

Impact of Artificial Intelligence (AI) in Firm Performance: Case Study on E-Commerce Companies in Vietnam

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ABSTRACT: This research employs the impact of Marketing Artificial Intelligence (AI) on the long-term financial performance of Vietnam's e-commerce companies, explore the mediating roles of customer engagement, satisfaction, loyalty, and data-driven decision-making, and examine their direct effects on sustainable financial performance. The data was collected via online surveys from February to May 2025 from these companies. Structural Equation Modeling (SEM-PLS) was employed to analyze relationships between Marketing AI, mediating factors, and financial performance. The research results indicate that Marketing AI significantly enhances customer engagement, data-driven decision-making, satisfaction, and loyalty, indirectly supporting sustainable financial performance. Customer satisfaction directly improves financial outcomes, while engagement, loyalty, and data-driven decision-making lack direct impacts. In conclusion, integrating AI-driven personalization with customer-centric strategies is crucial for competitive advantage and sustainable growth. The study recommends that Vietnamese e-commerce businesses prioritize personalized marketing and quality service to boost customer satisfaction, thereby optimizing financial performance. This research enriches understanding of AI's role in e-commerce and provides practical insights for industry practitioners.

KEYWORDS: Artificial Intelligence, E-commerce Company; Firm Performance; Customer Satisfaction; Vietnam

I. INTRODUCTION

With the global digital economy evolving rapidly, Vietnam's e-commerce industry is facing an important crossroads, both a golden opportunity and unprecedented challenges. With a market value reaching 21 billion USD by 2023 and a growth rate exceeding 25% per year since 2021, Vietnam has emerged as a bright spot in the Southeast Asian region (Vecom, 2023). Forecasts from the Vietnam Digital Economy Summit 2024 show that this figure could soar to 43 billion USD by 2025, thanks to an internet penetration rate of 73.2% (World Bank, 2024). However, behind this impressive development is fierce competition between "giants" such as Shopee, Lazada, and Tiki, along with the pressure to meet consumers' growing demand for personalized shopping experiences and sustainability. Currently, the Vietnamese e-commerce industry is facing a turning point. Businesses need to apply modern technology to promptly respond to the continuous changes of the market (Nguyen, 2024). A report from Google and Temasek (2023) also revealed that 68% of Vietnamese consumers in 2023 expect personalized shopping experiences, but many businesses still face barriers in implementation costs and a shortage of skilled human resources. In that context, artificial intelligence (AI) in marketing, with tools such as predictive analytics, is emerging as a breakthrough solution, helping to improve customer engagement, satisfaction, and loyalty, while optimizing data-based decisions. Dealing with these factors is not only an inevitable trend but also a critical need for the sustainable growth of Vietnam's e-commerce industry in the current era.

Vietnam's e-commerce industry is facing a strategic turning point, where increasing competitive pressure forces businesses to prioritize sustainable financial performance, and artificial intelligence (AI) in marketing becomes an indispensable tool to achieve this. According to Minh (2025), thanks to strong growth, the two platforms Shopee and TikTok Throughout 2024, Shop has maintained and strengthened its prominent position in the Vietnamese e-commerce landscape, reaching a record GMV of 13.82 billion USD, up 40% compared to 2023, showing the strong appeal of online shopping. However, to maintain this growth momentum, the industry needs to overcome the challenge of profitability and meet the increasing demand for personalization from consumers. According to Nguyen (2023), 70% of Vietnamese customers expect platforms to accurately predict their preferences, emphasizing the potential of technology in improving business efficiency. The industry's biggest challenge today

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revolves around balancing high operating costs and long-term profitability. According to Hoang (2023), e-commerce businesses in Vietnam spend an average of 25% of their marketing budget on acquiring new customers, but only 34% of customers return to shop a second time, indicating inefficiency in building loyalty. These figures emphasize the challenges businesses face in optimizing their finances, especially as consumers increasingly expect faster services and products that are more personalized to their needs. Without the intervention of advanced technologies such as AI, the industry is at risk of falling into an unsustainable growth spiral. AI in marketing is demonstrating its significant impact in tackling these challenges and enhancing the financial performance of Vietnam's e-commerce sector. According to Ngo (2024), businesses applying AI help increase productivity by 25–40% in sales, personalize customer experiences to increase revenue by 5–10%, and support employees to work more effectively. According to Ho (2025) noted that AI chatbots handle more than 2 million customer requests per month on major platforms, improving response time by 60% and increasing customer satisfaction by 30%. These figures show that AI is not only a cost optimization tool but also a driving force to build a sustainable financial model, helping the Vietnamese e-commerce industry overcome challenges and thrive in the future.

II. LITERATURE REVIEW

Theoretical background

Artificial Intelligence in marketing (AIM) refers to the application of AI tools such as data collection, data analysis, machine learning (ML), and natural language processing (NLP) to gather valuable customer insights, automate key marketing decisions, and optimize marketing strategies. (Flinders and Hayes, 2024). Today, AI is increasingly utilized to create content, streamline team workflows, enhance customer engagement, and deliver more precise outcomes (Flinders and Hayes, 2024). AIM helps businesses accurately predict customer needs and create value propositions through AI-powered co-creation tools (Bag et al., 2021). These solutions improve marketing promotions and reduce human errors. Businesses can leverage AIM to enhance marketing analytics, target prospects, predict consumer behavior, and deliver contextual value to enhance customer experiences (Kazmi et al., 2021).

Customer Engagement (CE) refers to the level of interaction and connection between a customer or potential customer and a brand, including its products, services, or related activities. This engagement goes beyond the purchase transaction and includes participation in brand-related communities or social networks (Vivek et al., 2014). Research by Pansari and Kumar (2017) highlights that satisfaction, emotional connection, and active participation are essential factors that drive customer engagement. In the growth marketing arena, building strong customer bonds is critical to long-term success. Proactive engagement not only helps brands build loyalty and expand their reach, but also provides valuable feedback for continuous improvement. Engaged customers can also increase a brand's presence on social media platforms, attracting more new customers (Mehta, 2023).

