trade by adopting AI.

2. Key Components of AI

As we can see in **Figure 3**, intelligence carries significant significance, demonstrating our grasp of the world around us. However, artificial intelligence (AI) encompasses various interconnected elements that must collaborate seamlessly (Kanade, 2022). Let's explore the fundamental components of AI.



Source: spiceworks.com.

Figure 3. Here we can see the key components of AI.

2.1. Machine Learning

Unlike traditional programming, machine learning enables AI systems to learn and enhance themselves based on previous experiences, devoid of explicit human instructions.

2.2. Deep Learning

Deep learning, a subset of machine learning, utilizes artificial neural networks to process data and acquire knowledge.

2.3. Neural Network

Resembling the connections of the human brain, neural networks are computer systems that facilitate deep learning and comprehend intricate information.

2.4. Cognitive Computing

By striving to mimic human thought processes, cognitive computing enhances machine understanding of human language and images, facilitating more effective human-machine interactions.

2.5. Computer Vision

Through deep learning and pattern recognition, computer vision seeks to comprehend visual information, encompassing images, graphs, tables, and videos.

2.6. Natural Language Processing (NLP)

This domain focuses on enabling computers to grasp and communicate in hu-

man language, encompassing reading, writing, and speaking skills.

3. The Impact of AI on Economic Growth and International Trade

Artificial intelligence has the potential to revolutionize global trade by enhancing our capabilities and increasing efficiency. This advancement may lead to significant economic growth and open doors for trading opportunities with other nations. Currently, the progress in improving work speed worldwide is limited and several factors could contribute to this (McKinsey Global Institute, 2018). One factor may be the learning curve associated with adopting new technologies, particularly AI, which has a transformative impact on various sectors of our economy. Mastering the use of these innovative tools requires time and resources. Furthermore, maximizing the benefits of AI necessitates a skilled workforce and effective business practices (Brynjolfsson, Rock, & Syverson, 2017). As AI continues to reshape the workforce and enhance productivity, it will influence our trading relationships. For instance, there may be a shift towards service-oriented roles in sectors such as restaurants and hospitals. The concern arises when AI substitutes human labor, particularly in physically demanding occupations like factory work. This transition could occur rapidly, potentially leading to job displacement (Arntzi, Gregoryi, & Zierahni, 2016).

However, AI also highlights the importance of specific skill sets, as it enables improvements and increases the value of certain tasks. Consequently, there could be an increase in service-based jobs, both within manufacturing and in international trade.

4. Artificial Intelligence in E-Commerce

AI in e-commerce refers to using computer systems or software to perform tasks that normally require human intelligence in the context of online businesses. It helps self-acing and simplified various aspects of e-commerce activities, it is working easier for customers to shop and businesses to operate expertly.

AI can detect customers purchasing history, behavior, and browsing patterns to provide personalized product recommendations. This improves customer experience, rising customer satisfaction, and growth sales. A Notable example is Amazon's product recommendation feature (Jannach, Zanker, Felfernig, & Friedrich, 2010). On the other hand, AI improves search engines by providing more specific output based on past search history. For example, eBay's search engine, Cassini, improves search results based on relevance rather than fixed criteria (Geva, Understanding eBay Cassini: How to Beat eBays Algorithm in 2023, 2022). Chatbots and virtual assistants become useful features in e-commerce. They offer 24-hour instant customer service such as quick answer and helps customer find products on demand. Alibaba's chatbot AliMe is a good example of how AI improves customer service (Qiu et al., 2017). Nowadays, AI plays an important role in detecting and preventing fraudulent transactions by identify-

ing unusual patterns in transaction data. This helps maintain a safe shopping environment and builds customer trust (Ray, 2022). Moreover, AI enables to detection of trends and forecast demand, allowing businesses to improve stocks and reduce dead stock and loss (Bertsimas, Kallus, & Hussain, 2016). E-commerce companies may optimize pricing by analyzing market trends and competitor prices. This result can increase sales, profit margins, and competitiveness (Morgan, 2011).

These are some ways AI is reshaping the e-commerce sector. As AI technologies advance, the e-commerce sector will be more customized, efficient, and reliable.

