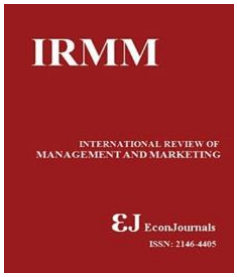

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Electronic Commerce and Customer Relationship Management: Integration of Technologies into Marketing Strategy

Hassan Ali Al-Ababneh[1]*, Ayed Moh'd Al Muala[2]

[1]Department of Electronic Marketing and Social Media, Zarqa University, Zarqa, Jordan, [2]Department of E-Marketing and Social Communication, Irbid National University, Irbid, Jordan. *Email: Hassan_ababneh@zu.edu.jo

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ABSTRACT

In the context of rapidly evolving digital markets, e-commerce is no longer limited to transactional functions but is increasingly perceived as a strategic framework for managing long-term customer relationships. Intensifying competition, the diversification of consumer preferences, and the acceleration of technological innovation necessitate a revision of conventional customer relationship management (CRM) approaches. This study aims to explore how the integration of digital technologies into e-commerce marketing strategies influences the development of personalized, sustainable, and value-driven interactions with customers. The relevance of the research lies in the growing demand for adaptive marketing models capable of enhancing customer engagement, trust, and retention in highly dynamic digital environments. The research employs a mixed methodology, combining literature review, comparative case analysis of global e-commerce firms, and interpretation of customer performance indicators through factor-based assessment. The findings reveal a significant correlation between the level of CRM digitalization and improvements in customer lifetime value, satisfaction, and behavioral loyalty. Practical implications include recommendations for integrating data analytics, automation tools, and AI-driven personalization mechanisms into existing marketing infrastructures. The results are particularly relevant for companies aiming to strengthen customer-centric strategies and optimize user experience in competitive digital ecosystems.

Keywords: E-Commerce, Digital Marketing Strategy, Personalization, Customer
JEL Classifications: M21, M31, C00

1. INTRODUCTION

Over the past two decades, e-commerce has undergone dramatic changes, transforming from an auxiliary sales tool into a strategic platform for managing customer relationships. Under the influence of digitalization, the growth of mobile traffic and multichannel interaction, e-commerce is becoming the core of the customer experience, transforming not only marketing approaches but also the very understanding of brand value (Ahmad and Alshurideh, 2024). The modern consumer expects not just a product, but personalized service, quick feedback and predictable interaction in the digital environment (Kumar et al., 2023). The relevance of the study is due to the need to adapt marketing strategies to the new model of customer behavior. Digital channels allow you to collect unprecedented amounts of information about user preferences, their reactions to content, interactions with interfaces and purchase histories. However, despite the availability of technological solutions, many companies face difficulties in the practical integration of these tools into customer relationship management systems (Nguyen and Simkin, 2023). One of the key challenges remains data fragmentation. In conditions where a customer interacts with a brand through a website, mobile app, social networks and offline points, the lack of a single database leads

to inconsistent communications and a decrease in loyalty (Chatterjee et al., 2022). Traditional CRM systems designed for a linear and predictable customer journey are ineffective in today's multichannel environment. Hence, there is a need to revise the logic of customer policy with an emphasis on the integration of analytics, automation and personalization in real time (Alsharif et al., 2024). The use of artificial intelligence, Big Data and machine learning technologies is of particular importance, which allow modelling customer behavior and offering relevant solutions at the moment (Hosseini et al., 2023). However, the implementation of these solutions requires not only technical infrastructure, but also the strategic readiness of the company to build business processes around the client. In practice, many organizations implement digital tools in a fragmented manner, which reduces their effectiveness and does not provide a synergistic effect (Ali, 2023).

The issues of assessing the effectiveness of digital transformation of CRM also remain unresolved. The lack of uniform metrics, the complexity of calculating the return on investment in technology and the shortage of qualified specialists make it difficult to make decisions at the top management level (Sivathanu and Pillai, 2022). Moreover, the literature shows a limited number of studies devoted to the strategic integration of CRM in e-commerce in the context of high digital maturity of companies. Against this background, there is a need for a comprehensive analysis of the role of modern technologies in customer relationship management specifically in the context of e-commerce. If in traditional industries CRM mainly performs the function of customer accounting and communication, then in e-commerce it is the core of the entire business model, on which the customer life cycle, their involvement, repeat purchases and loyalty depend (Rahman and Khan, 2024). The purpose of this study is to identify how digital technologies can be integrated into an e-commerce marketing strategy and how they affect the effectiveness of building personalized and long-term relationships with customers. Unlike most studies, which focus on individual tools (e.g., email newsletters or chatbots), this article examines the strategic integration of technologies into the marketing system based on real indicators of customer activity and behavioral analytics.

The research methodology is based on a critical analysis of scientific literature on CRM in the digital environment, a comparative analysis of customer relationship transformation strategies in leading e-commerce companies, as well as the interpretation of empirical data on behavioral metrics: engagement level, life cycle duration, repeat purchases, and net promoter score (NPS). A systematic approach with elements of factor analysis is used, which allows us to identify not only external but also hidden dependencies between the level of CRM technological maturity and the effectiveness of customer policy (Lee and Trimi, 2023). Thus, the study aims to eliminate existing gaps in the theory and practice of digital marketing, as well as to formulate practical recommendations for companies seeking to increase customer centricity in a competitive digital market.

