

Keywords: artificial intelligence (AI), customer relationship management (CRM), systematic literature review, bibliometric analysis, AI-CRM integration

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Optimizing customer relationship management through AI for service effectiveness: Systematic literature review

Abstract

The current technological evolution has resulted in changes in the global business landscape. The technological changes have resulted in an organization's business processes changing due to increased customer expectations that have also changed service standards with customer management tools. The adoption of new technologies, namely artificial intelligence, has become an innovative approach strategy to Customer Relationship Management for organizational sustainability. This article aims to provide literature about integrating AI into CRM using a systematic literature review with bibliometric analysis to explore the latest trends in CRM development influenced by AI technology and the benefits and challenges faced by organizations from AI technology. This study is essential for any industry that adopts AI technology in CRM in organizations. This research was conducted by reading and analyzing 25 articles and papers related to AI and CRM. The 25 studies will be processed using the Vos Viewer tool to visualize the development of CRM trends influenced by AI technology. The study found the benefits of integrating AI-CRM into organizations by increasing operational efficiency and effectiveness, increasing customer interaction, and personalizing services. However, organizations face challenges that require aligning AI-CRM models with their specific needs, cultural transformation, and balancing the roles and responsibilities of humans and AI within CRM operations. In conclusion, the study found that a thorough understanding of the impact and purpose of the role of AI-CRM is needed, conditioned by the organizational situation, to maximize the benefits and minimize the risks of integrating AI with CRM in an organization.

1. INTRODUCTION

In the current technological evolution, technology has changed every line of business globally where technology can change, improve, and simplify business processes to be more effective and efficient (Sewpersadh, 2023). Customer expectations will increase along with the evolution of technology, which makes companies change their standards with the right customer management tools to provide the best service to the market (Sardjono et al., 2023). The importance of understanding consumer behavior, preferences, and needs is a major challenge in managing customer relationships that require innovation in the operational process, product introduction, and service (Sofiyah et al., 2024). Without an understanding of these aspects, it won't be easy to provide a personalized and meaningful experience in the implementation of a Customer Relationship Management (CRM) system (Sofiyah et al., 2024).

The profound changes in the business landscape due to the evolution of technology in AI have led to an innovative approach to Customer Relationship Management (CRM) and customer service (Darban et al., 2024). Every customer interaction such as website visits, purchases, or customer service will generate data. The CRM system will use this information to help businesses make the right decisions, optimize operations, and provide a better user experience. In analyzing the increasing volume of customer data due to changes in the current era and managing and building strong relationships with loyal or potential customers according to existing information, CRM requires technological support to automate the entire process related to customers (Yoo et al., 2024).

Based on this view, in obtaining good performance, high productivity, to competitive advantage, several companies and organizations have adopted new technology (Paşcalău et al., 2024). AI has an important role in predicting company decisions, processing big data to provide solutions, and be able to interact with

customers in real time (Sardjono et al., 2023). The increasing maturity of AI technology with increased functionality, increased information processing, and a more interactive user experience so that AI has the potential to drive business development (Darban et al., 2024).

Integrating CRM systems with AI is very important for companies in the current era of industrial evolution so that they remain sustainable (Rahman et al., 2023). Integration of AI with CRM systems has the potential to improve operational efficiency and better customer experience (Darban et al., 2024). AI-driven CRM has the potential to gain insight from data, interpret patterns, and make decisions with limited human intervention (Ledro et al., 2023). AI technology with CRM allows companies to analyze data and be able to connect with customers faster but with a larger scope (Libai et al., 2020). In the long term, it will allow for interaction between humans and AI-driven systems and customers resulting in the provision of more personalized services widely at lower costs, which can change the nature of customer service (Libai et al., 2020).

Despite the growing interest in implementing AI in CRM due to its huge potential, many organizations still lack an understanding of how to integrate AI to generate meaningful value and impact effectively (Ledro et al., 2022). AI has the potential to be a revolution in redefining customer relationship management. However, several studies discuss how AI technology can be accepted, used, its benefits, and challenges, discussions about the use of AI in CRM to improve customer service are still few. To address this gap, this article aims to provide important insights that focus on the broad implications of the effects of AI in CRM on service effectiveness.

