From Personalization to Dynamic Pricing: AI Applications and Their Impact on E-Commerce Competitiveness

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Abstract: - The proliferation of artificial intelligence (AI) has accelerated the digital transformation of e-commerce by redefining consumer engagement, operational efficiency, and competitive dynamics. This study investigates the influence of AI applications on brand loyalty and sales performance through a comparative analysis of leading international and Turkish e-commerce firms, including Amazon, Alibaba, eBay, IKEA, Zalando, Hepsiburada, Trendyol, and LC Waikiki. Employing a qualitative case study methodology and content analysis of secondary data, AI-driven practices are examined across various domains, including personalized marketing, recommendation systems, chatbots, dynamic pricing, demand forecasting, and customer experience management. The findings demonstrate that AI substantially contributes to strengthening customer relationships, optimizing sales processes, and enhancing firm competitiveness by facilitating personalization and predictive capabilities. However, the analysis also identifies limitations and risks arising from unsuccessful applications, particularly those associated with algorithmic bias, over-personalization, privacy infringements, and deficiencies in user interface design. This research highlights both the strategic value and inherent challenges of integrating AI in e-commerce, suggesting that the responsible and customer-centric deployment of AI constitutes a critical determinant of sustainable competitive advantage in the contemporary digital economy.

Key-Words: - artificial intelligence (AI), e-commerce, dynamic pricing, recommendation systems, customer loyalty, digital transformation.

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1 Introduction

E-commerce is a business platform where buyers and sellers meet online, and with the development of technology, it is rapidly affecting the business world and transforming the sales process. With the new business processes, competition in the economy is increasing rapidly. Brands that integrate internet-based opportunities into traditional marketing processes establish a universal e-commerce channel that transcends segment-specific sales, enhancing both efficiency and creativity [1]. Due to e-commerce, brands reach many potential customers around the world and maintain continuous connections with them. E-commerce brands that are supported by artificial intelligence (AI) have the opportunity to quickly and easily access goals such as reaching customers, making sales, and maintaining brand loyalty.

According to [2], [3], with the increasing use and accessibility of the internet, AI has become the main subject of technological reform and a key input to rapidly advancing IT processes and business digital transformation. AI has different definitions in literature. AI refers to human-designed systems that simulate human cognitive functions such as reasoning, learning, decision-making and problem-solving and enabling machines to perform tasks that previously required human intelligence. [4]. In this context, AI supports businesses and enables their development in many areas such as customer service management, pricing algorithms, customer segmentation, chatbots, and assistants. Thus, businesses conduct research to increase their knowledge and experience about AI to gain a competitive advantage and apply efficient examples to their own processes.

This study aims to present the effect of AI applications of e-commerce brands on brand loyalty and sales through real-world examples. The study will examine examples of AI applications made by many different e-commerce brands around the world, including brands in Turkey, and will detail the purpose, method, and results of the applications.

2 Literature Review

The importance that businesses attach to both e-commerce and AI has enabled detailed literature research on these topics and the evaluation of the results of the applications implemented. The article by [5] examining the use of AI in e-commerce is similar to the subject of this research. Explaining how widespread use of the internet and the increasing use of AI are reflected in e-commerce, the authors first defined AI, listed its development processes, and then defined big data, artificial neural networks, machine learning, deep learning, the internet of things, expert systems, virtual reality, and genetic algorithms.

The article [6], on the other hand, examines the strategic role of artificial intelligence in the brand-building process. The authors begin by outlining the concept of AI and discussing its underlying components, as well as its applications across various sectors. According to their findings, AI enables brands to gain deeper consumer insights, develop personalized marketing and communication strategies, strengthen brand identity, and enhance customer experience management. In the final section, the authors highlight how AI supports market and trend analysis and argue that AI has become a critical tool for creating meaningful consumer–brand connections. They conclude that companies seeking to establish strong, competitive brands are increasingly investing in AI-driven branding capabilities.