Data-Driven Decision Making (DDDM) is increasingly becoming a core element for businesses to enhance performance and maintain competitive advantage in the modern business environment (Garcia & Adams, 2023). Instead of relying on intuition or subjective experience, organizations leverage data to make more accurate decisions, thereby optimizing operational processes, increasing productivity, and minimizing risks (Rustandy et al., 2023). Research by Brynjolfsson and McElheran (2016) reinforces this, showing that companies that adopt DDDM are approximately 5-6% more productive than those that do not use this method. In particular, in the context of customers increasingly expecting personalized experiences, DDDM plays an important role in helping businesses understand customers' needs, preferences, and consumption behaviors, thereby building more effective marketing strategies and improving user satisfaction (Kamal & Himel, 2023).

Customer satisfaction reflects the degree to which a customer's experience with a product or service aligns with or surpasses their expectations (Razak & Shamsudin, 2019). According to Shamsudin et al. (2018), customer satisfaction is influenced not just by the quality of the product but also by the overall experience throughout the buying journey, including the stages before, during, and after the purchase. Similarly, Chicu et al. (2019) argue that customer satisfaction goes beyond simply fulfilling basic needs, incorporating elements of surprise and positive experiences that foster an emotional connection with the business. In the current highly competitive marketplace, ensuring customer satisfaction has become essential for fostering brand loyalty and shaping future buying decisions. It serves as a key factor in helping businesses retain their customer base, sustain market presence, and improve overall financial performance (Hirata, 2019).

Customer loyalty is the ongoing preference a customer shows towards a specific brand or company, evident in their repeated purchases and positive actions like recommending the brand to others through word-of-mouth (Rane et al., 2023). This loyalty often results from positive experiences and satisfaction with a company's products or services. Rane et al. (2023) highlight that customer loyalty is a crucial driver of business success, shaped by important elements like customer satisfaction, the quality of services provided, overall customer experience, and effective management of customer relationships. Strengthening these areas strategically can enhance customer loyalty and drive profitability. However, building and maintaining loyalty is an ongoing challenge.

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Financial performance is the evaluation of a company's financial health and profitability over a specific period. It is measured using financial metrics such as revenue growth, net profit, earnings per share (EPS), return on investment (ROI), and cash flow. These indicators help investors, managers, and stakeholders assess a company's efficiency, stability, and growth potential (Brealey, Myers, & Allen, 2020; Ross et al., 2022). According to Tudose et al. (2022), financial performance is a complex idea that includes different factors like how a company is managed, its finances, accounting, how it's run by leaders, and economic factors at the business level. He argues that organizational performance includes four main aspects: profitability, liquidity, growth and stock market performance. Egbunike and Okerekeoti (2018) highlight that financial performance encompasses factors like how efficiently and effectively a company utilizes its resources.

Research hypothesis development

Marketing Artificial Intelligence and Customer Engagement

Artificial intelligence is widely used to improve operational efficiency and customer engagement (Prentice & Nguyen, 2020). One of the most important applications of AI is AI-powered personalization, which has had a significant impact on consumer engagement metrics. According to a study by McKinsey & Company (2021), tailored recommendations have the potential to boost conversion rates by as much as 20% and decrease cart abandonment by offering consumers more relevant deals. Furthermore, personalized marketing is associated with increased customer satisfaction and improved overall experiences, which helps build deeper brand relationships (Sharma et al., 2024). A key factor contributing to the effectiveness of AI in personalization is its ability to perform tasks with increasing precision over time. AI tools that use machine learning, deep learning, or generative AI can assist users in finishing tasks faster and with greater precision (Huang & Rust, 2021; Xie et al., 2022). Additionally, AI-driven marketing enhances business sustainability by enabling companies to make data-driven decisions and optimize customer engagement strategies (Magableh et al., 2024). However, another study by Gao et al. (2024) indicates that AI streamers often struggle to meet individual needs due to ambiguous responses, unclear goals, or limited availability, leading to more negative perceptions than human streamers. Meanwhile, human streamers are better able to provide personalized services, which can meet functional needs more effectively (Zheng et al., 2023).

H1: Marketing artificial intelligence has a significant impact on customer engagement

Marketing Artificial Intelligence and Data Driven Decision-Making

Data-driven decision-making (DDDM) helps businesses optimize performance by quickly analyzing information, identifying trends, and accurately adjusting marketing strategies (Verhoef et al., 2016). Artificial intelligence (AI) is crucial in automating this process, processing data at scale without manual intervention and reducing decision-making time. For example, businesses can use AI-driven chatbots and virtual assistants to provide continuous customer support (Chen et al., 2023), ensuring immediate responses to inquiries and customized product recommendations (Rosário et al., 2024a; Rosário et al., 2024b). In addition, AI also supports content creation and improves customer service quality through consumer sentiment analysis, thereby better personalizing interactions (Guercini, 2023). In addition, this technology can handle huge amounts of data while maintaining precision in targeting and improving customer engagement (Witten et al., 2011). Leveraging AI for data analysis allows businesses to build highly personalized marketing campaigns, drive customer engagement, increase conversion rates, and enhance brand loyalty (Sarin & Sharma, 2024). However, another study by Gathani et al. (2018) indicates that many participants struggled with collaboration due to a lack of domain knowledge and ineffective communication. A participant noted that outdated spreadsheets were difficult to reproduce, sometimes requiring contact with the original creator. While BI tools like Tableau support data exploration, a participant stated they lack hypothesis validation, and another found them cumbersome, requiring developer support and extensive training. A BI company employee admitted their tool had a steep learning curve. Due to a shortage of analysts, business users must conduct their own analyses despite struggling to communicate with technical teams.