In this article, an in-depth examination will be conducted on how AI technology can optimize CRM systems. Specifically, this article focuses on how AI capabilities can improve service effectiveness can optimize customer relationship management (Libai et al., 2020). A review of previous studies on the use of AI in CRM systems aims to identify the development and potential of CRM optimization with the help of AI. This study provides a comprehensive review of the application of AI in optimizing CRM systems, determining the main focus for future research, especially in terms of AI-CRM affecting long-term customer relationships and organizational performance for effective service delivery (Yoo et al., 2024). This is useful for future research and researchers who find perspectives on related topics. The following three research questions are raised to achieve this goal: (1) What are the main trends in the implementation of Artificial Intelligence in CRM systems across industries?; (2) Are organizations gaining operational and functional benefits from integrating AI into their CRM systems?; (3) What are the challenges organizations face when integrating AI into CRM systems?

2. LITERATURE REVIEW

2.1. Definition of customer relationship management

CRM is a strategic system that includes the collection, management, and utilization of data intelligently through the encouragement of technological innovation in developing valuable relationships with customers and identifying the best customers (Chatterjee et al., 2023; Ledro et al., 2022). In the 1990s, the concept of CRM emerged, which made various organizations invest large resources to successfully implement and apply CRM in their organizational strategies (Yoo et al., 2024). According to (Libai et al., 2020), CRM is defined as a comprehensive strategy and process for acquiring, maintaining, and collaborating with certain customers in producing excellence for the company and customers. CRM includes marketing, sales, and customer service integration activities to obtain greater efficiency and effectiveness in providing value to customers. CRM is one of the important innovative technologies in increasing customer satisfaction, loyalty, and profitability (Dastjerdi et al., 2023). The organization's expertise in utilizing CRM can be measured through the ability to analyze customer data accurately (Chatterjee et al., 2023). In today's digital era, data is a competitive advantage and added value, therefore the use of CRM that works with all forms of AI is one way to identify these opportunities (Saura et al., 2021). The academic community emphasizes that AI will represent the next evolution towards more sophisticated and efficient CRM optimization (Mishra & Mukherjee, 2019). Therefore, many studies collectively discuss the potential of AI-powered CRM by covering aspects of AI that influence the development of increasingly sophisticated CRM (Ledro et al., 2023).

2.2. Definition of artificial intelligence

According to (Kaplan & Haenlein, 2019), AI is defined as “the ability to correctly analyze external data, to learn from that data, and to apply that learning to achieve specific goals and tasks through flexible adaptation”. In the same article, researchers have proposed two AI classification schemes, the first is based on the stages of AI development, while the second is based on the style of intelligence demonstrated by the AI system (Majumder & Dey, 2022). In recent years, AI has become the core of many sectors of activity that have adopted new information technologies, which if utilized properly can provide the best prospects in application sectors across the board (Barredo Arrieta et al., 2020). In the long term, AI-controlled systems allow for human-like interactions and enable the provision of personalized services to customers at a lower cost, which may change the nature of customer service while doing so (Kaplan & Haenlein, 2019). Reference (Chatterjee et al., 2021), explained that the implementation of the AI-CRM system will have a positive impact on organizational performance if the development factor is equipped with a better implementation process the organization's ability to accept technology and the strength of employee cognitive acceptance of the new system based on the expertise developed. Reference (Chatterjee et al., 2021), the quality of AI-CRM implementation must be effective, and the organization's employees must have insight and expertise in implementing, maintaining, and refining the system. In the same article, the factor that supports the success of AI-CRM implementation is the organization's technological capabilities. The integration of CRM with AI has several advantages, academics explain the increase in customer acquisition and retention, minimization of churn among customers, and increased customer engagement (Monod et al., 2023). In addition, observations in several studies show that organizations need to pay attention to various factors that are key to getting the best potential from AI integration in CRM (Chatterjee et al., 2021).