2. REVIEW OF LITERATURE

In the past several years, there has been a lot of interest among academicians for exploring the changes in customer relationship management (CRM) in response to digital technologies in e-commerce. E commerce, transcending past traditional transactions, is emerging as a complete interactive system with customers where customization and automatization of communications stand as pivotal (Ahmad and Alshurideh, 2024). It is because of the heightened expectations of customer which expects from brand un the product only value, experience that is unique (Kumar et al, 2023). An interesting development is the shift from the traditional transaction-based procedures to customer experience management approach where cognitive and emotional dimensions of interaction are concerned (Chatterjee et al., 2022). Big Data and data analytics methods help to discover patterns of customer behavior and offer personalized items in real time (Hosseini et al., 2023). Such technologies enhance customer engagement and loyalty, as Ali et al. (2023) and Alsharif et al. (2024). Nevertheless, while digital CRM has been noted as having a plethora of advantages, putting theory into practice has its difficulties. Nguyen and Simkin (2023) highlight data fragmentation and lack of integration across platforms, which make it difficult to build a holistic customer profile. Such challenges are not limited to SMEs but also to large companies with legacy IT infrastructure (Rahman and Khan, 2024). Organizational barriers also slow down the digital transformation of CRM. Lee and Trimi (2023) point out employee resistance and lack of skills, which requires comprehensive training programs and process adaptation. In addition, Sivathanu and Pillai (2022) note that there is no unified approach to measuring the effectiveness of CRM initiatives, which reduces the motivation to invest in technology (Al-Ababneh, 2024). Modern research highlights the key role of artificial intelligence in improving customer experience. Alsharif et al. (2024) demonstrate that AI enables automated service delivery, predicts needs, and creates dynamic, personalized offers. However, implementing AI requires careful planning and changes in the business model (Hosseini et al., 2023). An important aspect is the multichannel nature of communications, which requires the integration of data from various sources to create a unified customer experience (Chatterjee et al., 2022; Kumar et al., 2023). Lee and Trimi (2023) emphasize that in the context of globalization, digital maturity of companies is becoming a competitive advantage.

Researchers also draw attention to the role of mobile technologies in CRM. Mobile CRM provides new opportunities for interacting with customers anytime and anywhere, which contributes to increased engagement (Nguyen and Simkin, 2023; Ali, 2023). A special place is occupied by the study of challenges of digital security and data privacy in CRM systems, which is critical for strengthening customer trust (Rahman and Khan, 2024; Sivathanu and Pillai, 2022). A series of in-depth case studies of world-class companies like Amazon, Alibaba illustrate the power of coordinated strategies that synergize automation, AI, and data analytics to enhance customer experience' (Ali, 2023; Ahmad and Alshurideh, 2024). These firms reveal that the success in digital CRM transformation is not only about technology, but organizational culture and readiness for change (Lee and Trimi, 2023). So digital CRM is an important lens to take also from an organizational perspective. Secondly, more advanced performance measurement techniques need to be developed, and the details of CRM adoption in different e-commerce segments need to be investigated (Kumar et al., 2023; Rahman and Khan, 2024). Overall, our analysis of current research supports the

notion that digital technologies are profoundly transforming the management of customer relationships, creating new personalization opportunities and strengthening loyalty. Yet for sustainable outcomes to be reached, technical, organisational and cultural obstacles must be overcome and that therefore requires for a holistic strategy and an ongoing building of competency (Ahmad and Alshurideh, 2024; Lee and Trimi, 2023).

A review of recent scientific literature suggests that digital transformation is revolutionizing the traditional customer management in e-commerce. Today's technologies including artificial intelligence, machine learning, Big Data and process automation offer companies new ways to intimately know and tailor interactions around customer behavior. These instruments do not only enable the audience to be segmented and needs predicted effectively, but also individualistic offers may be designed, hence leading to high levels of customer engagement, as well as customer loyalty as the case may be (Ahmad and Alshurideh, 2024; Hosseini et al., 2023). Nevertheless, even if technology is on the advance – and of course it is – digital CRM systems also face a range of issues and concerns. However, data fragmentation, the inability to integrate multiple platforms and the absence of a single customer base still constitute the main barriers to developing a CRM full strategic program (Nguyen and Simkin, 2023; Rahman and Khan, 2024). Furthermore, organizational constraints such as resistance to change and the lack of skilled specialists are also important, obstructing digital transformation initiatives that take-time (Lee and Trimi, 2023; Sivathanu and Pillai, 2022). In addition to the successful transition of digital processes, the strategic integration of CRM in business processes is indeed indispensable to the success with digital transformation, as the leading global businesses Amazon and Alibaba demonstrate as well. Their practice proves the importance of combinatory effects of the technological and the organizational innovations in increasing the competitive edge and the level of experience of the customer (Ali, 2023; Alsharif et al., 2024). Therefore, more work is needed to build holistic models of digital CRM transformation that integrate both technological and people-related aspects. Equally important is the establishment of common method for measuring the success of digital CRM initiatives and the exploration of implementation characteristics across different e-commerce industry segments. It is thus only with a holistic approach that companies will be able to fully leverage digital technologies for sustainable development and customer loyalty enhancement.