H2: Marketing artificial intelligence has a significant impact on data-driven decision-making

Marketing Artificial Intelligence and Customer Satisfaction

Customer satisfaction is assessed by comparing expectations before using a product or service and the experience after using it (Eshiett et al., 2021; Kotler & Armstrong, 2018). When the experience meets or exceeds expectations, customers tend to feel satisfied (Farris et al., 2010). Hennig-Thurau et al. (2022) argue that AI can analyze consumer behavior to personalize experiences, and help customers find more suitable products or services, thereby increasing satisfaction. AI helps businesses improve customer satisfaction by providing personalized experiences, thereby strengthening long-term relationships with customers (Magableh et al., 2024). In addition, AI allows businesses to mine data from social networks, evaluate customer feedback, and provide quick responses, helping to enhance the bond between businesses and customers (Christopher et al., 2013). Modern customers seek mass-produced products and desire unique and personalized experiences (Appel et al., 2020). However, it's important to acknowledge that using artificial intelligence and social media in relationship marketing comes with several

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challenges (Tuten & Solomon, 2017). One of the major concerns is data privacy, when businesses collect and use personal information for marketing personalization, which requires strict compliance with legal and ethical regulations to avoid undermining customer trust (Steinhoff & Palmatier, 2021).

H3: Marketing artificial intelligence has a significant impact on customer satisfaction

Marketing artificial intelligence and customer loyalty

According to Jain et al. (2024), as individuals engage with AI-driven applications across various platforms and business models, it is essential to examine how these interactions influence key aspects of consumer behavior, such as personality, attitude, engagement, decision-making, and trust. AI plays a vital role in enhancing customer loyalty, especially through personalized marketing (Bedi et al., 2022). Magableh et al. (2024) emphasize that the implementation of personalized marketing strategies, facilitated by AI, significantly enhances customer satisfaction and fosters deeper emotional connections with brands, thereby strengthening customer loyalty. By using data analytics algorithms, businesses can identify individual preferences, behaviors, and shopping habits (Patel & Trivedi, 2020; Yau et al., 2021). However, Davenport et al. (2020) suggests that when customers realize they are interacting with a chatbot, they may feel uncomfortable, which reduces their level of engagement with the brand. Additionally, skepticism about AI, especially as technology moves closer to context awareness, can hinder user trust and adoption (Chen et al., 2022). Customers also often have unrealistic expectations of AI, leading to frustration when technology does not perform perfectly (Gray, 2017).

H4: Marketing artificial intelligence has a significant impact on customer loyalty

Customer Engagement and Financial Performance

Pansari and Kumar (2017) argue that customer engagement (CE) is crucial for strengthening various brand metrics, such as building trust, fostering commitment, increasing customer satisfaction, enhancing loyalty, and improving brand recall. This not only helps businesses retain existing customers but also attracts new customers, thereby improving financial performance. In addition, CE can promote customer loyalty and satisfaction through investment in customer relationships (Brodie et al., 2013; Hollebeek et al., 2016; Pansari & Kumar, 2017). Moreover, Magableh et al. (2024) suggest that customer engagement plays an important role in helping businesses stay financially strong in the long run. By building closer relationships with customers, encouraging them to come back, and turning them into loyal supporters, businesses can grow steadily and stay ahead of their competitors. However, according to Su et al. (2023), negative customer sentiment, as expressed through online reviews, can adversely affect a company's stock returns, highlighting the financial repercussions of poor customer experiences. Similarly, Rahman et al. (2022) found that negative customer engagement incidents negatively impact brand equity, leading to diminished financial performance metrics such as Tobin's q and Market Value Added (MVA).

H5: Customer Engagement has a significant impact on Financial Performance

Data Driven Decision-Making and Financial Performance

In numerous organizations, Data-Driven Decision Making (DDDM) has emerged as the central approach to inform decision-making processes. By leveraging data and analytics, companies can make better-informed decisions, which in turn leads to enhanced outcomes and more efficient strategies (Brynjolfsson & McElheran, 2016; Elgendy et al., 2022). Companies that implement DDDM typically experience greater profitability, enhanced efficiency, and a boost in market worth (Brynjolfsson et al., 2011). As a result, numerous companies have heavily invested in data analytics to secure a competitive advantage and enhance their financial outcomes (Provost & Fawcett, 2013; Sheng et al., 2017). Data-Driven Decision Making (DDDM) is the use of data analytics to guide strategic and operational decisions. Instead of relying on intuition, this approach leverages objective information to ensure rational, transparent, and flexible decisions (Emma, 2024). Magableh et al. (2024) further argue that the value of data-driven decision-making lies not only in its technical implementation but also in how it strategically aligns with organizational goals to support long-term financial sustainability. However, Sharma et al. (2015) found that the primary impact of data analytics is on decision-making, but it does not guarantee improvement in organizational financial performance. In addition, Cao et al. (2015) found that developing data-driven information processing capabilities requires appropriate design of processes and strategies, otherwise financial performance may not increase. The adoption of DDDM sometimes does not bring about obvious financial benefits in the financial industry due to a lack of skills and process adjustments Brynjolfsson and McElheran (2019).

H6: Data Driven Decision-Making has a significant impact on Financial Performance

Customer Satisfaction and Financial Performance

Eklof et al. (2020) found that, within the service industry, businesses that achieve higher customer satisfaction levels are more likely to perform better financially. This is evident in key financial indicators such as Return on Assets (ROA) and Return on Equity (ROE), which show a positive correlation with customer satisfaction. Similarly, Berraies and Hamouda (2018) found that when customers are more content with products and services, the company's financial performance also sees a significant improvement. Managers in their study also reported that firms with high customer satisfaction tend to have an edge over their

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competitors. In addition, Ali et al. (2019) emphasized that when customer expectations are considered an important part of overall satisfaction, this factor can have a direct positive influence on the financial performance of the firm, especially in strategies related to corporate social responsibility. However, the study by Du et al. (2025) analyzed over 18 million product reviews on JD.com, finding that negative trends in customer ratings can adversely affect stock returns, indicating that customer dissatisfaction may negatively impact a company's financial performance. According to Otto et al. (2020), while customer satisfaction is generally beneficial, in some cases, dissatisfaction (or low satisfaction levels) can lead to reduced financial performance, particularly when companies fail to address negative feedback promptly. The authors emphasize that the costs of remedying dissatisfaction, such as increased marketing or service expenses, may exceed the financial benefits, resulting in a prolonged negative impact.

