A Research Map of Technology-Based Digital e-CRM: A Bibliometric Analysis to Identify Innovations and Future Trends

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ABSTRACT: Digital technologies such as AI, big data analytics, and blockchain have transformed Customer Relationship Management (CRM), enabling businesses to enhance customer interactions and satisfaction. However, research on the evolution, themes, and technological challenges of e-CRM remains fragmented and incomplete. This study applied a bibliometric analysis using publication data extracted from Scopus. A three-stage query process focusing on e-CRM, technological innovations, and customer engagement identified 624 documents, which were refined to 14 relevant publications. Data were analyzed using VOSviewer to visualize keyword co-occurrence, research trends, and collaborative networks. The analysis identified key themes such as customer satisfaction, customer loyalty, and customer experience, alongside the role of advanced technologies like AI, machine learning, big data, and blockchain in enhancing e-CRM efficiency. Social CRM and platforms such as Facebook, Instagram, and Twitter emerged as critical tools for improving customer engagement. Despite technological advancements, challenges such as data integration, system complexity, and security concerns remain prominent. Findings suggest that AI and big data drive predictive analytics and personalization, while blockchain enhances data security and transparency. Addressing implementation challenges is crucial for optimizing e-CRM systems. Future research should focus on bridging gaps in customer engagement and exploring innovative, technology-driven solutions. This study maps the evolution of e-CRM research, highlights technological advancements, and addresses challenges, providing valuable insights for advancing e-CRM strategies in the digital era.

Keywords: e-CRM, Digital Transformation, Big Data Analytics, Customer Experience, Bibliometric Analysis

INTRODUCTION

In recent decades, the marketing and customer relationship management (CRM) landscapes underwent tremendous transformation due to the emergence of digital technologies. Businesses may interact with customers more directly and offer more personal, relevant, and real-time experiences thanks to technologies like social media, data analytics, artificial intelligence (AI), and

the Internet of Things (IoT) (Nguyen, 2023). According to (Smith & Kumar, 2023), there is currently a dearth of comprehensive study on how these technologies might be optimised in CRM, and what little is available frequently concentrates on fragmented features. In this regard, using digital technology to manage client connections strategically is known as electronic customer relationship management, or e-CRM. Businesses may improve security, facilitate decision-making, and solve long-standing obstacles in consumer data management with the use of technologies like artificial intelligence (AI), blockchain, and big data analytics (Lee, 2023; Wang, 2024). However, several obstacles remain to overcome before these technologies can be fully implemented, including complicated system integration and concerns about client data protection (Ozili, 2024). A thorough mapping is required to comprehend the patterns in digital technology innovation and the future course of e-CRM research.

Many aspects of digital technology in CRM have been examined in earlier research, including the use of AI for service personalised and data analytics for customer segmentation (Nguyen, 2023; Wang, 2024). Nevertheless, current methods are frequently restricted to particular case studies or technological areas. This necessitates a methodical mapping process that pinpoints important subjects, innovation patterns, and technical developments in e-CRM research. Our study seeks to close that gap by offering a thorough bibliometric analysis. The study's main objectives are to chart the evolution of research, spot innovative trends, and assess how digital technology may help with e-CRM issues. Using this methodology, the study should offer a thorough summary of e-CRM technology advancements as well as possible directions for further investigation (Ozili, 2024; Smith & Kumar, 2023).

The effectiveness of e-CRM can be increased thanks to the many opportunities presented by modern digital technologies. With encrypted and distributed systems, blockchain, for instance, provides security and transparency in the management of client data (Smith & Kumar, 2023). Big data analytics and artificial intelligence (AI) also assist businesses in comprehensively analysing consumer data to predict customer demands, customise services, and increase customer retention (Nguyen, 2023; Wang, 2024). Businesses can use AI to automate consumer interactions with sophisticated chatbots, while big data analytics allows for real-time trend identification through large-scale data processing.

Furthermore, businesses can offer quicker and more responsive services by using the Internet of Things (IoT) to gather data directly from user devices (Lee, 2023). Implementation issues like data security, technological integration, and resource constraints must yet be resolved, nevertheless (Ozili, 2024)This study will investigate how advancements in digital technology can overcome these challenges and improve e-CRM's efficacy.

There are four primary goals for this study: 1) Methodically charting the evolution of research on digital technologies based on e-CRM; 2) Identifying key themes, trends in innovation, and collaboration patterns in e-CRM; 3) Examining how big data analytics, blockchain, and artificial intelligence may improve the efficiency of e-CRM; 4) Assessing how technical advancements might help with e-CRM implementation obstacles including data integration and security concerns.

Using a bibliometric analysis approach, this study will investigate the most significant publication trends and innovations in the e-CRM space. These findings are anticipated to significantly impact

company operations and scholarly literature, acting as a roadmap for creating more creative e-CRM tactics.

Although e-CRM practices have been greatly impacted by digital technology, a deeper comprehension of integrating this technology must be reinforced. By charting the evolution of e-CRM-based technology research, identifying the most recent advancements, and investigating the difficulties associated with its application, this study seeks to close that gap. A clear image of how digital technologies contribute to improving the efficacy of e-CRM can be obtained by concentrating on technologies like blockchain, artificial intelligence, big data analytics, and the Internet of Things. Therefore, in the current digital era, this research is anticipated to be a valuable resource for scholars and practitioners in creating more inventive and efficient e-CRM (Smith & Kumar, 2023; Wang, 2024).

METHOD

This study aims to uncover important trends in e-CRM research based on digital technology using bibliometric analysis. Using bibliometric analysis, researchers can assess and visualize the body of literature in e-CRM and comprehend the trends and dynamics of research development in digital technology. To obtain a complete view of the research contributions in this area, this study will use this method to gather and examine pertinent publication data from various sources, particularly prestigious databases such as Scopus.

Bibliometrics can be used to quantify the influence of publications, identify research trends, and comprehend the dynamics of knowledge growth in management research (Pynadath et al., 2022)Using bibliometric techniques in e-CRM and digital technology studies helps researchers better comprehend the advancements and patterns in this area. By employing bibliometric analyses, researchers can assess the contributions of previous studies, pinpoint areas that need more focus, and create creative approaches to improving customer relationship management procedures in the digital age.

This study's analytical process consists of several crucial steps, described as follows.