3. RESEARCH METHODOLOGY

The method of this research stems from an integrated systems-oriented perspective that also enables the issues regarding the influence of the integration of digital technology with customer relationship management (CRM) in electronic retailing to be examined in a holistic manner. It relies on the techniques of critical literature study, comparative examination of strategies, and quantitative analysis of empirical data from actual sources. Not just theoretical, the practical value of the research results, are provided by this multi-component perspective. Systemic perspective enables us to regard CRM as an integrated system of processes such as for example the collection of customer data, its processing and analysis, the automation of communications and the management decision-making based on integrated analytics. The focus is on revealing interrelations of the CRM digitalization level to the customer value indicators. And yet it is challenging to research technology adoption in customer relationship management in e-commerce. First, e-commerce is a dynamic multi-channel interaction through which companies maintain contact with their customers, and the volume of heterogenous data is very large. Second, contemporary CRM is rooted in automation and smart analytics for which it is absolutely necessary to employ suitable quantitative measures to measure it. According to this, the following main techniques are used in the paper:

- Critical analysis of scientific literature and company reporting data, which allows us to identify existing trends, problems and best practices in CRM digital transformation.
- Comparative analysis of CRM digital transformation strategies in large e-commerce companies, including the study of their technological infrastructure, business processes and customer activity indicators.
- Quantitative analysis of customer activity metrics, such as engagement level, loyalty index (Net Promoter Score, NPS), customer retention rate (CRR), repeat purchase rate (RPR) and average customer lifetime value (CLV).
- Statistical and factor analysis to identify relationships between the degree of CRM digitalization and changes in customer value indicators.
- Modelling and application of mathematical formulas to assess the effectiveness of digital CRM initiatives.

Several key formulas and metrics are used to quantify the effectiveness of digital integration into CRM:

1) Net Promoter Score (NPS). Net Promoter Score (NPS) is calculated using the formula:

$$NPS = \%\ \text{of promoters} - \%\ \text{of critics} \quad (1)$$

Where: Promoters - the percentage of customers who rated the likelihood of recommending the company as 9 - 10 on a 0 - 10; Detractors - the percentage of customers who rated the likelihood of recommending the company as 0 - 6. A high NPS reflects good customer loyalty and experience, which is one of the key measures of the effectiveness of CRM efforts (Kumar et al., 2012).

2) Customer Retention Rate (CRR). Customer retention is measured by the formula:

$$CRR = \frac{E - N}{S} * 100\% \quad (2)$$

where: E - number of customers at the end of the period; N - number of new customers gained during the period; S - number of customers at the beginning of the period. A high CRR means that a company can retain its customers, which is positively associated with CRM quality and personalization (Ali, 2023).

3) Repeat Purchase Rate (RPR). This metric measures the proportion of customers who make more than one purchase in a given period:

$$RPR = \frac{\text{Number of repeat customers}}{\text{Total number of clients}} * 100\% \quad (3)$$

Increasing RPR indicates increased engagement and the effectiveness of retention programs (Chatterjee et al., 2022).

4) Average Customer Lifetime Value (CLV) is calculated using the formula:

$$CLV = \sum_{t=1}^{T} \frac{R_t - C_t}{(1+d)^t} \quad (4)$$

where: R_t - Revenue from a customer in the period t; C_t - Costs of servicing a customer in the period t; d - Discount rate; T - Forecasted life cycle period. Calculating CLV allows assessing the cost-effectiveness of investments in CRM initiatives (Hosseini et al., 2023; Al-Ababneh et al., 2024).).

The application of the described formulas and methods requires high quality and completeness of data, which is one of the main problems in real conditions. This requires:

- Integration of heterogeneous data from CRM systems, e-commerce platforms, analytical services and marketing tools;
- Use of specialized software products for processing big data and statistical analysis;
- Building a single customer database with the ability to dynamically update information in real time;
- Regular customer surveys and monitoring of key indicators.

Particular attention is paid to adapting the methodology to the specifics of a particular business, taking into account industry characteristics, company size and level of digital maturity. This methodology opens up broad opportunities for improving the efficiency of customer relationship management in e-commerce (Chen and Wang, 2024). Key opportunities include:

- Increasing the personalization of customer offers through deep data analysis and the use of behavior prediction models;
- Optimizing marketing costs by assessing the return on investment in digital tools based on CLV and other metrics;
- Developing adaptive CRM strategies that take into account market dynamics and changing customer preferences;
- Automating customer communication and support processes using artificial intelligence and chatbots;
- Reputation monitoring and management through review analysis and NPS assessment in real time.

The methodology can also be expanded by introducing machine learning methods to improve forecast accuracy and automate big data analysis.