In its development, AI-integrated CRM Systems have evolved rapidly with machine learning, natural language processing, and deep learning techniques, allowing AI to do repetitive tasks that were previously done by humans. Successful companies have optimized CRM with AI technology to analyze customer data, use chatbots and virtual assistants, more personalized marketing strategies, voice and image recognition, and predictive analysis (Ledro et al., 2023). However, according to (Miraz et al., 2024) the use of AI in the form of chatbots to increase the effectiveness of customer relationship management is not effective, because the application of AI in CRM must refer to security, reliability, and transparency factors that can reduce service effectiveness. In addition, other literature states that biased customer data, system design, complicated integration with legacy systems, and dependence on AI-CRM can reduce its effectiveness, especially in service and operations, because AI-CRM depends on data quality, AI system design for complex problems, organizational readiness, and fallback mechanisms to humans for maintain balance in interactions with customers.

3. METHODOLOGY

3.1. Data collection

To achieve the objectives of this study, the author uses a complete literature study with the Systematic Literature Review (SLR) approach combined with bibliometric analysis. The use of SLR in this study is to identify, collect, and evaluate various relevant research results that have been published by ensuring the inclusion and exclusion criteria of the study (El Bakkouri et al., 2022). Bibliometrics are used to analyze mathematically and statistically in building intellectual relationships between articles and keywords that will provide a broad view of increasing trends and the probability of potential research. This approach is used not only to identify clusters but also to measure the significance of co-occurrence metrics to validate their relevance (Ledro et al., 2022).

The results of data collection through the database detailed in section 3.2 can be accessed here: <https://doi.org/10.5281/zenodo.14769629>.

3.2. Selection of article database

The data collected are the results of research published in journals online. Due to limited university access, the literature study search process uses three databases for analysis: Scopus-Science Direct, Springer, and MDPI.

3.3. Search terms

To identify research that followed the researcher's objectives, the researcher searched the three selected databases using keywords that have correlations in AI and CRM. In searching, the use of Boolean operators AND & OR, the researcher used the search keywords ("Artificial Intelligence" OR "AI") AND ("Customer Relationship Management" OR "CRM"), "Artificial Intelligence" AND "CRM", & "Artificial Intelligence Customer Relationship Management" in the title, abstract, and keywords. There are 10.764 analysis results from the three databases. The selection process uses the PRISMA method to find research that is relevant to the research question.

3.4. Selection of paper: Inclusion and exclusion criteria

Selection of articles or papers that meet the inclusion criteria below:

- Existing studies must contain studies related to the implementation of artificial intelligence in customer relationship management.
- Articles are by the research question.
- Articles published between 2019-2024.
- Articles written in English.
- Types of research documents in the form of articles and papers.
- Published with open access.

Conversely, exclusion criteria include:

- Research topics are not related to the scope of the study.
- Not included in the period range.
- Not written in English.
- Not including articles and papers.
- Not published with open access.

3.5. Data analysis

The selected articles and papers will be analyzed using bibliometric analysis and SLR, which examines research in the context of articles on the use of artificial intelligence in customer relationship management to map related fields and identify important themes in them. The data will be processed with the Vos Viewer tool for visualization of co-occurrence networks that describe the relationships between keywords.