H7: Customer satisfaction has a significant impact on financial performance

Customer Loyalty and Financial Performance

According to Magatef (2015), loyal customers significantly improve financial performance by consistently choosing a company's products or services over competitors, creating a steady stream of revenue that enhances long-term profitability. Their willingness to pay a premium, driven by trust and satisfaction, directly increases profit margins, especially in retail (Kandampully et al., 2015). Retaining these customers costs much less than acquiring new ones, leading to reduced marketing costs and improved financial performance (Lemon & Verhoef, 2016). Positive word of mouth from loyal customers also drives organic growth, expanding market share without additional advertising costs (Hanaysha, 2017). Khan et al. (2021) further emphasize that effective loyalty programs can enhance customer repurchase intention, which strengthens financial performance by ensuring a consistent revenue flow, particularly in competitive service industries. Similarly, Hossain et al. (2021) argue that customer loyalty, fostered through high service quality, indirectly boosts financial outcomes by encouraging recommendation behaviors that attract new customers at no additional cost. However, Song et al. (2022) argue that loyalty programs can negatively impact profitability if maintenance costs exceed incremental revenue. An analysis of food retail data shows that some product categories suffer from reduced profit margins due to heavy discounts and operating costs, undermining overall efficiency. Additionally, Kandampully et al. (2015) warn that an over-focus on retaining loyal customers can lead to complacency. This can stifle innovation and adaptability, indirectly harming long-term financial performance as competitors gain market share with more innovative products. Another study by Magatef and Tomalieh (2015) highlights that poorly designed loyalty programs can be counterproductive, leading to customer dissatisfaction and reduced financial returns.

H8: Customer loyalty has a significant impact on financial performance

III. RESEARCH METHODOLOGY

Data collection

To gather reliable and relevant data for this study, the survey is conducted among employees in Vietnam's e-commerce industry. Respondents work across various departments, including marketing, finance, and operations, ensuring they have insights into the key factors influencing a company's sustainable financial performance. The sample size is expected to be 250–300 participants, which is sufficiently large to support statistical analysis and ensure the accuracy of findings. Surveys will be distributed to e-commerce businesses throughout Vietnam, with a particular focus on regions where online commerce significantly contributes to the economy. The selection process for participating companies is carefully managed to guarantee their consent and the active participation of employees in the survey.

Research Method

To conduct this research, the researcher may adopt a multi-step pathway including empirical testing, opinion surveys, case studies, action research, data-driven theory building, field observations, and archival literature (Saunders, Lewis & Thornhill, 2019). The following are possible steps: First, an extensive review of existing sources will be conducted to explore concepts, theoretical models, and previous empirical results related to improving sustainable financial performance in e-commerce. Then, based on what has been discovered, the researcher will build a theoretical structure or a diagram explaining the factors that are likely to impact long-term financial development in the field of e-commerce. Next, the prediction will be tested through practical data. The researcher can use questionnaires to collect information and then process the data using quantitative analysis tools to determine the accuracy of the proposed predictions. Alternatively, a comparative approach could be taken by contrasting the financial performance of e-commerce businesses in Vietnam with that of other countries in the Southeast Asian region, based on available data. For example, differences in customer satisfaction or the effectiveness of AI use in marketing could be examined across markets. This analysis would help to shed light on the key drivers of financial sustainability and suggest effective practices that could be adopted by other countries. Overall, the research strategy for exploring the factors influencing sustainable financial performance in e-commerce will depend on the research question, available data sources, and a quantitative approach. Focusing

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solely on quantitative methods, such as surveys and data analysis, will provide a robust and measurable understanding of the topic.

Research Model



Figure 1. Research model

Table 1. Variables under the research model

ORDER	QUESTION	CODE
MARKETING AI		
1	AI helps businesses analyze and accurately predict customer shopping behavior	MAI1
2	AI effectively supports business promotion and marketing activities	MAI2
3	Using AI has helped businesses enhance brand recognition	MAI3
4	AI allows businesses to personalize marketing activities to each customer	MAI4
5	Businesses have improved their data analysis and decision-making capabilities thanks to artificial intelligence (AI)	MAI5
CUSTOMER ENGAGEMENT		
1	The company actively seeks and encourages customer feedback to improve its services and products	CE1
2	The company develops personalized communication strategies to effectively interact with customers	CE2
3	The company's customer engagement initiatives have increased customer loyalty and retention	CE3
4	Customers perceive the company as a business that is responsive and attentive to their needs	CE4
5	The company's customer engagement initiatives have contributed significantly to the growth and success of the business	CE5
DATA - DRIVEN DECISION MAKING		
1	The company invests in advanced technologies to support data-driven decision making	DDDM1
2	The company's decision-making processes are guided by accurate and up-to-date data analysis	DDDM2
3	The company regularly monitors key performance indicators (KPIs) to assess the success of its strategies	DDDM3
4	Data-driven decision making has contributed to improved efficiency and productivity in the company's operations	DDDM4
CUSTOMER SATISFACTION		
1	Customers' interactions with company employees contribute positively to their overall satisfaction	CS1
2	Customers are generally satisfied with the quality of the services or products provided by the company	CS2
3	The company consistently meets or exceeds customers' expectations for service quality	CS3
4	The company resolves any customer issues or complaints promptly and effectively	CS4
5	Customers recommend the company's services or products to others based on their level of satisfaction	CS5
CUSTOMER LOYALTY		
1	Customers say positive things about the company	CL1
2	Customers recommend the company to friends and family	CL2
3	The company is reliable in providing service	CL3
4	Customers intend to continue using the company's products	CL4
5	Customers have a strong preference for the company	CL5

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FINANCIAL PERFORMANCE		
1	You are satisfied with the financial performance of the company you work for	FP1
2	The company you work for has shown steady growth in revenue and profits	FP2
3	The financial performance of the company you work for compares favorably with industry standards and competitors	FP3
4	The investments your company makes are generating positive returns and creating value	FP4
5	Shareholders and stakeholders are confident in the financial stability and prospects of the company you work for	FP5