This article [7] contributed to the literature by explaining the sub-branches and usage areas of AI in their published article. The authors, who explain AI in a detailed and technical way, define AI in detail with headings such as machine learning, supervised-unsupervised learning, artificial neural networks, and deep learning. The authors, who talk about the application areas of AI, give examples of early detection of skin cancer with Skin Vision, Derma. Examples of AI applications include early disease detection in healthcare, biometric identification in defense, document similarity analysis through tools like Turnitin in education, and litigation outcome prediction with platforms such as Lex Machina in law. In the field of economics, the authors [7], who touch upon financial forecasting, risk management, portfolio optimization, trading strategies, customer behavior analysis, and market analysis, explain the benefits of AI in increasing customer loyalty and sales processes. In short, the authors argue that AI is very effective in many sectors and share and compare sample applications between sectors.

In their article titled 'AI in e-commerce', the authors [8] explain the increasingly popular AI and the benefits of its use in e-commerce. First, the authors talk about the benefits of e-commerce for sales and customers, and then they explain AI. In the article explaining the roles of AI in e-commerce, chatbots, recommendation tools, visual and voice searches, and customer relationship management are explained with examples. In conclusion, the authors see AI as an integral part of e-commerce [8]. A similar study was also done in this article [9]. The author details the historical development of AI, what it is, and its types. Explaining what e-commerce is and its effect on businesses, the author touched upon chatbots, customer behaviors and sales forecasting, visual search, privacy, and cybersecurity with AI. With a universal survey of twenty questions, the author tries to understand how participants relate to e-commerce and what their needs are. The author asks participants questions such as "Do you think AI applications improve the customer experience on e-commerce platforms?" and shares the answers numerically. In the last section, the author answers the research questions and completes his article with his suggestions [9].

The article [10] on customer behavior in AI-supported e-commerce is also one of the related articles. Stating that shopping experiences have changed with the expanding AI applications and that cashier-less systems in stores and smart assistants on websites have started to be used, the author asks about the demographic information and online shopping habits of approximately 400 survey participants with the snowball sampling method and shares the results numerically. In the article, which includes examples of brands such as Amazon, Google, Apple, and Microsoft, the online purchasing behaviors of customers are explained with examples. The author, who has access to both examples and survey results, provides in-depth information about the Turkish market [10].

It is seen in literature reviews that both e-commerce and AI are topics that are examined a lot. The frequent use of AI in the e-commerce sector, the fact that it offers very creative solutions to brands in areas such as personalized marketing, product recommendation and inventory

management systems, dynamic pricing algorithms, chatbots and virtual assistants, customer segmentation, market analysis, retargeting, and advertising, and the increasing number of these applications day by day, attract the attention of experts. The impact of AI on e-commerce has become a widely studied topic in recent literature. In this study, too, the effect of AI applications of e-commerce brands on customer loyalty and sales will be examined by using real-world examples.

3 Methodology

This research employs a qualitative case study approach supported by descriptive and comparative analysis. The study relies on secondary data obtained from peer-reviewed journal articles, industry reports, company documents, and case studies published between 2017 and 2025. Leading e-commerce brands such as Amazon, Alibaba, eBay, IKEA, Zalando, Hepsiburada, Trendyol, and LC Waikiki were selected through purposive sampling, based on their active use of AI in business processes, their significant market presence, and the availability of reliable data on their applications. This approach allows for an in-depth examination of how AI technologies are applied in different contexts and what implications they have for customer loyalty and sales.

The collected data were analyzed through comparative content analysis, with AI applications categorized under key themes such as personalized marketing, recommendation systems, chatbots, dynamic pricing, demand forecasting, and customer experience management. Each category was then linked to measurable outcomes, including improvements in customer satisfaction, retention, and purchasing behavior, as well as enhanced operational efficiency and sales performance. To ensure validity, multiple sources were triangulated, while reliability was supported by applying a consistent analytical framework across all brands. This methodology provides a structured foundation to evaluate both successful and unsuccessful AI applications, enabling a balanced assessment of their impact on e-commerce.