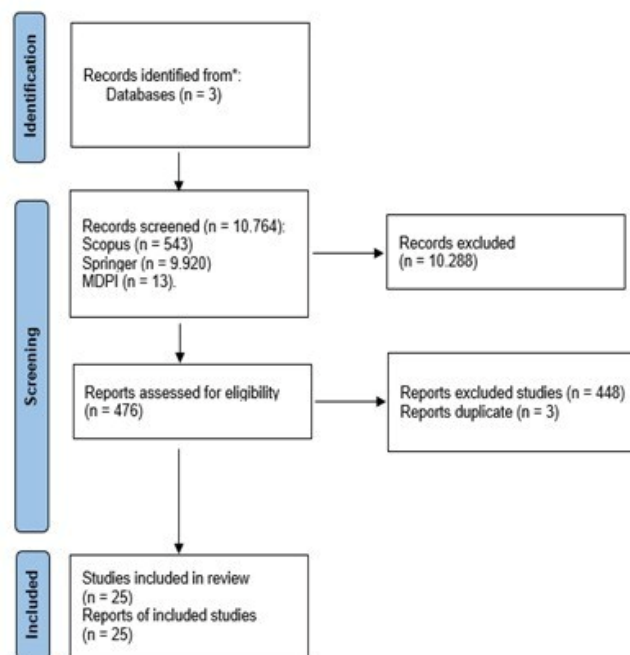


Fig. 1. PRISMA flow diagram

Each cluster is formed based on frequency and co-occurrence that allows for accurate identification of important themes in this study. The data is analyzed to measure performance and visualize trends through keyword co-occurrence analysis. The results of the analysis are cross validated with literature from the three databases.

4. RESULT AND DISCUSSION

Titles and abstracts of 25 selected papers and articles will be processed using Vos Viewer tools to visualize the development trends of artificial intelligence technology integrated with CRM that affect organizations and companies in the study as shown in Figure 2. This study involves 25 selected papers and articles to find trends, benefits, and challenges of AI integrated with CRM.

The keyword clusters generated from Vos Viewer identified four dominant clusters representing research themes in AI-CRM integration. In Figure 2, the co-occurrence network visualization analysis shows the relationship between one keyword and another keyword in the study, where each cluster shows a discussion group that is often discussed by researchers, indicating that the keywords Study, CRM, Organization, and Artificial Intelligence are the core of discussions related to AI-CRM integration, followed by other keywords such as Data, Relationship, and Time, which show an important role in shaping the strategy for implementing AI in the CRM system.

The items that are directly related to the Study and based on color/cluster grouping are presented in Figure 2. The item group is divided into 4 clusters shown in Table 1 along with the item details. The first cluster in blue includes terms such as CRM, Organization, Customer Relationship Management, Artificial Intelligence, Business, Challenge, and Data. The second cluster in red includes terms related to Study, AI CRM, Family Business, Impact, and Time. The third cluster in dark blue includes terms related to Company, Customer, Customer Satisfaction, and Relationship. The last cluster in yellow includes the terms AI chatbot and Intention. Clusters identified also provide direct evidence supporting the research questions regarding the operational benefits and challenges related to AI-CRM integration.

Tab. 1. Item occurrences

No	Items	Frequency	Cluster
1	Study	67	2
2	CRM	29	1
3	Organization	25	1
4	Customer Relationship Management	24	1
5	Data	21	1
6	Artificial Intelligence	21	1
7	Relationship	16	3
8	AI CRM	15	2
9	Time	13	2
10	Business	13	1
11	Company	12	3
12	Challenge	12	1
13	Customer	12	3
14	Customer Satisfaction	12	3
15	Impact	12	2
16	Family Business	9	2
17	Intention	9	4
18	AI Chatbot	9	4