1. Using keywords related to e-CRM and digital technology, publication data will be extracted from the Scopus database. The goal of this procedure was to gather articles on studies conducted in the domains of digital technology and e-CRM. Analysis parameter that used in the searching process are:

| Analysis parameter	Steps for screen data
• Publication Year: 2000–2024. • Document Type: Article, Review, Conference Paper. • Languange: English	• First query using keyword: "e-CRM" OR "Electronic Customer Relationship Management" OR "Digital CRM" OR "Social CRM" OR "Cloud-Based CRM" OR "AI-Powered CRM" OR "Customer Interaction Management" OR "Customer Engagement Platforms". • Second query add keyword to first query with: "Digital Transformation" OR "Digitalization" OR "Technological Innovation" OR "Industry 4.0" OR "Artificial Intelligence" OR "AI" OR "Machine Learning" OR "Predictive Analytics" or "Big Data" OR "Data Analytics" OR "Customer Analytics" OR "Data-Driven CRM" or "Blockchain" OR "Secure Data Management" OR "Decentralized Systems". • Third query add keyword to first and second query with: "Customer Engagement" OR "Customer Interaction" OR "Customer Experience" OR "Customer Retention".

Table 1. Analysis parameter amd keyword
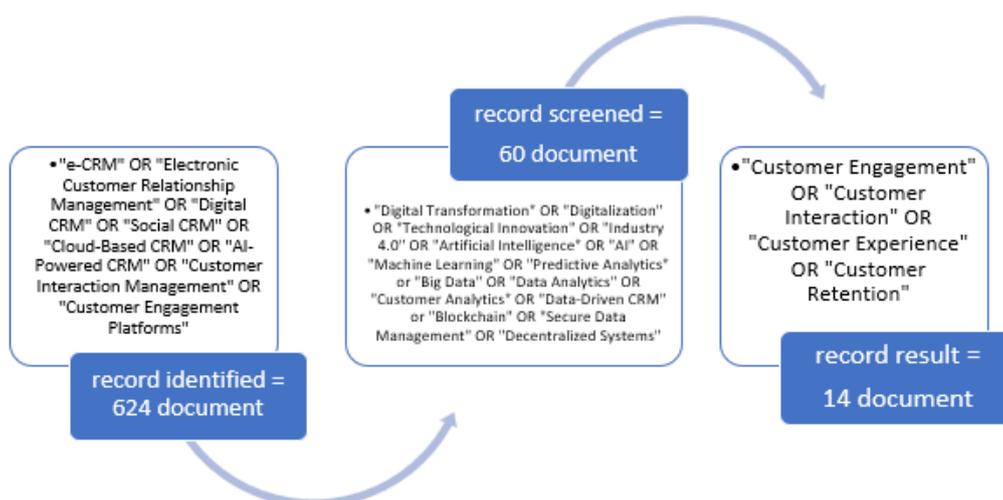
Fig 1. Search result from Scopus database using specific query

2. Following data export, bibliometric software such as VOSviewer or Biblioshiny will be used for the analysis. While Biblioshiny is a user interface for the R bibliometric package that enables more thorough and adaptable analysis, VOSviewer is a well-known tool for producing bibliometric visualizations, such as co-citation maps and author collaboration networks. Using this program, data mapping and visualization will be made easier, which will help academics identify important trends and patterns.

3. analysis parameters applied in this study include three main aspects. First, publication trends were examined using bibliometric analysis to quantify the number of articles published annually, identifying authors, significant journals, and research trends. This approach provides a general overview of how research in digital technology based on e-CRM has evolved over time (Ahmad et al., 2019; Hossain, 2020). Second, keyword mapping through co-occurrence analysis was employed to uncover key themes and emerging study topics. High-frequency keywords were selected for further examination (Chen et al., 2022; Pico-Saltos et al., 2021). Finally, co-citation and bibliographic coupling analysis were conducted to explore relationships between publications. Co-citation analysis identified literature frequently cited together, offering insights into the intellectual structure of the field, while bibliographic coupling determined connections between the publications (Abad-Segura et al., 2020; Singla, 2023).

RESULT AND DISCUSSION

The findings of a bibliometric search carried out using SCOPUS as the primary source have demonstrated significant advancements in e-CRM research and its connection to digital technology. This is a detailed examination of the outcomes for every query. In this bibliometric analysis, search results from each filtering query were compared. It is important to provide background information and gain a greater understanding of how a subject changes over time and how different study aspects are related.
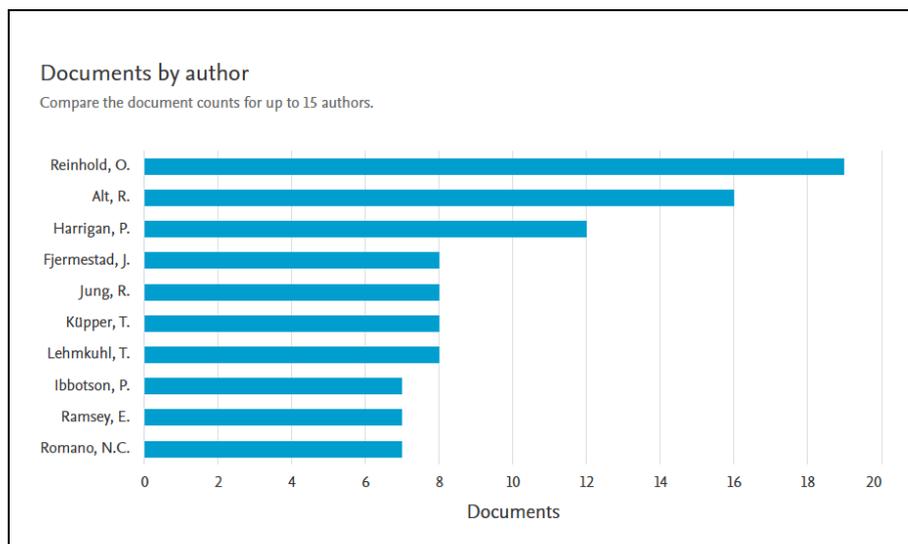
Publication trend and Author productivity over time