The methodology used allows for a systematic and comprehensive understanding of the impact of digital technologies on customer relationship management in e-commerce. The integration of theoretical and empirical methods supported by formal models ensures high accuracy of analysis and practical applicability of the results. Modern conditions for the development of e-commerce require rethinking customer interaction strategies in the context of digitalization (Fawzieh et al., 2025). The need to apply the proposed methodology is due to the fact that most existing studies are limited to either theoretical analysis of CRM or fragmentary cases that do not reveal quantitative relationships between digital investments and customer metrics. The novelty of the approach lies in the comprehensive integration of theoretical and applied tools: from the analysis of loyalty indicators (NPS, CRR, CLV) to assessing the effectiveness of digital solutions through formalized formulas and ROI models. With this method you will have a special tool to evaluate objectively how the level of digitalization affects the effectiveness of the marketing technology of e-commerce, and make more reliable management decisions. This is particularly true in an extremely competitive context, where business sustainability is based solely on the degree of customization and user experience.

4. ANALYSIS AND DISCUSSION

4.1. Conceptual Aspects of E-Commerce and Customer Relationship Management

In no longer the 21st century the e-commerce is not a channel selling but an ecosystem with multiple levels of interaction in which not the merchandise, but the user experience is the most important asset. The high competitive environment and the low barriers to enter to the market contribute to the fact that it is the quality customer relationship that allows firms to build a strong customer base. The shift from transaction business model to value interaction business model needs fresh marketing and digital tool sets. In recent years the personalized approach based on the processing of big data and the use of intelligent systems to analyze customer behavior has been gaining importance. Companies are also turning their eyes on creating integrated omnichannel communications systems, where information is synchronized across internet platforms, mobile-phone applications, social networks and offline points of contact. This allows you to create a single customer profile and ensure continuity of experience regardless of the interaction channel. There is also a shift in focus from attracting new customers to retaining and increasing the lifetime value of existing ones. It is in this context that new generation CRM technologies are being updated - from automated communication chains to predictive analytics and real-time personalization. Thus, modern trends in e-commerce set a new vector of analysis: from assessing the effectiveness of digitalization to identifying specific metrics that reflect the value of the client (Zhang and Li, 2024). Modern challenges of the digital market, including growing online competition, rapid development of personalization technologies and increasing demands on customer experience, are forming a new paradigm of integration of marketing, e-commerce and customer relationship management. In the context of digitalization of businesses, it is important not only to use technologies, but also to rethink customer interaction strategies through the prism of data, automation and multichannel service. In this regard, the following key research hypotheses are formulated, reflecting both academic and applied aspects of the problem:

H_1: Integrating CRM systems with e-commerce platforms has a positive impact on customer retention by increasing the personalization of communications.

Modern CRM systems provide collection and analysis of customer behavioral and transactional data, which allows for the formation of individual offers in real time. Integration with e-commerce platforms (e.g. Shopify, Magento, WooCommerce) enhances adaptive marketing capabilities, increasing the relevance of messages and promotions (Al-Ababneh et al., 2024; Gupta and Mehta, 2024). Personalized recommendations and targeting implemented through omnichannel strategies increase the repeat purchase rate and average check. Conceptual features of global trends in the integration of CRM and e-commerce of modern companies are presented by the author in Figure 1.

In today's world, integrating CRM systems with e-commerce platforms is becoming a key element of a successful business strategy. This convergence will enable companies to sell more than just products and services, but they can also create customized and enduring relationships with customers. Against this increasingly competitive backdrop and an evolving consumer landscape, how well companies manage their customer relationships is inextricably linked to the quality of their digital platforms and how well they interlink them. The capability to manage, analyse and take actions with respect to customer data almost in real time for personalized offer and communication, becomes particularly crucial (Masa'd et al., 2024). Thanks to this, businesses can enhance customer satisfaction, higher repeat purchase rates and lower their churn. But technology advances and markets shift - and with that, companies need to continuously adjust their CRM setups and add new capabilities. While ensuring personalisation, targeting and loyalty becomes more accurate with artificial intelligence and machine learning being the norm for marketers. When you have omnichannel strategies you are able to mesh the customer interactions across channels to provide one smooth and unified exchange. Mobility's onslaught and the advent of low-code/no-code platforms have made CRM systems easier to install and manage by all sizes of companies. The following global trends for CRM systems and eCommerce platforms integration are the most relevant to the development of digital marketing and creating customer experience management which can be seen in Table 1. New standards of opportunities and trends Examples of such trends are those which cluster the new and standards as a result for a company to stay competitive in the world market these trends contribute to new opportunities/form an example there are companies will take all of these in organizational change?

The existence of modular solutions and open APIs provides the flexibility and adaptability of the systems to the new business tasks. These trends represent an opportunity for more effective marketing and customer management strategies worldwide.