4 Leading E-commerce Brands and Successful AI Applications

AI has become one of the most important issues for e-commerce brands in terms of digitalization and competitive advantage. AI has provided strategic advantages to e-commerce brands in business processes such as personalized marketing, inventory management, product promotion, and dynamic pricing. Brands aiming for international success should be proactive and strategic in their use of AI. They must continuously assess how AI technologies will improve their processes and give them a competitive advantage. Leading e-commerce companies around the world are aware of the present and future importance of AI and are investing in this area to transform and develop their applications with AI. Leading e-commerce brands both in Turkey and in other countries continue their leading roles in AI as well. In this study, the AI applications of Amazon, Alibaba, E-Bay, IKEA, Zalando, Hepsiburada, Trendyol, and LC Waikiki will be explained with examples.

4.1 Amazon and AI Applications

Amazon was founded in 1994 by Jeff Bezos in the USA for selling books. Today, Amazon is one of the world's largest e-commerce companies, operating in e-commerce with Amazon.com, in the TV series/movie sector with Amazon Prime Video, and in the cloud computing service sector with Amazon Web Services (AWS), and is at the top of the Fortune 500 list. Amazon's vision is "to be the most customer-centric company in the world" , and it offers special services to its customers with AI and makes its applications more creative every day [11].

Amazon makes its customers feel that it is always with them with its shopping assistants. For example, Rufus is an assistant who shares product details and compares products [12]. Interests is another assistant that allows customers to be informed about products according to their own wishes. For instance, customers can leave a request on Interests such as "tools for nature adventurers" and get quick support with AI for products related to nature [13]. Health AI is a chatbot that recommends suitable products to patients. The personalized recommendation system is one of Amazon's most important AI applications. Offering millions of products, Amazon analyzes customers' past search history and shopping data to provide the products they are looking for without tiring them out and lists special products for its customers with the "For You" section.

In order for customers to reach the products they are looking for accurately and quickly; Amazon has set up a system where it finds synonyms of words and corrects errors with NLP (Natural Language Processing) in the search system and presents the products they are looking for to their customers. Amazon's visual search system allows customers to upload a photo to find the product they want to buy.

This feature helps customers find what they're looking for quickly, which speeds up the sales process and encourages repeat purchases. The more customers interact with the brand by creating shopping sessions, reviewing products, and making previous purchases, the more likely they are to shop again [14].

Amazon continues its pioneering role in the Metaverse environment as well. Amazon, which offers the "See in Your Room" option for furniture with its mobile application, enables the products to be seen in a virtual environment and to be perceived in their real size. In the event Amazon held with MetaWorld in India, customers create their avatars with the help of VR glasses and play digital games. With the help of points and coupons collected during the game, Amazon ensures that its customers spend time on the platform and increase their interaction with the brand, thus creating potential sales. In the game Peridot, Amazon sells products such as T-shirts and jewelry to players and continues its business with its customers in the Metaverse environment [15].

Dynamic pricing is a topic where Amazon gets a lot of help from AI. Amazon constantly updates product prices during the day by continuously analyzing competitor prices, customer behaviors, stock levels, and demographic changes. Amazon, which optimizes its profit margin with machine learning, calculates costs for its profitability goals and offers the best price to the customers. Amazon A/B tests offer the same product to different customers at different prices at the same time. For example, a watch that costs $300 for one customer costs $350 for another, and it is observed which price gets more clicks [16]. Amazon also differentiates prices according to the loyalty levels of its customers with AI. For example, the system that understands new users defines special discount codes for the first purchase and offers extra coupons to highly loyal customers. Amazon's AI tracks customers' carts and notifies them of low stock. It also helps close the sale by recommending a seller with a better price. As a result, Amazon maintains the bond it has created and continues its sales by supporting its customers with personalized products, marketing, and prices.

4.2 Alibaba and AI Applications

Alibaba is one of the world's largest e-commerce sites, founded in 1999 by Jack Ma in China, and has grown very quickly. Serving more than 200 countries, Alibaba has become one of the most powerful companies in its sector with its wide product range, wholesale sales, Alipay, logistics network, and AI-supported applications. Alibaba, which prepares proposals and business plans, writes emails, makes search suggestions, compares products, and even tells stories to children and offers suggestions with the help of Large Language Models (LLM) called Qwen, establishes quick communication with customers, and provides fast sales processes for its sellers [17].