a. Keywords like "e-CRM," "Digital CRM," and "Social CRM" were used in the first search, which produced 623 papers. This indicates that research on electronic customer relationship management is of great interest.
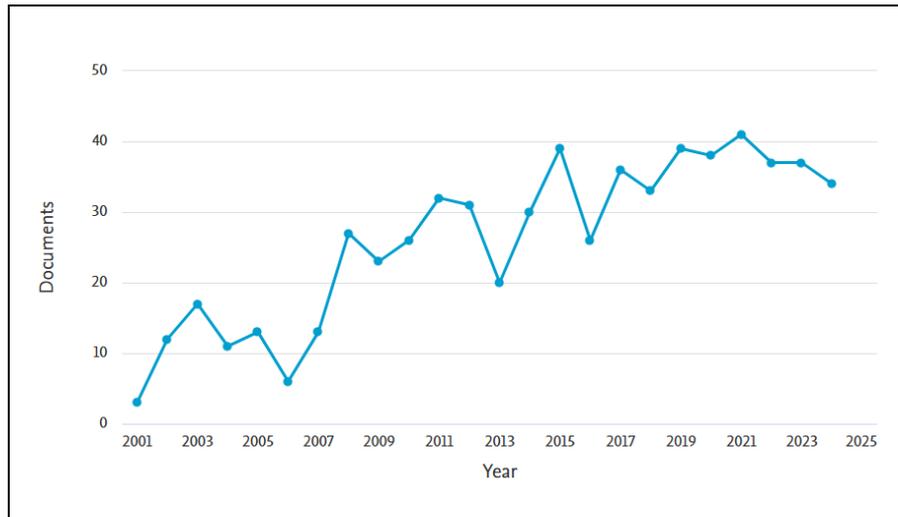
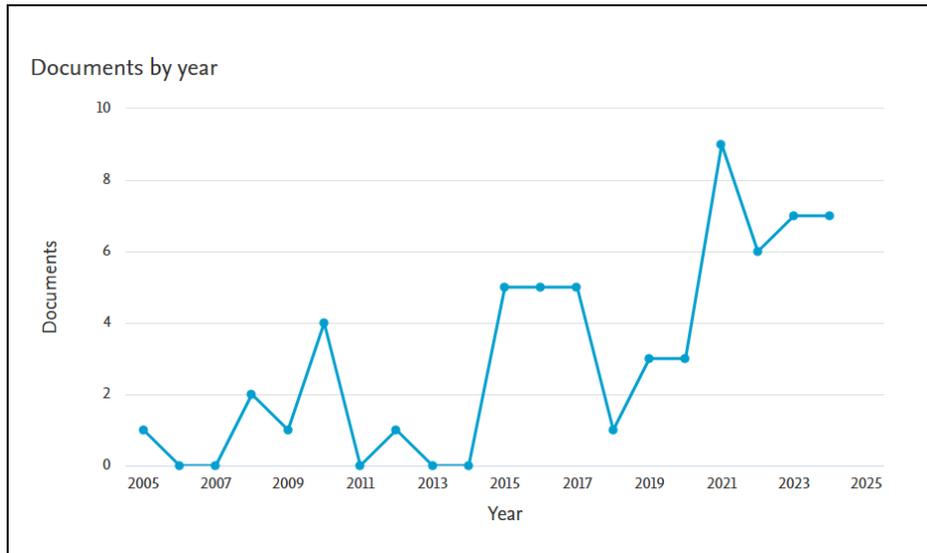Graphic 1. Number of documents by year at first query

Graphic 2. Number of documents by author at first query

With the growing use of digital technology in interactions with customers, these results indicate that e-CRM has become a significant topic in management and marketing. From the adoption of new technology to creative marketing strategies that use e-CRM to improve customer experience, the study in this category probably includes a wide range of topics (Barbu et al., 2021; Lendel & Varmus, 2015).
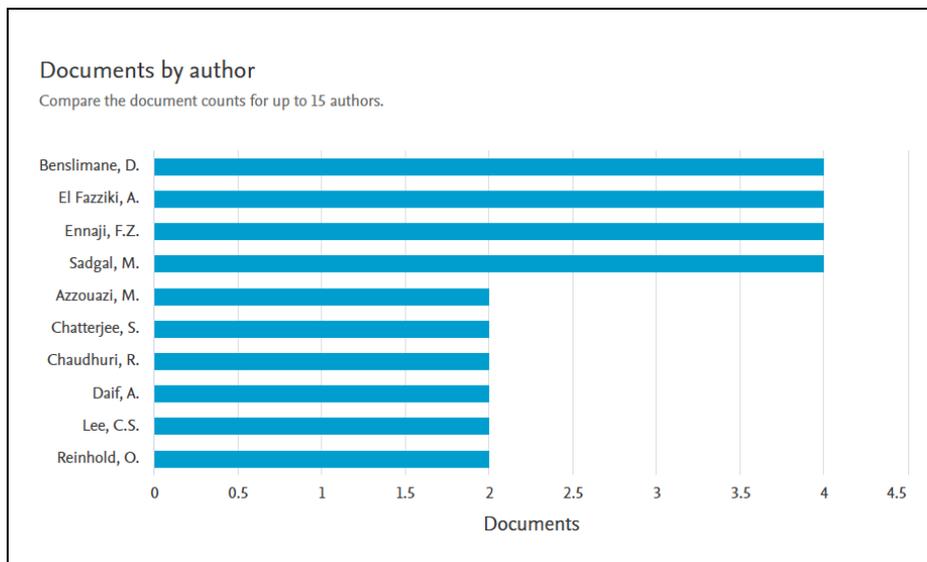
b. The second search returns 60 documents using the related terms "digital transformation" and "technological innovation."

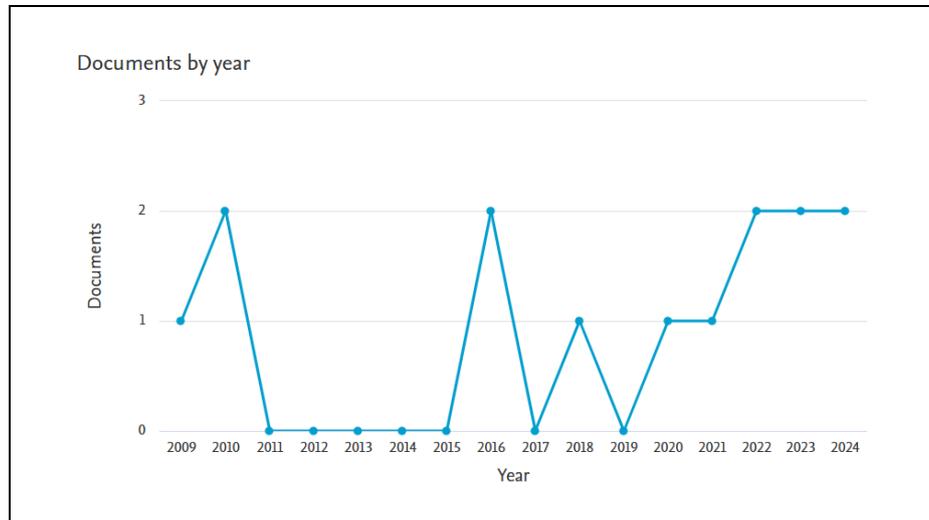Graphic 3. Number of documents by year at second query