IV. RESEARCH RESULTS AND DISCUSSION

Data description

The first item in the demographic questionnaire focused on the gender of employees in Vietnam's e-commerce industry. Out of 250 respondents, 126 identified as female, accounting for 50.40% of the total, while 124 identified as male, representing 49.60%. The gender distribution is almost evenly split between male and female employees, with only a slight predominance of females. This indicates a relatively balanced workforce in terms of gender within the companies surveyed. Most of the participants were between 18 and 25 years old, accounting for 56% of the total sample, with 140 individuals. The second largest age group was 26 to 35 years old, with 71 participants, making up 28.4%. Following this, 37 employees were aged between 36 and 45 years old, representing 14.8% of the sample. The majority of employees, 104 individuals, or 41.6%, have between 1 and 3 years of experience, indicating that the workforce in the e-commerce industry is largely composed of individuals with relatively limited experience. The second-largest group is those with 4 to 6 years of experience, comprising 76 people, or 30.4% of the sample. A notable portion of employees, 55 individuals (22%), have less than 1 year of experience, showing that a substantial number of employees are newcomers to the industry. The largest group was employees, with 147 people, making up 58.8% of the total. This shows that most of the workers in the e-commerce industry are full-time employees with steady roles in their companies. The second-largest group was interns, with 77 people, or 30.8% of the total sample. This suggests that many people in the industry are gaining practical experience. There were only 10 people (4%) who had leadership positions, which is a smaller number compared to the other roles.

Outer Loading

Outer loading refers to the coefficient that measures the strength of the relationship between an observed variable and a latent variable in a reflective model. Hair et al. (2022) recommend that an outer loading of 0.7 or higher indicates that the observed variable is a good indicator of the latent construct. Variables with outer loadings below 0.4 should be removed from the model, as they contribute weakly to explaining the latent variable. For values between 0.4 and 0.7, the decision to keep or remove the variable depends on the researcher's judgment, considering other factors such as composite reliability (CR) and convergent validity. During the evaluation of convergent validity using outer loadings, most indicators in the measurement model exhibited loadings above 0.7, aligning with the commonly accepted threshold for indicator reliability. However, two items - CS2 with a loading of 0.697 and MAI3 with a loading of 0.660 - fell slightly below this benchmark. Despite not reaching the ideal value, these loadings are still considered acceptable. According to Hair et al. (2017), loadings between 0.6 and 0.7 can be retained if they contribute meaningfully to the construct and do not adversely affect the model's reliability and validity. Further supporting this, research by Hair et al. (2017) suggests that indicators with loadings between 0.4 and 0.7 should be considered for removal only if their exclusion leads to a significant improvement in composite reliability. In this context, both CS2 and MAI3 demonstrate theoretical relevance and contribute to the comprehensiveness of their respective constructs. Therefore, retaining these items ensures the model maintains its content validity and theoretical integrity.

Table 2. Internal Consistency Reliability

Factors	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
CE	0.802	0.805	0.557
CL	0.852	0.863	0.628
CS	0.773	0.778	0.522
DDDM	0.787	0.790	0.610
FP	0.837	0.846	0.605
MAI	0.808	0.820	0.568

Source: Research result

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Cronbach's Alpha

All the scales in the study have Cronbach's Alpha values higher than 0.7, which meets the reliability standard suggested by Hair et al. (2014). This means that the items in each scale are consistent and reliable. The CL (Customer Loyalty) scale has the highest Cronbach's Alpha at 0.852, showing very strong internal consistency. The FP (Financial Performance) and MAI (Marketing AI) scales also show good reliability with values of 0.837 and 0.808, respectively. The other scales, including CE (Customer Engagement), DDDM (Data-Driven Decision Making), and CS (Customer Satisfaction), have values from 0.773 to 0.802, which are also above the acceptable level. These results show that the observed items in each group are closely related and measure the same concept well. Therefore, all scales are reliable and can be used for further analysis in the study.

Composite Reliability

Composite reliability is a measurement used to check how well the items in a group work together to measure the same idea. It is often used instead of Cronbach's Alpha to test internal consistency (Hair et al., 2017). In this study, values between 0.7 and 0.9 are considered acceptable and show good reliability. According to Table 4.12, all the variables - including CE, CL, CS, DDDM, FP, and MAI - have composite reliability scores within this recommended range. For example, CL has the highest score at 0.863, followed by FP (0.846) and MAI (0.820), which all show strong consistency. Even the lowest score, 0.778 for CS, is still above the minimum requirement. These results show that the items in each group are measuring the same concept in a reliable way. As shown in Figure 4.8, the values of this indicator for all variables fall within the acceptable range, so all variables are considered valid for further analysis.

Average Variance Extracted (AVE)

Average Variance Extracted (AVE) is a measure that shows how much of the variation in observed variables is explained by a latent construct, compared to the variation due to measurement errors. According to Shrestha (2021), if the AVE value is 0.5 or higher, it means the construct explains more than half of the variation in its indicators, which indicates good convergent validity.

Referring to Table 2, all constructs—CE, CL, CS, DDDM, FP, and MAI—have AVE values greater than 0.5. For example, CL has the highest AVE at 0.628, while CS has the lowest at 0.522, still above the acceptable threshold. These results show that the indicators for each construct are strongly related and effectively represent the same underlying concept. As shown in Figure 4.9, all AVE values are within the acceptable range, confirming that each construct meets the criteria for convergent validity and can be used in further analysis.

Hypothesis Results and discussion

The relationship between Marketing Artificial Intelligence and Customer Engagement

The analysis results from the SEM-PLS model indicate a statistically significant relationship between these two factors, with a coefficient $\beta = 0.698$ and $p = 0.000 < 0.05$. Therefore, hypothesis H1 is confirmed, aligning with the initial expectation that artificial intelligence in marketing has a substantial influence on customer engagement, supporting e-commerce businesses in Vietnam to enhance the effectiveness of their marketing strategies.