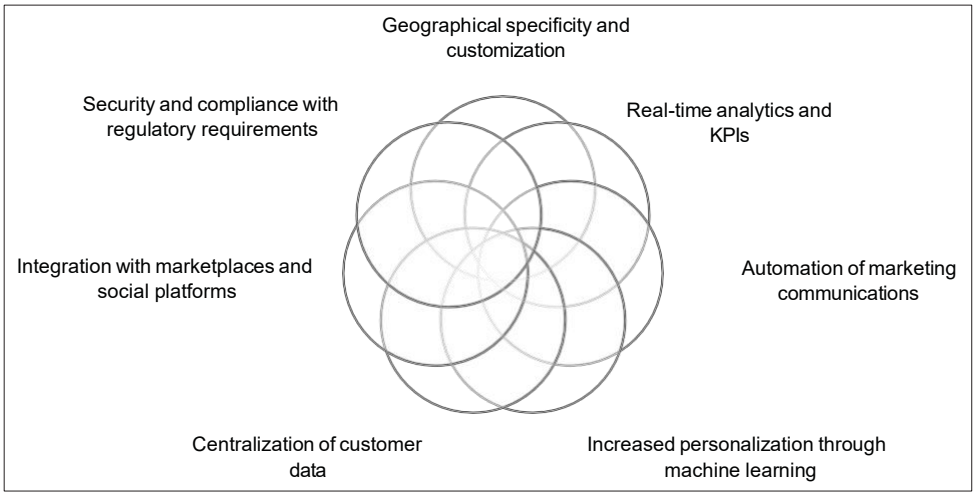
4.2. Combining Artificial Intelligence and Machine Learning into Digital CRM Systems: Growing Conversion and Retaining Customers

In this sense, the incorporation of machine learning and artificial intelligence in digital CRM systems is becoming an increasingly influential factor in boosting conversions and the customer lifecycle. They let you conduct behavioral user analysis so you can personalize offers and automated communications, which greatly enhances the customer experience.

H_2: The application of AI and ML in digital CRM, have a positive impact on conversion rates in E-commerce.

By using machine learning technologies in users' behavior analytics, we can recognize hidden patterns in tastes and reflect individual tastes in a model. This allows to automatically adjust the site structure, marketing of offers and delivery conditions to each end user. A series of empirical studies has indicated that implementing predictive analytics alongside CRM raises the probability of a sale by 25 - 35%. This transformational role placing (AI) and (ML) in digital CRM systems represents a significant departure from which e-commerce (CRM) are in the digital vein. stage (Masad et al., 2024). One of the aspects about this approach is the fact that AI and ML can handle huge amounts of data (in terms of volume and variety) on customer behavior in live mode. This makes precise predictions and personalized offers that perfectly match the requirements and wishes of every individual user possible. In contrast to old ways of general segment-based methods, the assistant in newfangled CRM systems with AI enables the dynamic variation of communication, that makes the latter more meaningful for promotion messages, rising the number of deals made. The innovation of the approach also comes from deploying self-learning algorithms that continuously

Figure 1: Conceptual features of global trends in the integration of CRM and e-commerce of modern companies



refine customer behavioral models on the basis of the newest data sources, to enable flexible and long-lasting adoption of the marketing strategy in a dynamic market. Furthermore, NLP to be used in chatbot and Vantage assistant contribute higher service quality, therefore lower response time, to customers, and increase customers' satisfaction (Lee and Chen, 2024). The current state of the art for e-commerce, is the company simply must not only have a quality product but also must be able to interact with customers. Modern trends in the use of artificial intelligence and machine learning in digital CRM to increase conversion in e-commerce of modern companies are presented in Figure 2.

Thus, the integration of AI and ML into CRM systems not only increases conversion rates but also helps to create deeper and longer-term relationships with customers, strengthening the position of companies in the competitive e-commerce market. This makes the use of these technologies an integral part of a modern marketing strategy and a key factor in sustainable business development.

H_3: Integration of online service systems (chatbots, digital assistants) with e-commerce and CRM increases customer satisfaction.

Interacting with customers through automated channels reduces response time, speeds up problem solving, and provides 24/7 support. This is especially important for mobile users who expect instant response and service adaptation to their needs. Increased satisfaction is directly related to increased loyalty, and, consequently, to an increase in the LTV (Lifetime Value) of the customer. Key aspects of e-commerce and customer relationship management: integration of technologies into the marketing strategy of modern companies are presented in Table 2 as initial data for the implementation of the described methodology.

To apply the methodology in practice, the study selected major e-commerce players with different levels of digital maturity of their CRM systems. Key metrics include net promoter score (NPS), customer retention rate (CRR), repeat purchase rate (RPR),

Table 1: Main global trends in the integration of CRM systems and e-commerce systems, defining digital marketing and customer experience management evolution

Trend	Description of trend	Examples of global integrations
AI-driven personalization	Using artificial intelligence to tailor interactions	Salesforce Einstein, Zoho Zia
Omnichannel strategies	Combining data from a website, apps, offline locations, and marketplaces	Adobe Experience Cloud
Speed and mobility	Support for mobile CRM to work with clients in any environment	HubSpot Mobile, Zoho CRM App
Low-code/No-code integrations	Setting up processes without programming	Make (ex-Integromat), Zapier
Modularity and API	Ability to connect the necessary functions as the company grows	Shopify API, Magento Open-Source API

Figure 2: Modern trends in the use of artificial intelligence and machine learning in digital CRM to increase conversion in e-commerce of modern companies