Graphic 4. Number of documents by author at second query

These findings suggest a more focused attention on how technological innovation and digital transformation impact e-CRM, even though this figure is significantly lower than the initial question's. To improve the efficacy and efficiency of customer relationship management, research in this area may examine the integration of technologies like blockchain, artificial intelligence, and big data into e-CRM systems. (Jih, 2011; Marolt et al., 2015; Trainor et al., 2011). While e-CRM is a vast topic, not all research explicitly relates it to digital transformation, as evidenced by the decline in the quantity of documents from the first inquiry to the second.
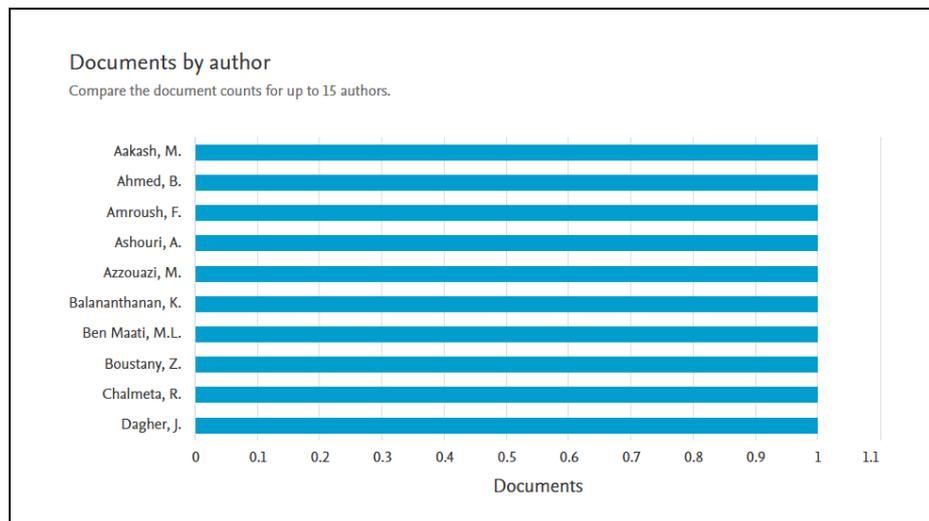
c. The third search produced 14 publications, emphasizing "Customer Engagement" and "Customer Experience. " The results show that while e-CRM and digital technology are of great interest, the emphasis on customer experience and engagement is still relatively new and may not have received enough attention.

Graphic 5. Number of documents by year at third query

Graphic 6. Number of documents by author at third query

This can point to areas that need more investigation to understand better how e-CRM might improve customer experience and engagement in a digital setting (Harrigan et al., 2012; Hassan et al., 2019; Malthouse et al., 2013). When digital technology and customer engagement are added as factors, there is a noticeable change in focus, even though there is a considerable interest in e-CRM generally, according to the comparison of the results from these three inquiries. Just 60 of the 623 documents that discuss e-CRM relate it to digital transformation, and only 14 of those documents concentrate on customer engagement. This suggests that although e-CRM is a wide issue, further research is still needed to explore integrating digital technology and emphasizing customer experience fully.

We can determine who authors published the most papers during various periods by looking at the first through the third graphs. Reinhold, O., is the most productive author in the first graph (2001-2014), with 19 documents, followed by Alt, R. (16 documents) and Harrigan, P. (12 documents). These writers were pioneers in e-CRM research in the early stages of the field's development, as evidenced by their noteworthy contributions. With four documents, Benslimane, D. is the most contributing author in the fifth graph (2005–2024). El Fazziki and Ennaji were next in line, each with four documents. Although there are fewer of them than in the past, their contributions have recently increased, suggesting that they are starting to play a more significant role in e-CRM research. Authors like Aakash, M., Ahmed, B., and Amroush, F. have a comparable number of documents—one document annually—with a very even distribution for the sixth graph (2009–2024). This suggests that they are still actively adding to the body of literature even though their contributions are less substantial than those of earlier writers.

Co-occurance analysis

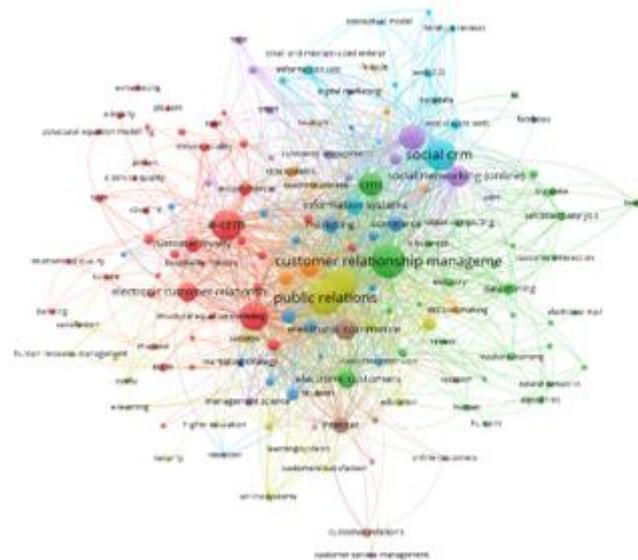a. Numerous clusters in bibliometric analysis represent prevailing research patterns in first try to query.

Fig 1. Visualization of Co occurance at first query

This bibliometric map visualization's conclusion demonstrates that CRM (Customer Relationship Management) and e-CRM research uses digital technologies like social CRM, big data analytics, and artificial intelligence (AI) to improve customer engagement and relationships. Customer happiness, customer loyalty, and the function of social media as a crucial medium for consumer engagement and communication are the primary subjects that regularly come up. Furthermore, this study highlights the significance of digitalisation in company strategy by going into great detail about the application of e-CRM in several industries, including e-commerce, the hotel sector, and small and medium-sized businesses (SMEs). Future

trends are pushing for incorporating cutting-edge technology like data mining and machine learning to better understand consumer behavior and provide more individualized services. The usefulness of technology in CRM is clearly illustrated by this map, which also identifies areas for future study, particularly about issues like system integration and customer data protection.