Previous studies have provided various perspectives on the role of artificial intelligence in marketing concerning customer engagement. Some studies support the validity of this hypothesis, such as Prentice et al. (2020), who argue that artificial intelligence is widely applied to enhance customer engagement through personalization tools. Similarly, McKinsey & Company (2021) emphasize that AI-driven personalized recommendations can increase conversion rates by up to 20%, thereby improving the overall customer experience. Additionally, Sharma et al. (2024) also agree that personalized marketing helps create deeper relationships with brands, a finding consistent with this study. However, there are also opposing views regarding the effectiveness of AI in this field. Yang (2023) suggests that AI-generated content may lack authenticity, making it challenging to maintain long-term customer engagement. Likewise, Abrokwah-Larbi and Awuku-Larbi (2023) point out that the high costs of implementing AI, combined with the need for specialized skills, may reduce the effectiveness of this technology in promoting engagement, especially if not applied appropriately.

Table 3. hypothesis result

Hypothesis	Relationships	Path coefficient	P-values	Result
H1	Marketing Artificial Intelligence → Customer Engagement	0.698	0.000	Accepted
H2	Marketing Artificial Intelligence → Data Driven Decision-Making	0.627	0.000	Accepted
H3	Marketing Artificial Intelligence → Customer Satisfaction	0.455	0.000	Accepted
H4	Marketing artificial intelligence → Customer Loyalty	0.535	0.000	Accepted
H5	Customer Engagement → Financial Performance	-0.003	0.979	Rejected
H6	Data Driven Decision-Making → Financial Performance	0.142	0.072	Rejected

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H7	Customer Satisfaction → Financial Performance	0.562	0.000	Accepted
H8	Customer Loyalty → Financial Performance	0.105	0.239	Rejected

Source: Result's result

The relationship between Marketing Artificial Intelligence and Data Driven Decision-Making

The analysis from the SEM-PLS model indicates a statistically significant relationship between these two factors, with a coefficient $\beta = 0.627$ and $p = 0.000 < 0.05$. Therefore, hypothesis H2 is confirmed, aligning with the initial expectation and previous studies that artificial intelligence in marketing effectively supports e-commerce businesses in Vietnam in data-driven decision-making, thereby optimizing marketing strategies.

Numerous previous studies have examined the role of artificial intelligence in marketing concerning data-driven decision-making. Some studies support this hypothesis, such as Verhoef et al. (2016), who state that data-driven decisions enable businesses to enhance performance through rapid information analysis and precise marketing strategy adjustments, with AI playing a crucial role in automating the process. Similarly, Magableh et al. (2024) assert that AI assists businesses in extracting valuable insights from complex data, thereby making timely and market-appropriate strategic decisions. Additionally, Sarin and Sharma (2024) also agree that using AI for data analysis helps businesses implement personalized marketing campaigns, improving decision-making efficiency and business outcomes. However, not all studies fully endorse this view. Gathani et al. (2018) argue that AI may face challenges such as the need for high-level expertise, which can complicate implementation. Likewise, Nguyen (2024a) emphasizes that the effectiveness of AI in data-driven decision-making also depends on the experience and analytical capabilities of leadership, indicating that the human factor remains significant.

The relationship between Marketing Artificial Intelligence and Customer Satisfaction

The analysis from the SEM-PLS model indicates a statistically significant relationship between these two factors, with a coefficient $\beta = 0.455$ and $p = 0.000 < 0.05$. Therefore, hypothesis H3 is confirmed, aligning with the initial expectation and previous studies that artificial intelligence in marketing positively influences customer satisfaction, helping e-commerce businesses in Vietnam enhance the quality of customer experiences through effective marketing strategies.

Previous studies have discussed the role of artificial intelligence in marketing concerning customer satisfaction. Some studies support this perspective, such as Hennig-Thurau et al. (2022), who argue that AI can analyze consumer behavior to personalize experiences, thereby helping customers find suitable products or services, increasing satisfaction levels. Similarly, Magableh et al. (2024) state that AI enhances customer satisfaction by providing personalized experiences while building lasting relationships with them. Additionally, Christopher et al. (2013) suggest that AI assists businesses in leveraging data from social media and customer feedback, enabling rapid responses that strengthen the connection between businesses and customers. However, some studies highlight limitations of AI in improving satisfaction. Tuten and Solomon (2017) argue that AI may reduce the personal element in interactions, making customers feel less connected to the brand. Similarly, Steinhoff and Palmatier (2021) warn that data privacy issues when collecting personal information for personalized marketing can reduce trust and satisfaction if legal regulations are not followed. Csordás et al. (2014) also emphasize that algorithmic biases and lack of transparency in AI decisions can lead to unfair experiences, negatively affecting satisfaction. Hoyer et al. (2020) add that if AI fails to meet customer expectations or does not provide superior convenience, its impact on satisfaction will be insignificant.

The relationship between Marketing artificial intelligence and Customer Loyalty

The analysis results from the SEM-PLS model indicate a statistically significant relationship between these two factors, with a coefficient $\beta = 0.535$ and $p = 0.000 < 0.05$. Therefore, hypothesis H4 is confirmed, aligning with the initial assumption and previous studies that artificial intelligence in marketing positively influences customer loyalty, helping e-commerce businesses in Vietnam build sustainable relationships with customers through effective marketing strategies.

Previous studies have evaluated the role of artificial intelligence in marketing concerning customer loyalty. Some studies support this perspective, such as Bedi et al. (2022), who argue that AI plays a crucial role in increasing loyalty through personalized marketing strategies. Similarly, Magableh et al. (2024) assert that AI-driven personalized marketing strategies not only enhance satisfaction but also create deep emotional connections with the brand, thereby strengthening customer loyalty. Additionally, Patel and Trivedi (2020) agree that using AI algorithms to analyze data helps businesses understand customer preferences and shopping habits, enabling the implementation of tailored marketing campaigns to promote loyalty. However, some studies highlight limitations of AI in improving loyalty. Davenport et al. (2020) suggest that when customers realize they are interacting with chatbots, they may feel uncomfortable, reducing their engagement with the brand. Similarly, Chen et al. (2022) warn that skepticism about AI, particularly as the technology approaches contextual awareness, may hinder customer trust and acceptance.