Alibaba has established its presence in the Metaverse universe with the help of the Taobao Maker Festival. Alibaba, which allows its customers to examine and purchase products in a virtual environment, attaches importance to existing in a virtual environment and maintaining its presence in the perception of its customers. Sellers create product visuals with the help of AI while the products are still in the design phase, and get customer feedback, reducing production costs and contributing to sustainability. This is because sellers decide on production based on the number of clicks and interests from the customers. The Alipay payment system, on the other hand, detects fraud with the help of AI, creates a credit score based on customers' past purchases, and resolves seller-buyer disputes [18].

4.2 E-Bay and AI Applications

EBay is an e-commerce platform founded in the USA in 1995, where both companies and individuals can sell products. The features that differentiate E-Bay from its competitors are the auction system and the system where users can trade with each other. E-Bay, which offers products of many categories from furniture to automobile parts, also offers NFT products. E-Bay, which now offers products to more than 190 countries, is one of the e-commerce platforms that attach importance to AI. E-Bay, which uses AI in the sale of second-hand products, especially valuable works of art, detects fake products and prevents their sale. With this application, E-Bay, which prevents counterfeiting, provides trust for its customers, builds a strong bond with them, and ensures sales. E-Bay, which wants second-hand products to be easily and cost-effectively offered for sale by the user, prepares visuals with AI (background change, etc.), produces automatic videos, and makes descriptions for the products. With these features, customers also get the opportunity to easily sell their own products on E-Bay, and they are both customers and suppliers on E-Bay. E-Bay, which performs price and stock optimization through AI, detects the sales speed of products in similar categories and presents the data to sellers. In short, E-Bay sets up many AI

applications for customer satisfaction and loyalty [19].

4.3 IKEA and AI Applications

IKEA is a furniture retailer founded in Sweden and spread all over the world, with stores in 60 countries today. Ikea has affordable, modern, and simple designs. Ikea, which sells its products with the flat-pack model, offers products that customers can assemble at home, so it is one of the furniture companies with high sales through its website. Ikea has a website designed to offer the store experience to its customers. Ikea, which benefits greatly from AI, is one of the leading e-commerce brands in the sector.

Ikea, with its Place application, offers its customers 3-dimensional furniture experience with the help of AI. In the Place application, as seen in Figure 1, customers first scan the floor of their room, then select furniture and see this furniture in 3D as if it were in their room. Thanks to the application, customers who quickly imagine the product in its usage environment have a low product return rate (because they understood how it would look beforehand). This situation both increases customer satisfaction and reduces Ikea's return product costs. Similarly, with the help of a 3D Showroom, Ikea offers virtual rooms that customers can design. Customers have a pleasant time on the website with the fun, cost-free, and fast designs they make [20].



Fig. 1: Ikea Place Application
Source: [21]

The ChatGPT-supported design assistant Kreativ understands the design, budget, etc. that customers want and gives special product recommendations to them. Ikea, with the help of AI, analyzes about 200 data points (holidays, weather, etc.) at the same time to make demand forecasting studies and manages its stocks optimally [21]. In Ikea's warehouses, AI-supported drones work in an integrated way with the website and stores to constantly perform warehouse counts and identify misplacements. Ikea's chatbots, named Billie and Sofia, support customers on issues such as product search and assembly [22]. Ikea, which wants to meet the increasing sustainability sensitivity of its customers, finds waste materials with AI applications in Space10 (an IKEA-supported research laboratory) and shows them on the map. Ikea designers, on the other hand, produce products with these materials and try to make the waste meaningful for customers. At this point, Ikea makes sustainability an application, builds a bond with its customers on protecting nature, and makes sales. In short, Ikea is a leading company in the furniture retail sector with its AI applications, and provides AI training to its employees with "Hej Copilot" to apply more AI.

4.4 Zalando and AI Applications

Zalando is Europe's largest fashion e-commerce platform. The company, founded in Germany in 2008, has enriched its operations with many different categories, starting with shoe sales. Zalando, which now provides services to more than 25 European countries, works with a marketplace model and is a marketplace for many brands. Zalando, which attaches great importance to AI applications, aims to both ensure customer satisfaction and strengthen its sellers' processes.