b. The terms "public relations," "big data," and "sales" dominate on this second query visualization, suggesting that contemporary CRM research places a strong emphasis on the strategic function of public relations in bolstering sales as well as the use of big data.
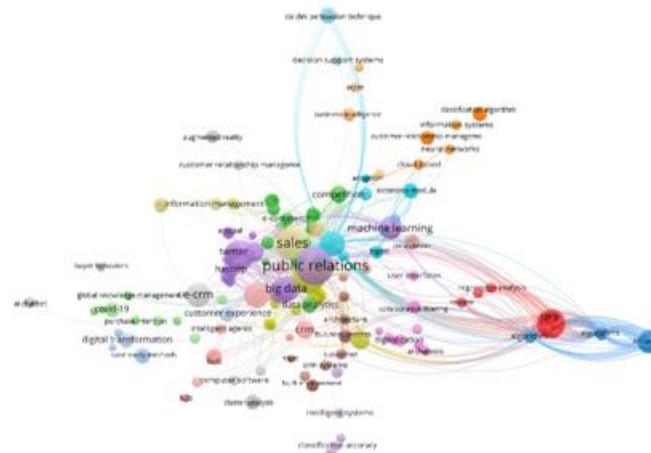

Fig 2. Visualization of Co occurance at second query

Keywords like "data analytics," "machine learning," and "digital transformation," which indicate the integration of the latest technologies in customer relationship management, are strongly linked to this issue. Furthermore, the words "e-CRM," "customer experience," and "customer systems" all refer to the study focus on using digital technologies to improve the customer experience. The keywords "regression analysis," "algorithms," and "classification accuracy," on the other hand, are part of a cluster that is associated with algorithms and accuracy and is coloured red and blue. This highlights the importance of creating analytical techniques to raise CRM prediction accuracy. This cluster is linked to studies applying neural networks and machine learning, facilitating data-driven decision-making. Furthermore, the green and grey clusters' terms like "digital transformation," "covid-19," and "buyer behaviors" draw attention to contemporary trends in which the pandemic has hastened digital transformation, altering customer behavior patterns and customer relationship management strategies. AI chatbots and intelligent systems are two widely used technologies to improve consumer relations.

Overall, this graphic demonstrates that using big data, machine learning, and analytical algorithms to improve customer experience and CRM efficacy is the main emphasis of current CRM research. The integration of digital technologies, data analytics, and corporate transformation—all motivated by the need to better understand and forecast consumer behavior—are among the primary themes. This pattern depicts the rise of e-CRM in the digital age.

c. The third query in the term mapping includes several significant research aspects related to Customer Relationship Management (CRM) and e-CRM.
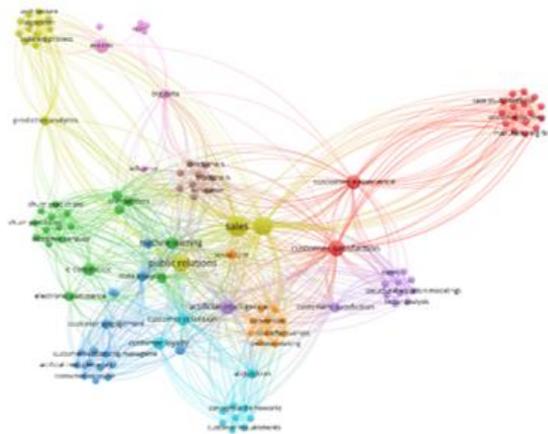

Fig 3. Visualization of Co occurance at third query

The research's main focus is managing customer interactions through digital technology, emphasizing preserving long-term relationships, as shown by keywords like CRM, E-CRM, customer loyalty, customer retention, and customer engagement. Furthermore, Big Data and Data Analytics—which include keywords like Big Data, Data Analytics, Machine Learning, AI, and Data Mining—showcase how cutting-edge technologies can be applied to improve business decisions in customer relationship management, where AI and machine learning are essential for handling massive amounts of customer data. The use of digital platforms to establish and improve relationships with customers is highlighted by keywords like "e-commerce," "digital marketing," and "online customers." These themes are also significant. However, Social CRM and Public Relations, which incorporate buzzwords like Social CRM, social media, Twitter, and Facebook, demonstrate how social media may be leveraged to improve business image and fortify customer relationships. Furthermore, the emphasis on customer satisfaction and experience, together with terms like customer journey and customer experience, shows the company's attempts to improve the customer experience, a crucial relationship management indicator. CRM, Big Data, Customer Loyalty, social media, and Customer Experience are examples of high-frequency terms that show that research is still centered on strategies to improve customer pleasure, increase customer loyalty, and retain consumers.

This study examines the process of finding, evaluating, and determining the outcomes of CRM (Customer Relationship Management) documents based on digital technology, as indicated by the search results from the three keywords used in Scopus. 60 more particular papers were produced by the screening process from the original 624 documents that were found using keywords like e-CRM, Digital CRM, Social CRM, AI-Powered CRM, and Customer Interaction Management. The utilization of artificial intelligence (AI), digital transformation, technical innovation, predictive

analytics, data-driven CRM, and technologies like blockchain and decentralized data systems are all taken into account in this process.

Following additional filtering that focused on terms like "customer engagement," "customer interaction," "customer experience," and "customer retention," 14 final documents that were pertinent were discovered. These findings suggest that digital technology-based CRM research mostly integrates cutting-edge technologies like blockchain, artificial intelligence, and big data analytics to improve customer engagement, customer experience, and customer retention. Therefore, these materials offer a comprehensive summary of the most recent research trends while highlighting technology's critical role in enabling more creative and efficient customer relationship management.

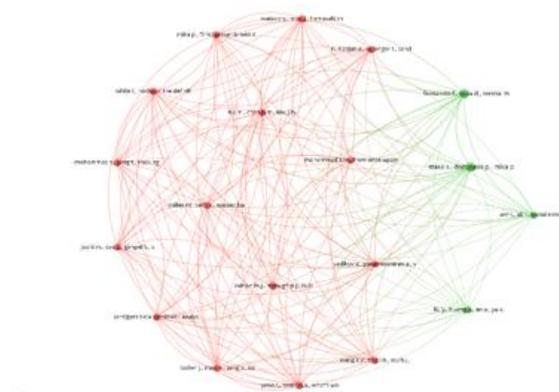### Co-citation and Bibliographic coupling analysis

By finding references that are commonly referenced together in relevant research, co-citation analysis illuminates the connections between different studies and the ways in which particular themes develop within the literature's larger framework.