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Verma et al. (2021) add that, although AI can enhance marketing efficiency, its impact on loyalty is not always clear, especially when over-reliance on AI may diminish the emotional connection between customers and the brand.

The relationship between Customer Engagement and Financial Performance

The analysis results from the SEM-PLS model show no statistically significant relationship between these two factors, with a coefficient $\beta = -0.003$ and $p = 0.979 > 0.05$. Therefore, hypothesis H5 is rejected, contrary to the initial prediction that customer engagement has a strong influence on the financial performance of e-commerce businesses in Vietnam.

Previous studies have analyzed the relationship between customer engagement and financial performance, but they present differing viewpoints. Some studies support the view that customer engagement positively impacts financial performance, such as Pansari and Kumar (2017), who argue that customer engagement enhances brand metrics like satisfaction, loyalty, and brand recall, thereby attracting new customers and retaining existing ones, leading to improved financial performance. Similarly, Magableh et al. (2024) emphasize that customer engagement plays a crucial role in maintaining long-term financial stability by building close relationships, encouraging repeat purchases, and turning customers into loyal advocates. However, many studies highlight limitations of engagement in improving financial performance. Su et al. (2023) suggest that negative customer emotions, expressed through online reviews, can adversely affect a company's stock returns, underscoring the financial consequences of poor customer experiences. Similarly, Rahman et al. (2022) found that negative engagement events reduce brand value, leading to declines in financial metrics such as Tobin's q and Market Value Added (MVA). KPMG (2016) also notes that failing to meet customer expectations can negatively impact retention and repurchase behavior, resulting in reduced profits and loss of market share. Additionally, Kumar and Pansari (2016) argue that not all forms of engagement directly translate into financial gains, particularly if they are not accompanied by transactional behavior, leading to weak or insignificant impacts on financial performance.

The relationship between Data Driven Decision-Making and Financial Performance

The analysis results from the SEM-PLS model show no statistically significant relationship between these two factors, with a coefficient $\beta = 0.010$ and $p = 0.890 > 0.05$. Therefore, hypothesis H6 is rejected, contrary to the initial prediction that data-driven decision-making has a strong influence on the financial performance of e-commerce businesses in Vietnam.

Previous studies have thoroughly examined the relationship between data-driven decision-making and financial performance, but they present conflicting viewpoints. Some studies support this hypothesis, such as Brynjolfsson et al. (2011), who argue that companies adopting DDDM often achieve higher profits, improved efficiency, and increased market value. Similarly, Magableh et al. (2024) emphasize that DDDM supports long-term financial sustainability by aligning strategies with organizational goals. McAfee and Brynjolfsson (2012) also point out that companies using DDDM have 4% higher productivity and 6% higher profits compared to competitors. However, some studies highlight the limitations of DDDM in improving financial performance. Sharma et al. (2015) found that data analytics primarily impacts decision-making but does not guarantee improvements in organizational financial performance. Gillon et al. (2016) recommend not seeking a direct link between data analytics and financial performance without understanding how to create value from data. LaValle et al. (2010) also stress that applying data analytics does not automatically lead to financial performance if essential supporting factors are absent.

The relationship between Customer Satisfaction and Financial Performance

The analysis results from the SEM-PLS model indicate a statistically significant relationship between these two factors, with a coefficient $\beta = 0.420$ and $p = 0.002 < 0.05$. Therefore, hypothesis H7 is accepted, aligning with the initial prediction and previous studies that customer satisfaction has a strong influence on the financial performance of e-commerce businesses in Vietnam.

Previous studies have investigated the relationship between customer satisfaction and financial performance, but they present views that are not entirely consistent. Some studies support this hypothesis, such as Eklof et al. (2020), who found that in the service industry, companies with high customer satisfaction levels often have better financial performance, reflected through indicators like ROA and ROE. Similarly, Berraies and Hamouda (2018) point out that when customers are satisfied with products and services, the company's financial performance also improves significantly. Magableh et al. (2024) also emphasize that customer satisfaction, when combined with technology and data strategies, not only enhances brand image but also contributes to promoting sustainable financial growth. However, some studies highlight the limitations of customer satisfaction in improving financial performance. Du et al. (2025) analyzed over 18 million reviews on JD.com and found that negative trends in customer reviews can adversely affect stock returns. Otto et al. (2020) also state that customer dissatisfaction, if not addressed promptly, can lead to recovery costs exceeding financial benefits, causing prolonged negative impacts. Suharyanti and Dewa (2019), through a meta-analysis of 64 studies, show that the relationship between customer satisfaction and financial performance varies widely, with correlation coefficients ranging from -0.256 to 0.899, and during the period from 1991 to 2000, this relationship was not statistically significant.

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The relationship between Customer Loyalty and Financial Performance

The analysis results from the SEM-PLS model show no statistically significant relationship between these two factors, with a coefficient $\beta = 0.015$ and $p = 0.920 > 0.05$. Therefore, hypothesis H8 is rejected, contrary to the initial prediction that customer loyalty has a strong influence on the financial performance of e-commerce businesses in Vietnam.

Previous studies have thoroughly examined the relationship between customer loyalty and financial performance, but they present inconsistent viewpoints. Some studies support this hypothesis, such as Magatef (2015), who points out that loyal customers generate a stable revenue stream by consistently choosing the company's products or services, thereby enhancing long-term profits. Similarly, Lemon and Verhoef (2016) argue that retaining loyal customers costs significantly less than acquiring new ones, helping reduce marketing expenses and improve financial performance. Magableh et al. (2024) also emphasize that customer loyalty helps maintain stable revenue, reduce advertising costs, and promote growth through organic referrals. However, some studies highlight the limitations of customer loyalty in improving financial performance. Song et al. (2022) suggest that loyalty programs can negatively impact profits if the cost of maintenance exceeds the additional revenue generated. Kandampully et al. (2015) warn that an excessive focus on loyal customers may lead to complacency, reducing innovation and affecting long-term financial performance. Islam et al. (2022) also state that there is no strong relationship between customer loyalty and financial performance, as financial performance is primarily influenced by other financial and non-financial factors.