5. Artificial Intelligence in E-Commerce: Case Studies

AI is being used more and more in e-commerce because it has many benefits, such as personalized product recommendations, improved customer service, intelligent search, optimized pricing, efficient logistics, and more accurate sales predictions. When e-commerce giants use AI in their businesses, their sales go up by at least 20% and their costs go down by at least 8%. After the pandemic outbreak, everyone moved toward online shopping, and now this trend is gaining more popularity. 17.8% of sales were made from online purchases in 2021, this has increased to 20.8% in 2023, and almost a quarter (23%) of all purchases predicted to be made online in 2025. The impact of AI on the e-commerce industry is predicted to be substantial, with an estimated worth of $45.72 billion by 2032. An overwhelming majority of businesses (84%) consider AI as their primary area of focus and development. The remarkable effectiveness of AI technology in improving various business metrics by over 25% further underscores its significance in the e-commerce sector. These current trends make it clear that AI in e-commerce is becoming more important and has great promise for the future (Bleich, 2023).

5.1. Personalized Product Recommendations

The expectations of customers have changed as the way they shop has evolved. In today's online shopping environment, customers anticipate a personalized experience, and when retailers deliver this, it leads to a 40% increase in revenue. 1 in 10 retailers has fully implemented personalization across all channels. Artificial intelligence (AI) has been proven to enhance efficiency and reduce costs in the field of e-commerce. It can improve marketing efficiency by 10% - 30% at a lower cost and assist businesses in acquiring new customers by around 3% - 5%. Moreover, AI has the potential to enhance customer satisfaction and engagement by 5% - 10%. Thus, artificial intelligence can greatly enhance various aspects of an e-commerce business.

5.2. Intelligent Search

Besides offering personalized product recommendations, AI enables retailers to

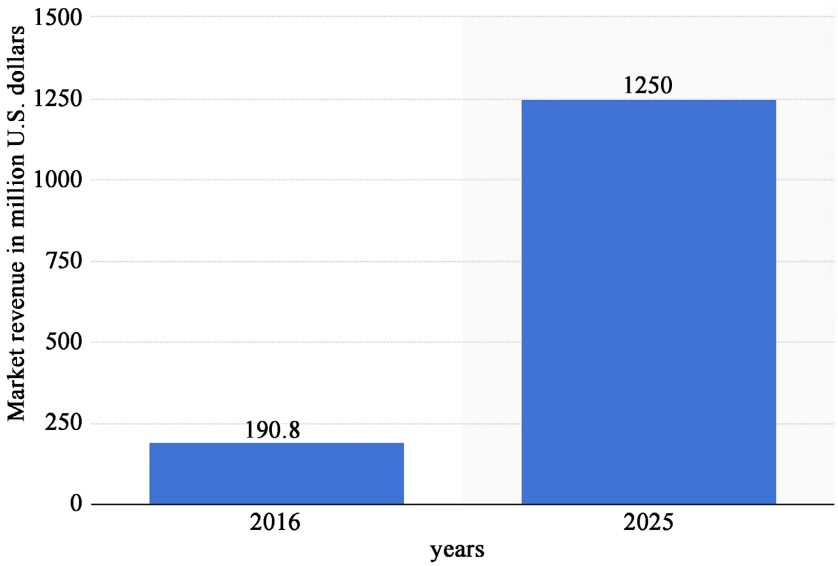
comprehend the intent behind shoppers' search queries. This can result in a reduction in the average bounce rate between 20% - 45% in e-commerce, as intelligent search provides more relevant results. The global average cart abandonment rate is 70.21%, but with intelligent search and an understanding of shopper intent, retailers can effectively present the right products to customers at the right time and place.

5.3. Logistics and Predictive Analysis

Artificial Intelligence (AI) in e-commerce draws data from multiple sources, including buying patterns, consumer behavior data, and demographic information. This enables effective inventory management by utilizing past sales data, current market trends, and social insights to predict customer preferences. AI can also forecast demand for special events like Black Friday (where online sales rose 2.3% year-on-year), ensuring appropriate pricing and discounts. Companies using AI have demonstrated improved control over shipping costs by 15%, stock levels by 35%, and service levels by 65% (Alicke et al., 2021). Additionally, as prompt delivery is crucial to 99% of online shoppers, 42% of retailers are striving to offer same-day delivery, and AI can contribute to achieving this goal.