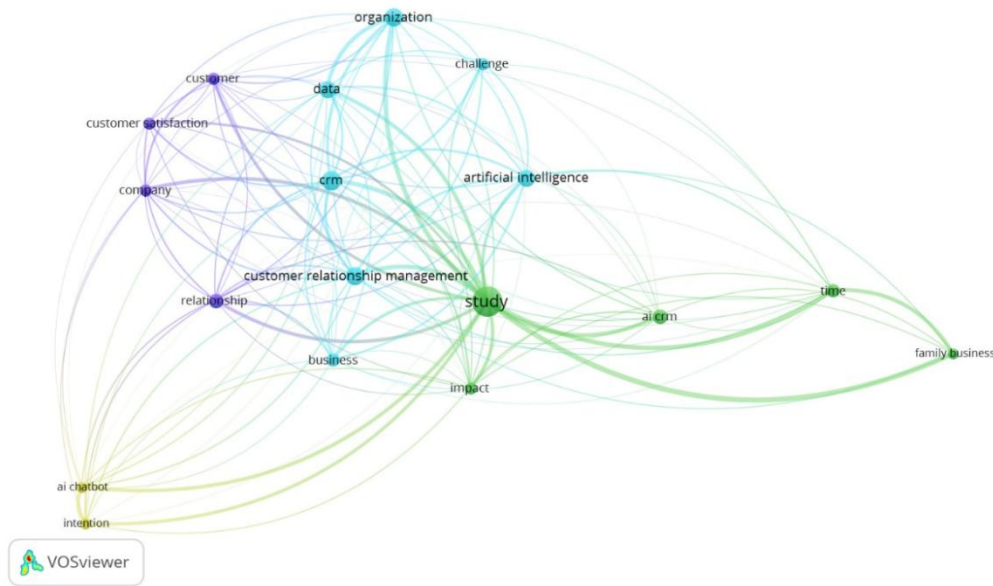


Fig. 2. Cluster analysis of Co-Occurrence with titles and abstracts

Figure 3 shows that there is a development in study trends marked with a bold line/highlight (between CRM, artificial intelligence, organization, and study) starting in 2022 which are AI and data related to organizations. Early studies suggest that successful organizations need to consider the AI revolution to analyse and manage large amounts of customer data which is an important aspect of a business (Chatterjee et al., 2019).

Figure 3 provides information related to the distribution of research based on the year of publication. The light colors represented by green and yellow indicate that the research is newer, meaning that the research topic is still considered feasible. As seen in Figure 3, topics such as Relationships, CRM, Intention, Customer Satisfaction, Impact, and AI chatbots have become topics that are often researched in recent years. The topic emphasizes the role of AI chatbots in CRM strategies that impact customer intention in increasing customer satisfaction. This is in line with and validated by a study conducted by (El Bakkouri et al., 2022; Miraz et al., 2024) on the importance of chatbots as a transformative tool to improve CRM functions, as well as AI-CRM strategies to drive long-term customer relationships (Chatterjee et al., 2023).

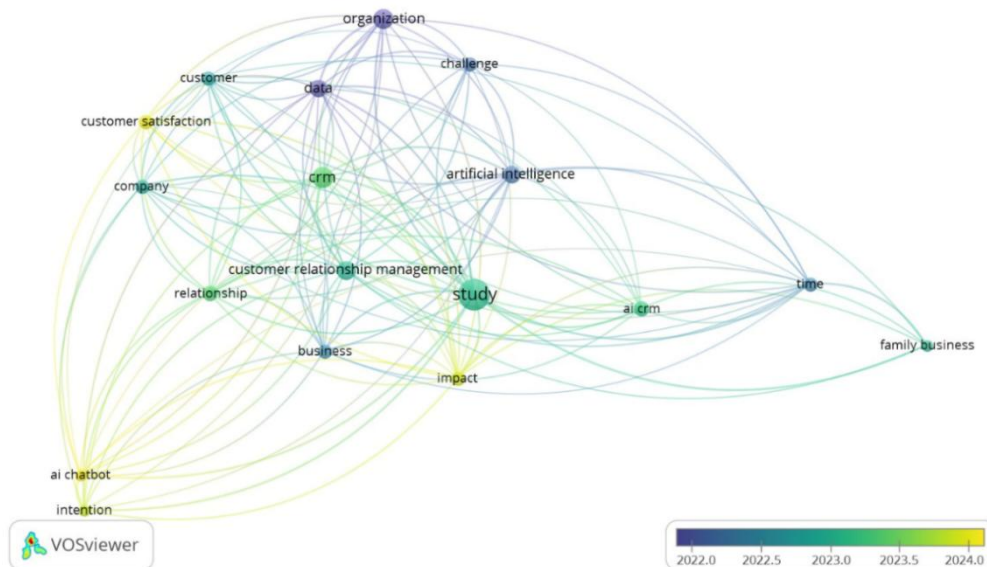


Fig. 3. Overlay visualization trend

Figure 4 illustrates the emergence of keywords and their relationship between one keyword and another. Where the keyword analysis is divided into 4 clusters with labels on each cluster contained in Table 2, each cluster has a special theme that is interrelated.