V. CONCLUSIONS AND RECOMMENDATIONS

Conclusion

The e-commerce industry in Vietnam is undergoing a period of robust growth, with rapid expansion and increasingly fierce competition among businesses. In a context where consumers are demanding more personalized shopping experiences and businesses face pressure to optimize costs to achieve sustainable financial performance, the application of Artificial Intelligence in Marketing (Marketing AI) has become a critical solution. The author conducted this study to explore the impact of Marketing AI on financial performance in Vietnam's e-commerce industry. The study employs the SEM-PLS method to analyze data, with the survey targeting employees working at e-commerce businesses across Vietnam, to assess the impact of Marketing AI and the mediating role of factors such as customer engagement, satisfaction, loyalty, and data-driven decision-making.

The research findings indicate that Marketing AI has a positive and significant impact on customer engagement (H1), data-driven decision-making (H2), customer satisfaction (H3), and customer loyalty (H4), thereby indirectly influencing financial performance through these mediating relationships. Notably, customer satisfaction is proven to have a direct impact on financial performance (H7), highlighting the critical role of customer experience in improving financial outcomes. However, factors such as customer engagement (H5), data-driven decision-making (H6), and customer loyalty (H8) do not show a significant direct impact on financial performance, suggesting the need for specific strategies to convert these factors into tangible financial value. These findings not only shed light on the impact of Marketing AI but also provide deep insights into how mediating factors influence sustainable financial performance.

Recommendations

Based on the research findings and analysis, the author identifies several factors that influence the financial performance of e-commerce businesses in Vietnam through the application of Marketing AI. These factors include Marketing AI and Customer Satisfaction, where Marketing AI positively impacts customer satisfaction, and customer satisfaction directly enhances financial performance. However, other factors such as customer engagement, data-driven decision-making, and customer loyalty do not have a direct impact on financial performance, despite being improved by Marketing AI. Below are the author's recommendations to help the e-commerce industry in Vietnam improve its financial performance and maintain a competitive edge in an increasingly challenging market.

The author recognizes that Marketing AI and Customer Satisfaction are two critical factors that need improvement to enhance the financial performance of Vietnam's e-commerce industry, as they have a positive impact. First, Marketing AI improves customer satisfaction, which in turn boosts financial performance, and thus should be strengthened. E-commerce businesses should focus on personalizing AI in marketing activities (MAI4) by using advanced AI tools to recommend products and deliver advertisements tailored to each customer, making them feel more valued (the industry should strengthen AI applications to personalize customer experiences, MAI4). Additionally, the industry should enhance data analysis and decision-making through AI (MAI5) by organizing training sessions for marketing staff to learn how to use AI tools for fast and accurate data analysis, enabling more effective advertising campaigns (the industry should conduct training for staff to use AI for better data analysis and decision-making, MAI5). Furthermore, the industry needs to prioritize analyzing and predicting customer purchasing behavior

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using AI (MAI1) by regularly updating customer data in AI systems to accurately predict their needs in a rapidly changing market (the industry should continuously update data to accurately predict customer purchasing behavior, MAI1).

Next, since Customer Satisfaction directly improves financial performance, the e-commerce industry in Vietnam must take steps to enhance this factor. First, customer satisfaction with the quality of service and products (CS2) is the most critical aspect. Businesses should ensure high-quality service by organizing training for support staff to address customer inquiries quickly and effectively, while also tightly controlling product quality to reduce returns or complaints, thereby increasing customer satisfaction (the industry should organize staff training and control product quality to enhance customer satisfaction, CS2). Additionally, the industry should encourage customers to recommend services or products when satisfied (CS5) by implementing incentive programs, such as offering rewards or discounts for referring friends, thus boosting sales through word-of-mouth (the industry should create programs to encourage satisfied customers to recommend products, CS5). Moreover, interactions with employees that contribute to customer satisfaction (CS1) can be improved by ensuring support teams are friendly and helpful, for example, by using AI-powered chatbots to quickly answer simple questions, combined with human support for more complex issues, providing a better experience (the industry should combine AI chatbots and staff to improve customer interaction quality, CS1).

In addition, since customer engagement, data-driven decision-making, and customer loyalty do not directly impact financial performance, the industry should limit over-reliance on these factors. To enhance financial performance and competitiveness, the e-commerce industry in Vietnam should focus on key aspects of Marketing AI and Customer Satisfaction. First, the industry should leverage Marketing AI to improve customer experiences, but it must limit activities that only increase engagement without leading to purchases, such as avoiding large investments in social media engagement programs that do not generate revenue. The industry should also reduce excessive focus on data analysis if it is not tied to specific financial goals, for instance, by avoiding investments in complex analytics tools without a clear plan to use the data to boost sales. Additionally, the industry should limit spending on customer loyalty programs that do not yield actual revenue, such as avoiding costly promotions that do not result in purchases. Second, with the rapid growth of the e-commerce industry in Vietnam, market expansion is essential. The industry should plan to reach new customer groups, such as those in rural areas or international markets, while preparing contingency plans to address unexpected disruptions, such as policy changes or economic crises. Following the Covid-19 pandemic, the industry needs to recover to improve its business situation. To enhance financial performance and prepare for future challenges, the industry should ensure stable customer service quality, for example, by maintaining a responsive support team and flexible customer care policies to reduce the risk of losing customers during tough times. Moreover, the industry should develop plans to support customers during crises, such as offering discounts or free shipping during difficult periods, to retain customers and sustain revenue.

Finally, improving financial performance and competitiveness is a key goal for Vietnam's e-commerce industry to achieve sustainable growth. This study, by identifying the relationship between Marketing AI, Customer Satisfaction, and financial performance, can help the e-commerce industry in Vietnam both enhance its market competitiveness and achieve sustainable financial growth in an increasingly competitive landscape.

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