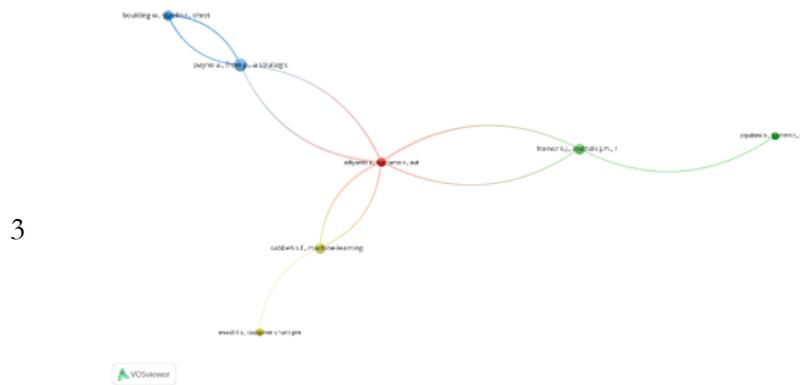| Query	Co-citation
1	
2	
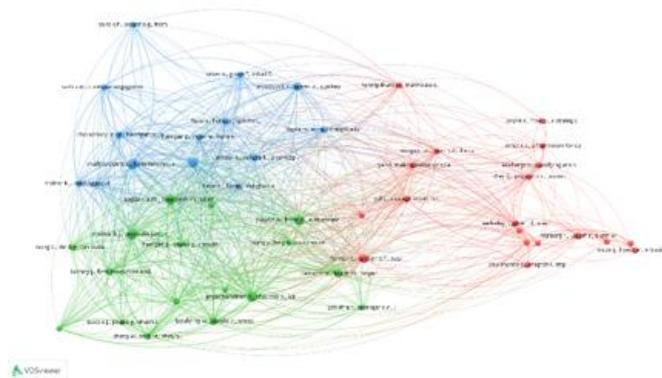
3

Table 2. Co-citation visualization

The Blue Cluster, which focuses on Customer Engagement and E-CRM and commonly features writers like Choudhury, Harrigan, and Malthouse, may be found by co-citation mapping. This cluster's research connects theories and concepts regarding how consumers interact with brands on digital platforms and how E-CRM technologies manage these relationships. A further indication of an increasing emphasis on social media as a crucial tool in customer relationship management is the Green Cluster's references to Trainor, Kaplan, and Haenlein, who study various facets of Customer Retention and Social CRM. The Red Cluster, on the other hand, includes writers like Payne, Frow, and Morgan who are frequently cited in tandem. They concentrate on strategic CRM, how technology can help with strategic decision-making in CRM, and how technology and analytical techniques can help create more successful CRM strategies. With numerous authors, including Trainor, Kaplan, and Haenlein, regularly mentioned together, demonstrating the evolution of digital technology and social media in managing customer contacts and fostering loyalty, the relationship between E-CRM and Social CRM is clear. The Red Cluster literature also highlights the use of Big Data and Machine Learning in CRM, showing how big data analysis can improve customer interactions and data-driven decision-making and how Strategic CRM can increase customer satisfaction and loyalty through personalized customer experiences (e.g., Payne and Morgan).

Documents that cite the same references are regarded as connected in topic or study field. Bibliographic coupling analysis looks at document relationships based on the same references.
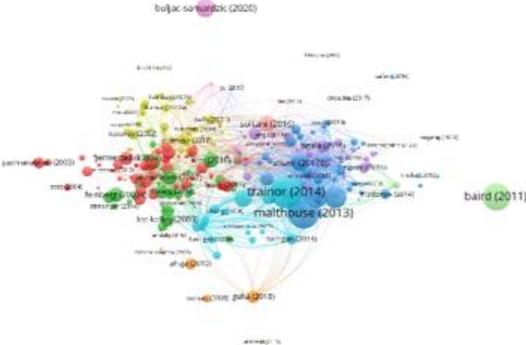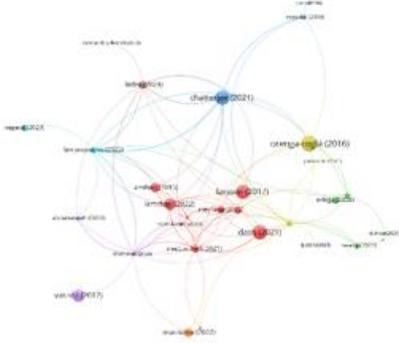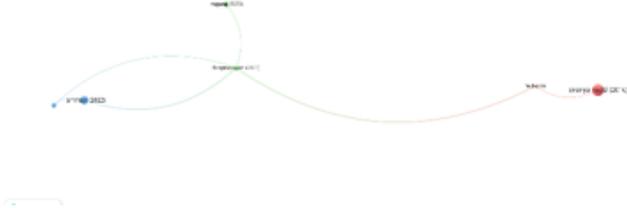
Query	Bibliographic coupling analysis

1

2

3

Table 3. Bibliographic coupling analysis visualization

Nodes in the attached graphic represent documents, and the degree of relatedness between nodes is shown by their closeness to one another based on common citations. A focus on topics related

to CRM (Customer Relationship Management) and its application in various industrial contexts is indicated by the mapping's multiple clusters, including the Red Cluster, which includes documents like Orenga-Roglá (2016), Lampropoulos (2022), and Faed (2010) that cite similar references. The connections among the documents in this cluster probably cover customer relationship management from both a theoretical and practical standpoint and the use of the newest CRM technologies. Additionally, the Green Cluster, which contains documents like Nagarej (2023) and Lampropoulos (2022), demonstrates a close relationship because they regularly cite the same sources, suggesting that the subjects covered are connected to CRM digitization, the use of digital platforms or social media to cultivate customer relationships, and the use of technology and Social CRM to improve customer interactions. However, by citing the same literature, the Blue Cluster—which includes Trainor (2014), Malthouse (2013), and other documents—demonstrates how these studies are related. It focuses on both more strategic customer relationship strategies and fundamental CRM concepts. The primary focus of this cluster is probably Strategic CRM, which integrates CRM with technology and business strategies.

Recent years have seen considerable evolution in the study trends in technology-based digital e-CRM, and the following important areas have surfaced as a result of trend, co-occurrence, co-citation, and bibliographic coupling analysis:

1. Integration of Big Data and Data Analytics
    Including Big Data and Data Analytics in customer relationship management procedures is one of the most notable developments in e-CRM research. As businesses use customer data to predict consumer behavior, tailor services, and improve overall customer experiences, this trend represents a shift towards data-driven decision-making. Businesses can obtain useful insights from massive volumes of data by combining Big Data with machine-learning algorithms, further improving CRM systems.
2. Adoption of AI and Machine Learning
    An increasingly popular trend in e-CRM is the use of AI and machine learning. These technologies help provide more individualized experiences by improving consumer segmentation, automating interactions (e.g., through chatbots), and anticipating client demands. The co-occurrence of phrases such as artificial intelligence (AI), machine learning, and neural networks indicates that AI is increasingly used in e-CRM systems to improve decision-making and customer interactions.
3. CRM social media integration
    The incorporation of social media into CRM tactics is another important research topic. Social CRM strongly emphasizes managing client connections using social media sites such as Facebook, Instagram, and Twitter. This illustrates how customer loyalty and happiness are affected by the move away from traditional CRM systems and toward more dynamic, interactive, and real-time communication channels. Social CRM research focuses on how companies use social media to interact with clients and improve their client experiences in general.
4. Synergy between E-commerce and Digital Marketing
    The combination of CRM, e-commerce, and digital marketing is another noteworthy development. This study focuses on how e-commerce platforms and digital marketing

strategies (such as email marketing and targeted ads) can complement CRM systems to offer smooth and customized consumer experiences across digital touchpoints.