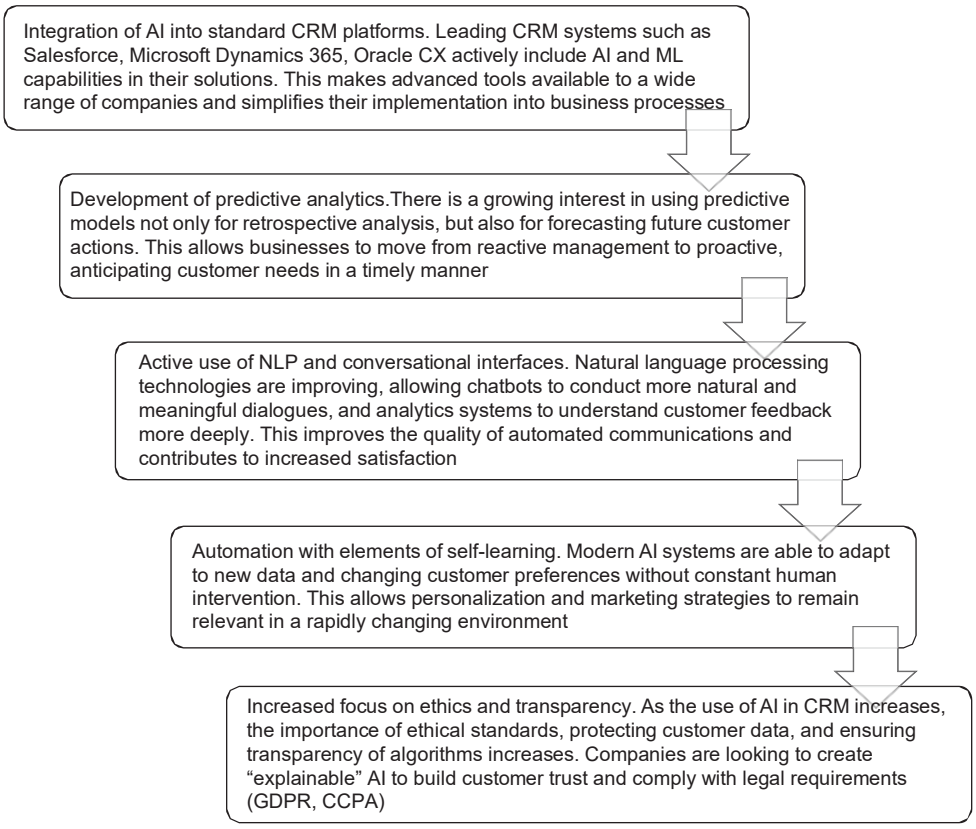
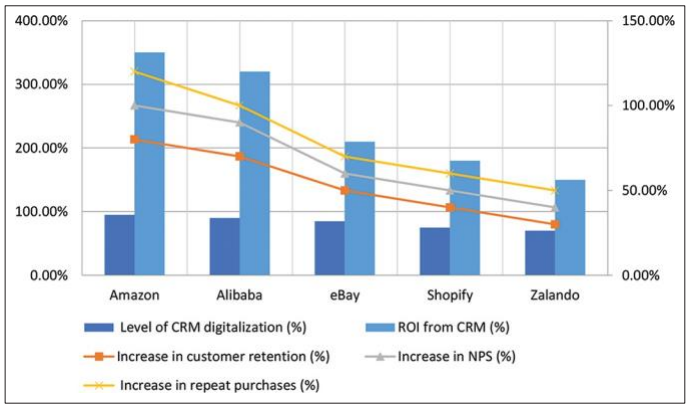


Table 2: Key aspects of e-commerce and customer relationship management: integration of technologies into the marketing strategy of modern companies

Company	Level of CRM digitalization (%)	NPS (%)	CRR (%)	RPR (%)	CLV (thousands of $)	Number of clients (million)	Average check ($)	Investments in CRM ($ million)
Amazon	95.00	58.00	89.00	72.00	1350	310	75	450
Alibaba	90.00	54.00	85.00	68.00	1200	780	65	400
eBay	85.00	46.00	78.00	61.00	980	180	60	230
Walmart	80.00	50.00	80.00	65.00	1100	150	70	300
Shopify	75.00	52.00	75.00	58.00	850	40	55	150
Zalando	70.00	48.00	72.00	55.00	780	35	58	120