Zalando, which has achieved success in customer service with AI, automatically analyzes the emotional state of its customers through the language they use and ensures that dissatisfaction rates decrease. Zalando, which is aware of the sustainability expectations in fashion, evaluates its products in terms of sustainability and provides customers with the opportunity to easily access sustainable products with the "eco-friendly filtering" feature. Zalando has developed a design assistant with AI to meet the expectations of the fashion sector. The assistant provides personalized style recommendations to customers, offers products in a style that suits their body type, and completes the missing part of the outfit. The assistant provides sellers with information about the latest fashion styles, trend analyses, and collections, enabling them to design products. Zalando is one of the leading brands that develops AI applications in the fashion sector. In this way, Zalando offers creative style recommendations to its customers and increases its sales by being with its customers in their outfit needs [23].

4.5 Hepsiburada and AI Applications

Hepsiburada is an e-commerce platform founded in Turkey in 1998. Today, it is one of the largest online

shopping sites in Turkey. Hepsiburada is a platform that continues its business with a marketplace model, selling its own products as well as the products of third-party sellers. Hepsiburada tries to ensure customer satisfaction by selling millions of products with thousands of sellers. Hepsiburada performs logistics and delivery services with "Hepsijet," payment transactions with "Hepsipay," and high-level subscription transactions with "Hepsiburada Premium" [24].

Hepsiburada was publicly offered on the NASDAQ stock exchange in 2021 and gained the title of the first e-commerce company from Turkey to be listed on NASDAQ. Two of the most important strengths that differentiate Hepsiburada from its competitors and lead to such successes have been the importance it attaches to customer satisfaction and its continuously developing digital transformation applications. Hepsiburada is one of the e-commerce platforms that attaches great importance to AI. Hepsiburada, with its ChatGPT integration, automatically analyzes the comments made by its customers on the products and services they have purchased. Hepsiburada's impartial evaluation and its provision of a summary "evaluation summary" for each product have been the first example in Turkey. AI, which selects keywords in the comments, ensures that customers see the comments of other users and trust the product they will buy, thus persuading the customer to buy the product and make the sale [25].

Another application where Hepsiburada uses AI efficiently has been the "Smart Shopping Chef". Customers who summarize the recipe of the meal they want to make can add the ingredients to their cart with one click with the help of the Smart Shopping Chef. The chef, supported by ChatGPT, has succeeded in making meal preparation practical for customers, thus ensuring the sale [26]. Hepsiburada also benefits greatly from AI during campaign periods. In the campaign period, it named "Legendary Youth," designs made with AI are supported through the AI laboratory "MidJourney" to appeal to customers aged between 15-25 and have developed the bond of young people with the brand and ensured sales.

Hepsiburada has also developed algorithms to help its customers find the products they are looking for more accurately and quickly with smart search support. Hepsiburada guides its customers not only with smart search but also with personalized product recommendations. For example, new products are recommended to customers who frequently shop for electronics based on their past purchases.

The "Hepsiburada Çekbul" application is a system where a customer who sees a product on another user can upload a photo of the product to the mobile application and reach the product with the AI working in the background. With all these AI applications, Hepsiburada has managed to establish superiority over its competitors and is increasing its investments in this area [27].

4.6 Trendyol and AI Applications

Trendyol, a company founded in 2010 and Turkey's first Decacorn (a technology company with a valuation exceeding $10 billion) company and e-commerce platform, has a strong sales volume with more than 80 million products and delivery to more than 100 countries. As of 2021, Alibaba Group has the largest partnership share in the company with a 70% stake. Trendyol, which has a logistics network called "Trendyol Express" and a food and grocery service called "Trendyol Go," serves millions of customers [28].

Trendyol, which has one of Turkey's leading R&D centers called "Trendyol Tech," stands out with its innovative strategies and AI applications. Trendyol serves its customers with an AI-supported Chatbot. The AI assistant named AITEN, offers kitchen tips, cleaning suggestions, etc. Trendyol, which tries to provide uninterrupted and correct communication with its customers with Chatbot and AITEN, tries to increase customer satisfaction and sales [29].