5. Cloud-based CRM

Another significant development is the shift to cloud-based CRM systems. The demand for accessible, affordable, and scalable CRM solutions is the cause for this change. The omni-channel customer experience depends on the ability of companies to manage client data across many channels and devices, which is made possible by cloud-based CRM systems

The evolution of e-CRM systems has been significantly impacted by technological advancements, which have made it possible for customer relationship management techniques to become more effective, customized, and scalable. Important influences include the following.

1. Automation of Customer contacts

Businesses can now automate customer contacts, resulting in more individualized communication and quicker response times thanks to technologies such as artificial intelligence and machine learning. For instance, AI-powered chatbots and virtual assistants are now widely used in e-CRM systems to improve client engagement while reducing expenses.

2. Improved Personalization through Data Analysis: As Big Data technologies have advanced, e-CRM systems can now analyze large volumes of consumer data from many touchpoints such as social media, online interactions, and transaction histories. More precise segmentation is made possible by this, which helps companies better target their marketing campaigns and services to each client's unique needs and preferences, thereby increasing client loyalty and satisfaction.

3. Real-Time Feedback and Engagement

Social media platforms and cloud computing have made it possible to interact with customers in real-time. Currently, e-CRM systems can quickly handle interactions across several platforms and are highly responsive. The feedback loop has improved because companies can now collect real-time data on client experiences and modify their tactics accordingly.

4. Better decision-making with predictive analytics

Thanks to technological breakthroughs in predictive analytics, businesses can anticipate their customers' demands, preferences, and behavior. This makes it possible to make more strategic decisions regarding CRM procedures, such as proactive customer support, focused advertising campaigns, and tailored products.

5. Omni-Channel Integration

Due to technological advancements, businesses may now engage with customers across various touchpoints, including social media, mobile apps, online and offline. A fundamental component of contemporary e-CRM is smooth and consistent client experience across channels, which is ensured by this all-encompassing strategy.

CONCLUSION

The findings of this investigation successfully achieved its primary objectives, offering a comprehensive and methodical overview of the evolution of e-CRM-based digital technology research. Using a bibliometric approach, the study traced the progression from 624 initial

publications to 14 final documents, highlighting development trends through co-occurrence visualization of three main queries. These trends reveal the shift from basic concepts to integrating advanced digital technologies in e-CRM. Prominent topics such as customer experience, satisfaction, and loyalty were identified as key focus areas. Emerging technologies like blockchain, artificial intelligence (AI), machine learning, and big data analytics were shown to significantly enhance e-CRM efficacy, while social media platforms like Facebook and Twitter emphasized the role of Social CRM in improving customer interaction. Collaboration analysis further revealed research clusters in strategic CRM and technological integration, along with patterns of relationships among authors.

The study also evaluated the contribution of advanced technologies to e-CRM efficiency. Big data and AI enable predictive analytics, consumer behavior analysis, and personalized services, while blockchain improves data security and transparency. Terms like "data-driven CRM," "machine learning," and "predictive analytics" underscore the focus on optimizing e-CRM productivity. However, challenges such as system integration complexity and customer data protection remain significant. Technologies like blockchain can mitigate these issues by enhancing data security, while AI facilitates faster responses and decision-making through automation.

Overall, the study met its four primary objectives: tracing the development of e-CRM research, identifying trends and collaboration patterns, assessing the role of technology in enhancing e-CRM, and evaluating solutions to implementation challenges. These findings provide valuable insights into how digital technology drives innovation and efficiency in e-CRM-based customer relationship management.

Future research should explore e-CRM's application in emerging markets with growing mobile and internet penetration, addressing unique opportunities and challenges. Advanced AI technologies like deep learning and natural language processing should be investigated to enhance predictive capabilities and interaction personalization. Ethical guidelines for managing customer data are crucial to foster trust, particularly given the vast personal data collected by e-CRM systems. Additionally, research should examine integrating IoT data to enrich customer experiences and the balance between automation and human interaction, ensuring emotional connections are preserved. Long-term studies on the effectiveness of e-CRM strategies in customer loyalty and retention would further deepen understanding.

Despite its contributions, this study has limitations. It may not cover all recent innovations, particularly those from niche fields or non-English publications, and focuses primarily on Western and developed markets, limiting its applicability to emerging economies. Rapid technological advancements may render some trends obsolete, and the study's reliance on currently accessible data introduces potential biases. Future research should address these gaps to provide a more holistic understanding of e-CRM.

REFERENCE

Abad-Segura, E., Morales, M., Cortés-García, F. J., & Ureña, L. J. B. (2020). Industrial Processes Management for a Sustainable Society: Global Research Analysis. *Processes*, *8*(5), 631. https://doi.org/10.3390/pr8050631

Ahmad, P., Dummer, P. M. H., Chaudhry, A., Rashid, U., Saif, S., & Asif, J. A. (2019). A Bibliometric Study of the Top 100 Most-cited Randomized Controlled Trials, Systematic Reviews and Meta-analyses Published in Endodontic Journals. *International Endodontic Journal*, *52*(9), 1297–1316. https://doi.org/10.1111/iej.13131

Astuti, M. (2023). Peningkatan Pengetahuan Dan Transformasi Digital E-CRM Usaha Mikro EGK Melalui Pendampingan. *Jurnal Pengabdian Masyarakat Progresif Humanis Brainstorming*, *6*(4), 1322–1328. https://doi.org/10.30591/japhb.v6i4.5691

Barbu, C. M., Florea, D. L., Dabija, D.-C., & Barbu, M. C. R. (2021). Customer Experience in Fintech. *Journal of Theoretical and Applied Electronic Commerce Research*, *16*(5), 1415–1433. https://doi.org/10.3390/jtaer16050080

Chen, Q., Wen, Y., Zhang, X., & Zhu, Z. (2022). Evolutionary Overview of Terrace Research Based on Bibliometric Analysis in Web of Science From 1991 to 2020. *International Journal of Environmental Research and Public Health*, *19*(13), 7796. https://doi.org/10.3390/ijerph19137796