Cluster 1 contains the keywords CRM, Organization, Data, Artificial Intelligence, Challenge, Business, and Customer Relationship Management. In the context of research on optimizing CRM with AI, the first cluster focuses on analysing CRM related to data management and utilizing technology in an organization where data management and utilization of AI in an organization have the potential to increase the efficiency of customer management that focuses on business transformation using CRM. The relationship of this cluster is validated in a study conducted by (Chatterjee et al., 2019), namely that AI integrated with CRM provides transformative benefits in business by utilizing customer data to improve operational capabilities. This is also reinforced by (Gaczek et al., 2023) research which states that organizations that adopt AI effectively in CRM will focus on handling challenges related to data management and business transformation. However, there is a difference in the results of research conducted by (Dastjerdi et al., 2023) in the healthcare industry, saying that the integration of AI in CRM systems related to patient medical records, companies must pay more attention to data security and patient privacy.

Cluster 2 contains the keywords Study, AI CRM, impact, time, and family business. In the context of research on optimizing CRM with AI, the second cluster focuses on analysing the discussion of studies that focus on the influence of technology on CRM, where the discussion is in-depth regarding the impact of implementing AI in CRM, especially on a family business scale and regarding the right time for its implementation. This cluster was validated in a study conducted by (Chatterjee et al., 2023; Chaudhuri et al., 2023), where the importance of time in implementing AI-CRM will affect its effectiveness, especially in the context of family businesses.

Cluster 3 contains the keywords Relationship, Customer, Company, and Customer Satisfaction. In the context of research on optimizing CRM with AI, the third cluster focuses on how customer relationships with companies include impacts on customer satisfaction. This cluster explores the discussion on how CRM can strengthen the relationship between customers and companies in achieving customer satisfaction. This is validated through research conducted by (Miraz et al., 2024; Rahman et al., 2023), who both argue that stronger customer relationships are developed through AI-CRM systems which result in a significant impact on customer satisfaction.

Cluster 4 contains the keywords AI Chatbot and intention. This cluster focuses on how the use of technology such as AI Chatbots can drive CRM capabilities. This cluster explores the discussion on the role of AI Chatbot as an important basis for interactions with customers to improve service efficiency and effectiveness. This cluster is validated through research conducted by (El Bakkouri et al., 2022; Khneyzer et al., 2024; Sofiyah et al., 2024), all three studies argue that AI Chatbot in CRM influences customer intention by providing interactive experiences through efficiency and effectiveness in automating repetitive tasks and improving services, thereby increasing CRM capabilities in various industries.

Tab. 2. Label cluster

Cluster	Color	Label
1	Blue	CRM, Organization, Data, Artificial Intelligence
2	Red	Study, AI CRM
3	Dark Blue	Relationship, Customer
4	Yellow	AI Chatbot, Intention

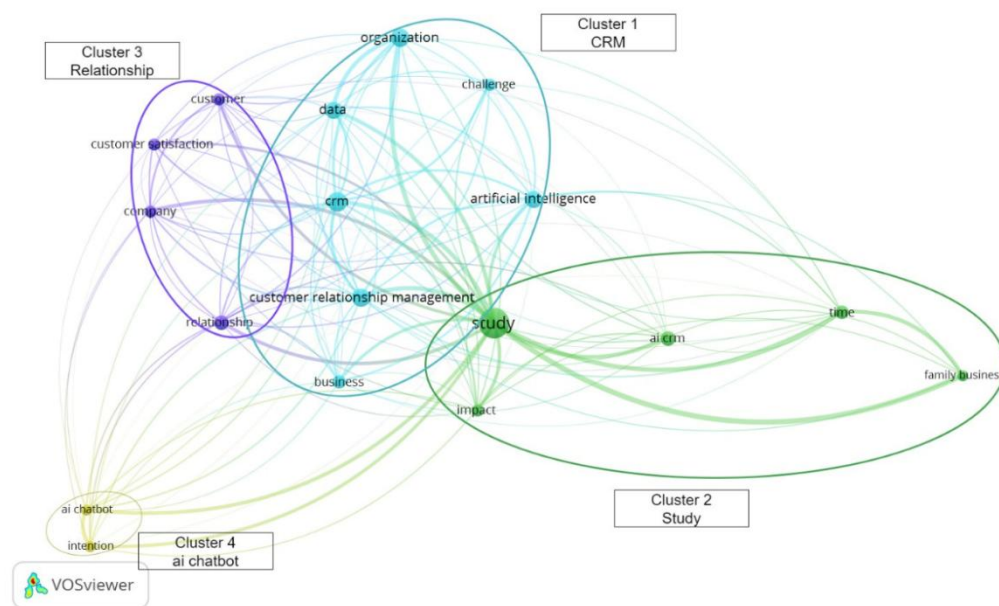


Fig. 4. Output vcluster analysis

These clusters represent a diversity of perspectives on AI integration in CRM that are in line with previous research trends, ensuring their relevance to the CRM landscape and broader understanding.