Trendyol Germany, which optimizes product titles by using image recognition with Vision AI and language model technology with Google Gemini, is another successful AI example. Trendyolmilla, Trendyol's successful brand in fashion, is also a pioneer in the use of AI in the fashion sector. Using AI and guiding commands (prompts), the Trendyolmilla design team created a three-dimensional product and mannequin. This project is highlighted as a model study for the fashion industry, as illustrated in Figure 2. Trendyolmilla, which offers alternative products and fabrics from shoes to dresses, produces fashion trends by reducing greenhouse gas emissions and manages to attract the attention of its customers' developing sustainability awareness [30].

Using AI, Trendyolmilla quickly delivered on customer expectations for segmentation and personalization, all without physical production, which prevented waste. Trendyol, while increasing the bond with its customers via its AI applications, also increased its sales.



Fig. 2: Trendyolmilla and AI
Source: [30]

4.7 LC Waikiki and AI Applications

LC Waikiki (LCW) is one of Turkey's fashion giant brands and operates worldwide. The company, which has the slogan "Good dressing is everyone's right," sells fashion and home textile products in more than 60 countries with its affordable fashion approach. LCW, which transforms its processes with developing technology, benefits from AI. LCW has a digital style consultant, "Elsiva". While Elsiva provides styling and consultancy services free of charge, it offers personalized combinations and product recommendations to those who want to have style with its AI algorithm [31].

LCW also offers a visual search option for its customers. This enables its customers to reach the product they are looking for without wasting time. Aiming to lower its return rate, LCW employs AI to communicate with customers about their reasons for returning items. The company analyzes this feedback to better understand issues, allowing it to improve product quality and streamline its logistics and inventory processes. LCW, which has created its presence in the Metaverse environment as seen in Figure 3, offers its virtual store in a way that is compatible with computer games. LCW, which offers its products in 5 different themes, such as Anime and Waikiki beach, enables its customers to collect coupons by playing games and provides support to customers for sales [32].

LCW designers design products in 3D and get support from AI on issues such as patterns with GEN AI. LCW, which attaches importance to customer experience, strengthens its bonds with its customers and increases sales with AI applications.



Fig. 3: LCW Metastore
Source: [32]

5 AI Applications In Campaign Periods and Special Days

With digital transformation, consumers' purchasing processes are transforming, and the trend towards e-commerce is increasing. In e-commerce, there is a sales peak, especially during certain periods. These periods are special days and discount periods. They are New Year, Valentine's Day, Mother's Day, Father's Day, back-to-school, Black Friday (the last Friday of November), Cyber Monday (the Monday after Black Friday), religious and national holidays, and mid-year periods. In these periods, customers' demands show a great increase, and brands work in an extraordinary way with all their departments to meet customer demands and increase sales.

E-commerce brands that want to provide seamless service to their customers by performing operational processes in the most efficient way and optimizing their profits during such periods benefit greatly from AI. Brands offer special products to customers during campaigns and special days with the help of personalized recommendation systems. For example, products frequently purchased on Mother's Day are presented to customers by matching them with their search history. For example, a pasta maker is recommended to a customer who researched kitchen products close to Mother's Day. In this way, customers find the products they are looking for quickly and make the purchase.

Dynamic pricing is another important topic because the market has competitive prices during these periods. Brands evaluate these periods as times when purchases will definitely be made and are actually interested in what market share they will have. With dynamic pricing, products are offered for sale at the most optimal price by analyzing stock management, customer behaviors, and competitor prices. Prices change instantly with any data.

In 2017, Amazon, which used dynamic pricing, updated the prices of 28% of its products [33]. Stock and demand forecasting, on the other hand, provides brands with information about the amount of stock they should keep and the warehouse location based on past sales and click-through rates. Thus, brands manage their stock costs correctly and prevent out-of-stock problems. During sales and special campaigns, chatbots and AI assistants play a vital role in customer service. They instantly handle the high volume of inquiries and tasks that human staff cannot manage, allowing brands to meet the demands of millions of customers. This situation allows customers to shop seamlessly and practically, increasing customer loyalty and making sales.

Especially with different products going on sale during periods like Black Friday, customers turn to different products. At this point, it is important to do marketing that will direct customers to the right products. With tools like Google Ads, brands analyze which products to advertise to which customers and prevent unnecessary advertising expenses. A customer who sees a product from another customer and is impressed and wants to buy it can find it with the visual search method by taking a photo, which is an AI application, and an advantage that speeds up customers during tight campaign timings.