5.4. AI Assistants

As we can see in **Figure 4**, AI-powered chatbots handle 70% of online customer conversations. However, with the introduction of generative artificial intelligence, the e-commerce industry has experienced to $5.92 trillion increase in value. The chatbot market size was $190.8 million in 2016. It will increase by around $1.25 billion in 2025 (Thormundsson, 2023). Retailers are rushing to upgrade their existing chatbots with new capabilities. AI assistants can address



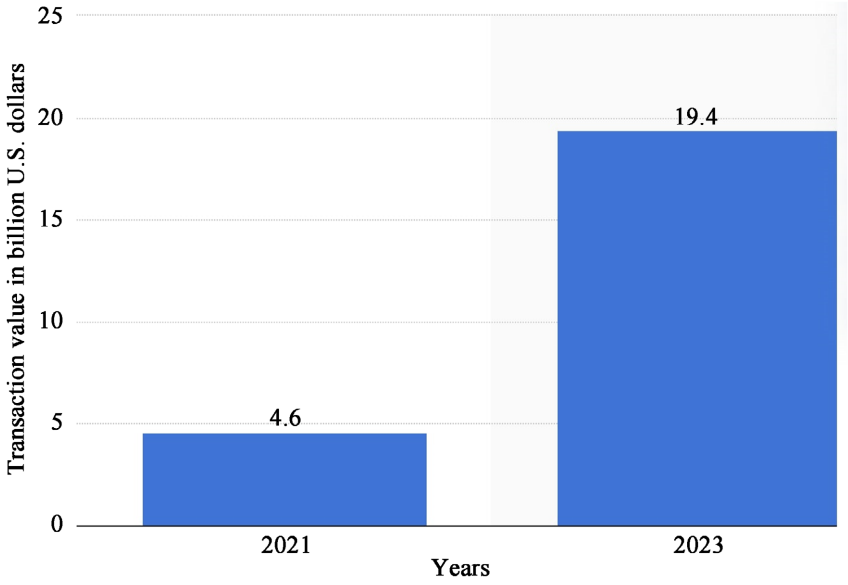
Source: statista.com.

Figure 4. Chatbot market size from 2016 to 2025.

more complex queries at any time of the day or night, enhancing the shopping experience for customers. Furthermore, these assistants facilitate communication in supply chains by overcoming language barriers and preventing costly mistakes, such as the identification of counterfeit goods.

5.5. Voice Assistants

As we can see in **Figure 5**, the predicted increase in e-commerce purchase value made through voice assistants is significant, with a rise from $4.6 billion in 2021 to $19.4 billion in 2023 (Chevalier, E-commerce transactions value via voice assistants worldwide in 2021 and 2023, 2023). This growth, which is more than 400% in two years, is attributed to the rising availability of voice assistant purchasing items, particularly on smartphones and smart devices used at home.



Source: statista.com.

Figure 5. Voice assistants' e-commerce transaction value from 2021 to 2023.

6. Case Studies of E-Commerce Giants

Artificial Intelligence is reshaping the world we live in. The implementation of AI is significantly transforming various industries, such as international trade, and having a huge effect on successful companies like Amazon, Alibaba, Shopify, and eBay. These companies use AI for their business operations, enhance customer satisfaction, and grow global growth. Let's discuss how the e-commerce giants like Amazon, Alibaba, Shopify, and eBay use AI to increase business.

6.1. Amazon

Amazon uses a variety of AI methods on its e-commerce platforms. One such technique is recommendation systems, where AI algorithms predict customers' preferences and suggest items, they are likely to purchase (Linden, Smith, &

York, 2003). Amazon also employs dynamic pricing, adjusting prices based on demand and competition to offer competitive deals (Chen, Mislove, & Wilson, 2015). Furthermore, AI helps Amazon with inventory management accurately forecasting which products to stock based on sales history and trends. This ensures popular items are always available and increases customer satisfaction (Jenkins, 2020). In addition, Amazon's AI voice assistant Alexa provides facilities for the users such as making shopping with voice commands and convenient and spontaneous purchases as well (Lopatovska et al., 2018).