4.2. Benefits of integration AI CRM to organization

Based on the visualization of Fig. 4 further described in Table 2, clusters 3 and 4 highlight benefits that focus on the critical role of AI in driving intent, customer satisfaction, and strengthening relationships. The connection of AI with CRM as an operational system provides a solution for companies in the development of a connected business ecosystem and disruptive innovation (Yoo et al., 2024). In this case, AI-CRM can extract meaningful information from large data sets, complete various tasks, identify opportunities, and improve customer interactions (Miraz et al., 2024; Sardjono et al., 2023; Yoo et al., 2024). AI-CRM plays an important role in today's industry, especially in the retail, tertiary, and tourism sectors with the use of chatbots having a positive impact on customer service through real-time interaction, personalization, reduced operational costs, and data and information analysis (Khneyzer et al., 2024; Sofiyah et al., 2024), but in the healthcare sector there are concerns about misuse and potential errors against patients (Khneyzer et al., 2024). AI-CRM has a positive impact on marketing, especially digital marketing by using machine learning and Big Data with the support of data-based marketing strategies to obtain customer knowledge data and performance evaluations that focus on understanding user behavior, innovation strategies, customer orientation, and decision-making (Saura et al., 2021). According to (Sardjono et al., 2023), the role of AI in the telecommunications industry has a role with the use of Big Data allowing for predicting decisions, problem-solving, and interacting quickly in achieving productivity in operational activities. In the integration of AI with CRM, improvements not only occur in CRM capabilities but also improve the overall performance of the organization and provide competitive advantages (Yoo et al., 2024). However, this is different from the results of research conducted by (Jaruwanakul, 2024) on large enterprises that the integration of AI in the form of Big Data in CRM provides a competitive advantage but does not affect organizational performance due to the possibility that Big Data analysis does not directly affect the improvement of integration in organizational functions. Companies that apply AI in the CRM process will be better prepared to integrate various functions, improve collaboration between teams, and achieve superior overall performance (Jaruwanakul, 2024). The use of AI-CRM helps the management authorities of business organizations to make the data obtained suitable for use by AI algorithms. The use of AI algorithms can produce more accurate analysis at lower costs without human intervention so that when a problem arises, it will easily provide an efficient and effective solution (Chatterjee et al., 2019).