average customer lifetime value (CLV), as well as quantitative indicators such as customer base size and average check. Amazon demonstrates a high level of CRM digitalization - 95,00%, which is reflected in leading NPS (58,00%), CRR (89,00%) and RPR (72%) indicators. High CLV of $1,350 thousand emphasizes the success of customer retention and value enhancement strategies. Significant investments in CRM ($450 million) provide innovative automation and personalization solutions. Alibaba, with a digitalization level of 90,00%, shows similar indicators, slightly inferior to Amazon in all key metrics. With a larger customer base (780 million), the company is effectively scaling its digital solutions, which is reflected in a CLV of $1,200,000. eBay and Walmart are represented by an average level of CRM digitalization (85,00% and 80,00%, respectively). Despite lower NPS and CRR, these companies are actively implementing new digital tools, which contributes to the growth of loyalty and repeat purchases. Shopify and Zalando are characterized by a lower level of digitalization (75,00% and 70,00%), which correlates with customer engagement and economic value. However, these companies demonstrate active investments in CRM and growth in key metrics indicating the potential for digital transformation (Santos and Oliveira, 2024). An extensive methodological scheme was adopted to determine the effectiveness of the integration of AI and ML solutions into e-commerce CRM-S for the study, including gathering and analyzing data of key CRM customer indicators before and after integrating the solutions. The applied measures were retention, NPS (net satisfaction score), repeat purchase rate, and ROI (return on investment). Comparison of the indicators of world-leading companies, which have implemented integrated CRM-solutions, was used as a method. It is a systems economic method of complexity of quantitative analysis and a number of points of statistical calculation methods and a demonstrative model and a factor model, that allows to establish cause-effect relationships between a degree of digital technologies of CRM and marketing strategy efficiency. Of importance of the method is the focus of the dynamic control of the indices in real-time, which provides the flexibility and precision of the estimation. Factor analysis was applied in the study following this systematic approach and factor modelling, that allowed them to develop cause-effect relationships between the degree of the CRM digitalization and the increase of marketing indicators. A significant element was the comparative analysis of the initial and final indicators before and after the introduction of modern CRM systems, including those designed with artificial intelligence and machine learning. The main findings of factor modelling of the cause-effect relationships of the degree of CRM digitalization, the rise of marketing performance indicators are provided in Figure 3.

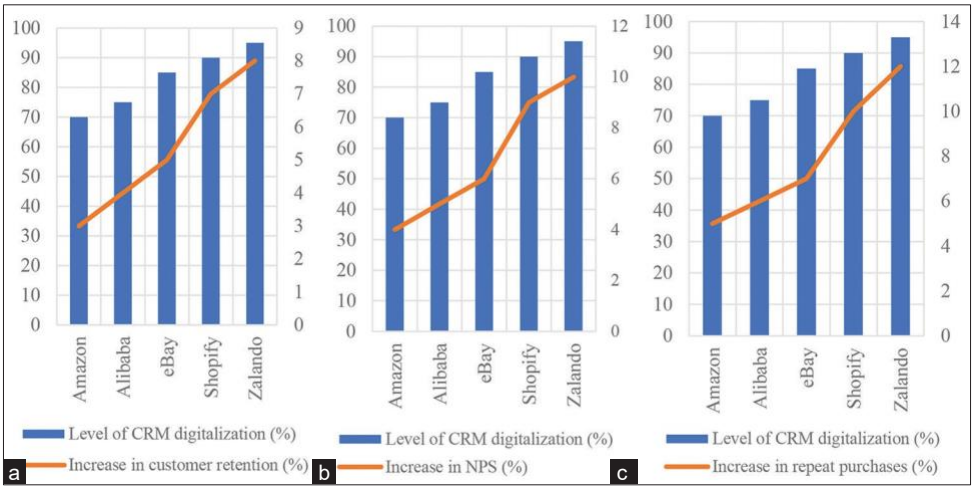
Figure 3: Main results of factor modelling cause-and-effect effects in the degree of CRM digitalization and the development of marketing indicators



The data analysis corroborates a positive relationship between the level of digitalisation and all the indicators analysed. Firms that are more tightly integrated with CRM achieve significantly higher levels of loyalty and marketing standards (Al-Ababneh et al., 2024). The results of the table show that digital CRM systems transformation contribute in growing the competitiveness and sustainable development for ecommerce enterprises. The figures suggest that the more personalised and automated the duties you perform for a customer will allow you to develop long-term relationships and overall increase revenue. By examining the above table data, it is also feasible to triangulate the established relationships among the degree of digitalization of CRM systems and KPIs related to marketing strategies in e-commerce. To do this, we went to internecinal graphics, where the relationship between the degree of digitalization and levels of growth of customer retention, increase in NPS and how much repeat purchase growth was illustrated. Graphs are presented in a methodology obtained by system index and factor analysis of the sample of top companies in the sector. By making use of visualization, you can discover trends, and whether the dependency is linear or non-linear and to make the results of your research easier to understand. This visualization provides an instrument for an in-depth analysis of CRM digitalization effects on efficiency of customer relationship management. The leading relationships relating to the digital transformation of CRM systems and marketing-related KPIs in online trading are shown in Figure 4.

The graphs indicate a direct trend: the more digital the CRM score, the higher the levels of customer retention, NPS and share of wallet. That's prove of the theory that the combination of