Intense campaign periods are dangerous times for attempts at cybercrime, as cybercriminals think that the customer and the brand will be busy during these periods, specifically target both of them. In these moments, AI analyzes the processes that are progressing abnormally, informs the customer and the brand, and stops the transactions. As a result, campaigns and special days are periods when customers turn to e-commerce very often, and great demands that cannot be met by human power are managed very successfully with the help of AI.

6 E-Commerce Brands and Unsuccessful AI Applications

The use of AI by e-commerce brands is increasing rapidly every day. In addition to countless successful examples of AI applications in areas such as pricing, stock management, personalized recommendation systems, and marketing, there are also unsuccessful results from applications that are implemented quickly and without completing the necessary tests. For example, the Chatbot developed by North Face with IBM Watson did not give the expected performance in product recommendations, which disappointed both customers and the company. It recommended the wrong sizes to customers and frustrated them [34].

E-commerce brands aim for customers to find the right product quickly with chatbots and assistants, but unsuccessful applications cause customers to waste time and decrease sales. Another example of failure was Target's prediction that a young woman was pregnant by analyzing her past behaviors with AI and sending her promotions. The young woman's family defined this situation as a privacy violation, and the brand was criticized by its customers, which harmed the brand's bonds with its customers and its sales [35]. Tesco's dynamic pricing with AI and offering different prices for the same product to different customers at the same time has hurt the trust of customers who noticed this situation. Customers who thought the prices were unfair reduced their purchases from the brand, and their loyalty was damaged [36].

When the common points of unsuccessful AI applications are examined, it is understood that they are generally caused by data biases, chatbots not being able to fully understand customers 'interests, expectations), insufficient user interfaces (UX/UI), excessive personalization, and privacy violations. Taking both good and bad examples of AI into account, e-commerce brands are working to implement their own AI strategies. By analyzing user comments, conducting advanced tests, and performing forecasting studies, they're taking more secure steps to develop their AI systems.

Beyond these illustrative cases, the implications of unsuccessful AI applications extend directly to firms' competitive positions in e-commerce. When AI tools fail to deliver accurate, fair, or context-sensitive results, the very advantages that make AI attractive—such as personalization, automation, and predictive accuracy—can turn into liabilities. For instance, biased algorithms or opaque recommendation systems can erode consumer trust and reduce engagement, while malfunctioning chatbots or misaligned dynamic pricing systems can offset the gains achieved from efficiency and personalization. Consequently, the lesson from these failures is not only the technical need for better data governance and model testing, but also the strategic importance of embedding ethical and user-centric principles into AI development. Integrating a feedback-driven, transparent approach ensures that AI continues to strengthen customer relationships rather than jeopardize them, aligning technological performance with sustainable e-commerce competitiveness.

7 Summary of AI Application Findings by Category and Brand

To facilitate clearer comparative inference, this section synthesizes the specific findings and qualitative outcomes of the AI applications across personalized marketing, recommendation systems, chatbots, dynamic pricing, demand forecasting, and customer experience management categories for each of the leading e-commerce brands, moving beyond individual case narratives. Table 1 (Appendix) explains the summary of AI application findings, combining the core application and its primary qualitative outcome for key e-commerce brands.

8 Conclusions

With developing technology, business processes are transforming and digitalizing. One of the most important tools of this digitalization is AI. E-commerce is an active platform where customers are in contact and sales are made 24/7. E-commerce brands frequently use AI applications to increase their bonds with customers as well as increase sales. Customers want to make their purchases quickly, efficiently, safely, and sustainably, and expect applications from brands in this direction. E-commerce brands that want to meet the expectations of their customers and establish a dynamic and sincere bond with them attach great importance to this and invest in AI at this point.

With AI, e-commerce brands support and grow their businesses with creative applications in personalized marketing, advanced customer segmentation, dynamic pricing, chatbots and virtual assistants, stock management and demand forecasting, product recommendation systems, product promotions, fraud detection, and security. E-commerce brands care about their relationships with sellers as much as they care about their strong bonds with customers. With AI, brands support their sellers for their strategic decisions and operational processes by providing them with automatic reports and analyses.