4.3. Challenges of implementation of integration AI CRM to organization

Clusters 1 and 2 of the visualization of Fig. 4 and described in Table 2 highlight challenges in industries such as family businesses related to data management, business transformation, to strategic implementation of organizations in adopting AI in their CRM. The challenge of implementing AI in CRM is the absence of a specific fixed model, which means that the implementation is adjusted to the company itself (Sardjono et al., 2023). Companies need to identify certain areas such as business objectives, clear KPIs, and ethical principles, for data collection and use in adjusting company needs with the required AI-CRM implementation (Ledro et al., 2023; Saura et al., 2021). Ethical considerations are an important challenge in various industries, especially the healthcare industry which is concerned about data security and privacy because patient data breaches relate to their privacy and safety which can lead to a decrease in trust and legal and regulatory issues (Dastjerdi et al., 2023). Organizations must adhere to ethical principles and regulations embedded in their standard operating procedures by forming an ethics team to define guidelines related to morals, rights, and operational accuracy, this is to avoid bias created by AI that will cause problems for the organization (Ledro et al., 2023). In relation to data, understanding emotions and sentiments generated from customer data is a challenge for AI-driven CRM systems, because previous AI applications were mostly not designed to retrieve and interpret this type of data (Ledro et al., 2023; Libai et al., 2020). The traditional way of working that is isolated in a company is a challenge in achieving AI-CRM implementation due to the cultural transformation in data-based decision-making and a customer-centric approach that requires businesses to collect, store, and analyze large amounts of data (Chaudhuri et al., 2023). A change in cultural mindset is needed not only among management but also among employees, and it also requires effective change management with a phased approach that ensures resources are used efficiently and changes are aligned with strategic goals in transforming and growing the culture by building awareness of the benefits of AI in operational CRM and their performance in the organization, thus increasing interaction and use of AI applications by realizing cultural alignment (Ledro et al., 2023). The need for support from all stakeholders is an important challenge in AI-CRM integration because it will involve many departments that require human resource allocation to ensure everyone is aligned with project goals (Ledro et al., 2023; Libai et al., 2020). In addition, companies need to balance the roles and responsibilities between humans and AI in the use of CRM, where AI can indeed automate tasks and help human work become more strategic, but AI is not a substitute for human insight and empathy (Ledro et al., 2023). Organizations must establish clear roles for humans and AI systems where the knowledge output from the AI system is returned to humans. There needs to be an explanation from the organization about what AI is, its function, how to understand the results, and ask them to use it in balancing AI-human interactions. In addition, allocating human resources to more complex tasks with critical thinking and emotional intelligence are a solution to balancing roles.

5. CONCLUSION

In this research literature review with bibliometric analysis, it was found that trends in research on AI implementation in CRM have been carried out on several topics, which can be classified into four cluster groups. The latest AI-CRM research development trends examine issues related to AI chatbots, intention, impact, and customer satisfaction that support the transformation from traditional corporate and organizational models to distributed organizations. In this case, the new organizational model uses AI to optimize CRM capabilities in improving operational system efficiency such as task automation, processing large amounts of data concisely, identifying opportunities, and increasing customer relationship interactions. Not only in its operational system, but the use of AI in CRM is a solution for improving marketing and sales programs, reaching prospective consumers, integrating functions in an organization, and helping the organization's management authority with lower costs and more effective and efficient performance. In addition, maturing AI technology will increase its functionality, especially in interacting with humans which will result in the provision of more personalized services and more interactive experiences that change the nature of customer service.

However, it is undeniable that implementing AI will face various challenges for both the organization and related human resources. Concerns arise from the implementation of AI-CRM, namely the impact of timeliness and management data. These concerns will cause broader impacts such as ethical consideration, cultural transformation, and the unclear role of AI-Human. The way organizations work that is still traditional, will

hinder the achievement of AI-CRM implementation. Organizations are required to adjust their needs in implementing AI and CRM, organizations must first know what to achieve that is adjusted to the capabilities and thorough assessment to apply AI to their CRM. Organizations need to define what they want to create and what they want to provide with a detailed analysis to produce an understanding and concept of how AI-CRM management is aligned with business goals to achieve AI integration with the greatest impact on their organization. In ensuring the success of its integration, organizations need to prioritize training, guidelines, socialization, and clear business objectives to improve employee competency in using AI effectively and produce more effective and efficient business processes that will enhance competitive advantage and organizational performance. From the HR side, there needs to be support for roles because various departments will be involved in carrying out the AI-CRM function. Often technological advances are considered negative which threaten the role of humans, therefore a sense of ownership and responsibility from HR is needed where technological advances such as AI-CRM are only tools that help organizational performance become more strategic and efficient in achieving organizational goals, not to replace the role of humans in an organization.

This article emphasizes the importance of carefully understanding the impact and intention of the role of AI-CRM conditioned by the organization's situation in maximizing the benefits provided by AI and minimizing unwanted risks. This study is limited by literature in English, literature access, and article and paper data types only, thus limiting the understanding of the use of AI for CRM.

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Veronica and Danang Prihandoko served as research supervisors and research authors. They were responsible for guiding and directing the research, overseeing preparation, data cleaning, and editing the manuscript. Aji Hartanto contributed to data collection, research writing, formal analysis, data processing, and manuscript writing.

Conflicts of Interest

The authors declare that there are no conflicts of interest to this work.

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