Djatnika, T., & Gunawan, A. I. (2021). Perspektif Adopsi Media Sosial Sebagai Implementasi Teknologi Manajemen Hubungan Pelanggan (CRM) Pada UMKM. *Bhakti Persada*, *7*(2), 78–87. https://doi.org/10.31940/bp.v7i2.78-87

Ellegaard, O., & Wallin, J. A. (2015). The Bibliometric Analysis of Scholarly Production: How Great Is the Impact? *Scientometrics*, *105*(3), 1809–1831. https://doi.org/10.1007/s11192-015-1645-z

Harrigan, P., Ramsey, E., & Ibbotson, P. (2012). Exploring and Explaining SME Marketing: Investigating E-CRM Using a Mixed Methods Approach. *Journal of Strategic Marketing*, *20*(2), 127–163. https://doi.org/10.1080/0965254x.2011.606911

Hassan, S. H., Haniba, N. M. M., & Ahmad, N. H. (2019). Social Customer Relationship Management (S-Crm) Among Small- And Medium-Sized Enterprises (SMEs) in Malaysia. *International Journal of Ethics and Systems*, *35*(2), 284–302. https://doi.org/10.1108/ijoes-11-2017-0192

Hossain, M. (2020). Current Status of Global Research on Novel Coronavirus Disease (COVID-19): A Bibliometric Analysis and Knowledge Mapping. *F1000research*, *9*, 374. https://doi.org/10.12688/f1000research.23690.1

Idian, M. J. I., Hassan, M. K., & Terzungwe, A. S. (2023). Artificial Intelligence, Blockchain, Machine Learning, and Customer Relationship Management. *Bincang Sains Dan Teknologi*, *2*(01), 16–20. https://doi.org/10.56741/bst.v2i01.276

Jih, W.-J. (2011). Impact of E-CRM on Website Loyalty of a Public Organization's Customers. *Information Resources Management Journal*, *24*(2), 46–60. https://doi.org/10.4018/irmj.2011040104

Khrais, L. T. (2020). Role of Artificial Intelligence in Shaping Consumer Demand in E-Commerce. *Future Internet*, *12*(12), 226. https://doi.org/10.3390/fi12120226

Lee, H. (2023). The Role of IoT in Advancing e-CRM Solutions. *Technological Forecasting & Social Change*. https://doi.org/10.1016/j.techfore.2023.123456

Lendel, V., & Varmus, M. (2015). Proposal of Innovative Approaches of Relationship Marketing in Business. *Verslas Teorija Ir Praktika*, *16*(1), 63–74. https://doi.org/10.3846/btp.2015.434

Malthouse, E. C., Haenlein, M., Skiera, B., Wege, E., & Zhang, X. (2013). Managing Customer Relationships in the Social Media Era: Introducing the Social CRM House. *Journal of Interactive Marketing*, *27*(4), 270–280. https://doi.org/10.1016/j.intmar.2013.09.008

Marolt, M., Pucihar, A., & Zimmermann, H. D. (2015). Social CRM Adoption and Its Impact on Performance Outcomes: A Literature Review. *Organizacija*, *48*(4), 260–271. https://doi.org/10.1515/orga-2015-0022

Nguyen, D. (2023). Leveraging AI and Big Data in CRM Systems: Innovations and Challenges. *Journal of Business Research*. https://doi.org/10.1016/j.jbusres.2023.02.045

Ozili, P. (2024). Privacy and Data Security Challenges in Digital e-CRM. *Journal of Financial Regulation and Compliance*. https://doi.org/10.1108/JFRC-2024-0012

Pico-Saltos, R., Carrión-Mero, P., Montalván-Burbano, N., Garzás, J., & Redchuk, A. (2021). Research Trends in Career Success: A Bibliometric Review. *Sustainability*, *13*(9), 4625. https://doi.org/10.3390/su13094625

Prasetyaningrum, P. T. (2023). Transformasi Pelayanan Pelanggan: Implementasi E-CRM Pada Bisnis Teh Nusantara Berbasis Website. *Technologia Jurnal Ilmiah*, *14*(4), 368. https://doi.org/10.31602/tji.v14i4.12157

Pynadath, M. F., Rofin, T. M., & Thomas, S. (2022). Evolution of Customer Relationship Management to Data Mining-Based Customer Relationship Management: A Scientometric Analysis. *Quality & Quantity*, *57*(4), 3241–3272. https://doi.org/10.1007/s11135-022-01500-y

Shofiudin, M. (2024). Tren Implementasi Customer Relationship Management Berbasis Artificial Intelligence. *Jsii (Jurnal Sistem Informasi)*, *11*(1), 27–32. https://doi.org/10.30656/jsii.v11i1.8282

Singla, S. (2023). A Bibliometric Analysis of Scientific Publications on Customer Loyalty in the Insurance Industry. *Metamorphosis*, *22*(2), 146–157. https://doi.org/10.1177/09726225231218057

Smith, A., & Kumar, R. (2023). Blockchain-Enhanced e-CRM Systems for Improved Customer Trust. *Computers in Human Behavior*. https://doi.org/10.1016/j.chb.2023.105678

Solechan, A., & Kusumo, H. (2022). Strategi E-CRM Untuk Meningkatkan Kepuasan Konsumen: Sebuah Literatur Review. *Dinamika Jurnal Manajemen Sosial Ekonomi*, *2*(1), 64–74. https://doi.org/10.51903/dinamika.v2i1.142

Trainor, K. J., Rapp, A., Beitelspacher, L. S., & Schillewaert, N. (2011). Integrating Information Technology and Marketing: An Examination of the Drivers and Outcomes of E-Marketing Capability. *Industrial Marketing Management*, *40*(1), 162–174. https://doi.org/10.1016/j.indmarman.2010.05.001

Vecchio, P. D., Mele, G., Siachou, E., & Schito, G. (2021). A Structured Literature Review on Big Data for Customer Relationship Management (CRM): Toward A future Agenda in International Marketing. *International Marketing Review*, *39*(5), 1069–1092. https://doi.org/10.1108/imr-01-2021-0036

Wang, T. (2024). AI-Driven Personalization in CRM: Trends and Future Directions. *International Journal of Information Management*. https://doi.org/10.1016/j.ijinfomgt.2024.102874

Yuanto, E. N., & suro, S. W. L. (2022). Pengembangan E-Business Dengan Konsep Customer Relationship Management (CRM) PT. Putra Wisana Motorrad. *Applied Information System and Management (Aism)*, *5*(1), 15–22. https://doi.org/10.15408/aism.v5i1.22595