Among successful examples are Amazon's personalized recommendation systems, Alibaba's Large Language Model, IKEA's Place application, Hepsiburada's Çekbul application, Trendyol's assistant named AITEN, and LCW's Metaverse experience. In campaign periods and on special days, AI applications play a critical role for e-commerce brands that want to meet intense demand and provide quality service. With demand forecasting, product recommendations, automatic advertisements, and dynamic prices, e-commerce brands demonstrate their competitive structure during campaigns and special days and get the opportunity to show themselves to their customers. In addition to successful examples, there are also unsuccessful examples due to reasons such as excessive personalization or privacy violations. The study mentions unsuccessful applications with examples such as the chatbot developed by North Face with IBM Watson and Target's customer behavior analysis.

AI has countless application examples that can be considered new and are still being developed every day by both e-commerce brands and companies from different sectors. E-commerce companies are accelerating their AI development and setting strategic goals to achieve digital transformation. Their aim is to better know their customers, meet their needs, and offer the most effective sales and marketing solutions.

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APPENDIX

Table 1. Summary of Key AI Applications and Qualitative Findings Across E-commerce Brands (by Category)

AI Category	Brand	Specific AI Application	Key Finding/Outcome (Qualitative Metric)
Personalized Marketing	Amazon	"Interests" Assistant; Loyalty-based Pricing	Inform customers about products based on personal wishes/hobbies.
	Trendyol	Trendyolmilla Design Team	Meets customer expectations for segmentation and personalization quickly, avoiding waste from physical production.
Recommendation Systems	Amazon	Personalized Recommendation System; "For You" Section	Analyzes past search/shopping data to accurately and quickly provide products, listing special products to reduce customer effort.
	LC Waikiki	Elsiva (Digital Style Consultant)	Provides free, personalized combination and product recommendations to customers seeking style and fashion advice.
	Hepsiburada	Personalized Product Recommendations	Guides customers by recommending new products based on past purchase history (e.g., electronics).
Chatbots	Amazon	Rufus (Generative AI Assistant); Health AI	Shares product details, compares products, and recommends suitable products to patients.
	Ikea	Billie and Sofia Chatbots	Supports customers with product search and assembly inquiries.
	Trendyol	AITEN (AI Assistant)	Provides kitchen tips and cleaning suggestions, striving for uninterrupted and correct communication to increase customer satisfaction and sales.
Dynamic Pricing	Amazon	Dynamic Pricing Algorithm; A/B Testing	Constantly updates product prices by analyzing competitor prices, customer behavior, and stock levels to optimize profit margin and offer the best price.
Demand Forecasting	Ikea	AI Data Analysis	Analyzes approximately 200 simultaneous data points (e.g., holidays, weather) to perform demand forecasting and manage stocks optimally.
	E-Bay	Price and Stock Optimization	Detects the sales speed of products in similar categories to provide data to sellers.
Customer Experience Management	Ikea	Place Application; 3D Showroom	Allows customers to see 3D furniture in their own room before purchase, leading to a low product return rate and increased customer satisfaction.
	Alibaba	Visuals for Pre-production	Sellers generate product visuals with AI before design is final, getting customer feedback to reduce production costs and contribute to sustainability.
	Hepsiburada	ChatGPT-integrated Comment Analysis; Smart Shopping Chef	Provides customers with an impartial, summarized "evaluation summary" of product comments to build trust and persuade purchases.
	Zalando	Customer Service AI	Automatically analyzes the emotional state of customers through language used, which helps in ensuring that dissatisfaction rates decrease.
	E-Bay	Counterfeit Detection	Detects fake products, especially valuable art, preventing their sale, which provides trust for customers and builds a strong bond.
	LC Waikiki	Visual Search; Return Feedback Analysis	Allow customers to reach the product they are looking for quickly, without wasting time.
	Amazon	Visual Search; NLP in Search	Allow customers to upload a photo to find the product they want to buy, which speeds up the sales process and encourages repeat purchases.

Source: created by the authors.