6.2. Alibaba

Alibaba uses ingenious techniques to drive e-commerce sales such as AI and data mining. It explores the performance of every customer, examines the search history, and analyzes the habit, so that they can deliver personalized recommendations and boost engagement (Liu, Dolan, & Pedersen, 2010). Alibaba also employs predictive analytics for inventory management leveraging AI to forecast sales and optimize inventory (Seyedan & Mafakheri, 2020). Furthermore, AI chatbots are utilized for customer service to provide quick and accurate responses, improving the overall shopping experience and potentially increasing sales (Misischia, Poecze, & Strauss, 2022). Finally, through the analysis of vast amounts of customer data, Alibaba adopts a "Customer to Businesses" (C2B) model, tailoring products to customers' needs and thus driving sales through personalized offerings (Jing, Jiang, Du, & Sugumaran, 2018).

6.3. Shopify

Shopify utilizes AI and data mining in various ways to enhance e-commerce sales. It employs AI to gain insights into how customers behave. This enables shop owners to customize their offerings and increase sales (Huang, 2021). It uses chatbots to provide round-the-clock customer service. Chatbots can promptly answer customers' queries and assist them with their purchases, enhancing the shopping experience and potentially boosting sales (Lee & Moray, 2007). Furthermore, Shopify uses AI to forecast future sales and trends based on historical data. This helps businesses prepare for demand, improving customer satisfaction based on their shopping patterns (Pavlyshenko, 2019). Personalized recommendations can enhance the likelihood of additional purchases (Jannach, Zanker, Felfernig, & Friedrich, 2010).

6.4. eBay

eBay harnesses the power of AI and data mining for various tasks that contribute to its e-commerce sales growth. It uses AI to analyze data from millions of listings and provide sellers with the sales price range. The chance of making a sale goes up when the price is right (Schlosser & Richly, 2019). eBay using AI fraudulent activities detect (Beutel, Akoglu, & Faloutsos, 2015). AI helps eBay to improve its search results. When customers search for products, AI tries to ensure

that the results are needed (Geva, eBay SEO: A Step-By-Step Guide to Ranking on eBay, 2023). eBay also uses AI image recognition. It helps people find specific items. These AI functionalities boost sales (Fryman, 2017).

These case studies show AI significantly impacts international trade through e-commerce business. AI has added some helpful aspects to e-commerce business that people never thought about it. AI makes customer product searching easier, customer service more efficient, ensuring secure transactions and a shipping experience is more personalized.

7. Artificial Intelligence in E-Commerce: Benefits

In the modern day, AI is making its way to the smarter world. AI is helping to create advanced tools for automation that can save humans time for productive tasks. The use of AI is revolutionizing the e-commerce sector which is unbelievable. Some vital benefits are highlighted below.

7.1. Visual Search Method

AI has brought many benefits to e-commerce, such as making visual search better and enabling buyers to find goods that look like the same images they have shared. This function makes shopping more convenient and more personal.

7.2. Improve Sales Process

AI also helps find possible customers by analyzing their habits and behaviors. This makes the sales process better.

7.3. Enhance Personalization

AI also takes personalizing to a whole new level by recommending products to users based on their interests and behaviors.

7.4. Virtual Assistants

Chatbots are available around the clock to help with customer service, product research, and sales.

7.5. Filter Counterfeit Reviews

AI helps build customer trust by identifying and filtering out counterfeit reviews.

Overall, the implementation of AI has resulted in a significant enhancement of the e-commerce experience and operational efficiency.

8. Conclusion

Artificial Intelligence is gaining popularity in the realm of online shopping, although it still has room for improvement. Companies that operate online stores are continuously enhancing their AI capabilities to cater to customer preferences. Occasionally, these companies collaborate to merge their AI expertise and create

more advanced tools. In addition to this, using AI can solve a significant problem for e-commerce users, and most customers cannot select the specific size of the product while purchasing the product. As a result, the value of product refunds in the e-commerce business is very high. So, we think if we can solve this problem by using AI, it is possible to improve the shopping experience for customers. On the other hand, the losses for vendors caused by product refunds can be gradually reduced. We believe that the integration of AI in online shopping will have a transformative impact. It will influence how we make online purchases and sales, customer retention rates, customer satisfaction levels, and overall business efficiency.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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