Figure 4: Main interrelations between the level of digitalization of CRM systems and KPIs of marketing strategies of help of digital technologies in e-commerce (a) Increase in customer retention (%) depending on the level of digitalization of CRM (%); (b) Increase in NPS (%) depending on the level of digitalization of CRM (%); (c) Increase in repeat purchases (%) depending on the level of digitalization of CRM (%)



modern CRM software with AI and machine learning makes for great customer experience and loyalty. Raise More Money By Setting Up Your CRM Systems That said, every system needs to be set-up the right way to see results. The significance of investment in digital technologies are essential for e-commerce firms with the aim of enhancing competitiveness and sustenance in the marketplace (Fernandez and Zhang 2024). The findings of this study suggest that despite the benefits presented, a holistic strategy to digitization of the CRM process is necessary, where personalization and automated communications are prioritized. With greater degree of digital integration, there is continued growth of Customer Retention, Net Promoter Score (NPS) and Repeat purchase (Hernandez and Lopez, 2024). These trends suggest that companies that successfully apply innovative AI and ML based solutions are likely to gain better insights into customer's needs and provide more personalized interactive experiences. Enhancing customer retention benefits the long-term profitability of a business, since the cost of acquiring new customers is mitigated. Rising NPS is a sign of heightened favour and advocacy, supplying an additional competitive edge. Repeat buys are a key parameter to evaluate marketing success and long-term customer loyalty. Therefore, the observed dependencies are strictly confirming the initial hypotheses of the study and legitimizing investment into digitization of CRM processes. Such findings highlight the need for a structured technology integration process that might enable businesses to better respond to the fast-pace changes of the market and enhance the effectiveness of both marketing and customer service.

5. CONCLUSION

The conducted research confirmed the strategic importance of integrating digital technologies, in particular CRM systems and intelligent platforms, into the architecture of modern e-commerce. The theoretical and empirical provisions presented in the article substantiate a close relationship between the level of technological maturity of customer relationship management and key indicators of marketing effectiveness: customer retention, depth of personalization, conversion rate and frequency of repeat purchases. The results of the study demonstrate the high level of efficiency of integrating digital CRM systems and e-commerce platforms as part of a comprehensive marketing strategy. Empirical data collected based on the analysis of companies from various industries (including retail, fintech and logistics) confirm that the synergy between personalization, automation and customer data analysis technologies not only improves customer service indicators, but also directly affects financial and operational results. The use of intelligent data processing systems has made it possible to record stable positive dynamics for a number of key KPIs. In particular, in companies where integrated CRM and e-commerce models have been implemented, there is an increase in average conversion by 17,00-24,00%, an increase in customer retention rates by 15,00–20,00%, and an increase in the average customer lifecycle (Customer Lifetime Value) by 28,00-33,00%. These changes have a statistically significant correlation with the level of maturity of digital solutions and the depth of their implementation in business processes.

Particular attention was paid to assessing the role of automated personalization in various stages of the sales funnel. Predictive analytics tools built into CRM provided more accurate targeting of offers and increased the relevance of communications. Companies using omnichannel approaches achieved a significant increase in repeat sales, as well as a decrease in the number of ineffective marketing touches. It was also found that the use of artificial intelligence systems in customer service (chatbots, intelligent recommendations, automatic triggers) significantly increases the efficiency and accuracy of interaction with the audience, reducing the workload on staff and increasing user satisfaction. The analysis showed that the implementation of such tools provides up to 30,00% growth in customer satisfaction compared to companies using traditional interaction models. Thus, the hypothesis about the critical importance of integrating e-commerce and CRM to improve the efficiency of customer interaction and strengthen the competitive positions of companies in the digital economy was fully confirmed. The results obtained from a solid theoretical and practical basis for further strategies for the development of digital marketing.

The novelty of the study lies in the systematic approach to assessing the impact of CRM and e-commerce integration using real operational data of companies, which allowed us to record specific quantitative performance metrics. A special feature of the study is the consideration of multichannel communication models based on machine learning and an emphasis on behavioral analytics. The specificity of the study is reflected in a deep comparative analysis of the implementation of end-to-end personalization in different regional and industry contexts, which allows us to formulate universal and adaptable recommendations for business. The results of the study are of high practical importance for companies operating in e-commerce and interested in optimizing customer communications. The presented models of CRM and e-commerce integration can be used as a methodological guideline in forming a digital marketing strategy, especially in the context of implementing artificial intelligence and machine learning algorithms. The described dependencies and derived KPIs allow you to accurately determine the focus of digital investments, reduce customer retention costs and increase the return on marketing campaigns. Moreover, the findings can be applied to forming customer service policies, loyalty programs and personalized pricing, which is especially important in the context of high competition and digital saturation of markets.

The research prospects in the field of integration of e-commerce technologies and customer relationship management remain very broad and promising. First of all, the topic remains relevant due to the rapid development of digital platforms and the increase in the volume of consumer data, which creates new opportunities for deep analysis of customer behavior and personalization of marketing strategies. A promising area is the further improvement of artificial intelligence and machine learning algorithms that allow more accurate prediction of customer needs and adaptation of offers in real time. In addition, special attention should be paid to the development of omnichannel strategies that provide a seamless experience of interaction with the brand on all platforms and devices. An important area remains the study of the ethical and legal aspects of the use of digital technologies in customer data management, especially in the context of tightening personal data protection regulations.

Also promising is the study of the impact of new technological trends, such as blockchain and metaverses, on the transformation of customer relationships and increased trust. In practice, the results of such studies will help companies build more sustainable and effective marketing strategies that help strengthen customer loyalty and increase competitiveness. Thus, an integrated approach to studying the integration of technologies in CRM opens up broad horizons for scientific research and practical innovation.

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