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Transforming Customer Relationship Management through Disruptive Technology: An Empirical Study on Role of Artificial Intelligence and Machine Learning

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Abstract

Businesses, in an effort to keep up with the changing world, are now finding new ways to connect with their customers, and Artificial Intelligence (AI) is playing a big role in this change. AI tools like chatbots and systems that predict what customers need help companies be more efficient and give faster, more personalized, and more helpful service. Al and Machine Learning (ML) make it easier for businesses to understand their customers and build trust with them. AI is also helping businesses learn more about customer behavior and it is getting possible to solve problems even before they happen. But using AI isn't always easy. Companies need to make sure customer data is safe, use AI responsibly, and keep a balance between technology and human connection. This paper looks at how disruptive technologies like AI and ML are changing customer relationship management (CRM), the benefits it brings, and the challenges businesses face. With careful planning, AI can help businesses grow while creating better connections with their customers. A sample of 219 was collected to find the result of the study. The factors identify the impact of AI and ML on Customer Relationship Management are Personalization and Customer Experience, Data Processing and Management, Enhanced Decision-Making, and System Automation.

Keywords: Artificial Intelligence, Machine Learning, Customer Relationship Management, Disruptive Technology, Customer Experience

Introduction

Customers are king in any business and it is important to appease their growing needs in order

to stay relevant in an industry. For this same reason, Customer relationship management (CRM) has become the backbone for businesses in this competitive world. Technology has shown to be a crucial ally as companies keep trying various means to understand and cater to their customers. Artificial Intelligence (AI), in particular, has brought about significant changes in CRM with its ability to help businesses collect and analyze data better and even use this data more effectively. These innovations not only work in favor of customer interactions but also streamline operations and improve decision-making. The evolution of CRM from traditional, data-driven approaches to AI-powered systems marks a turning point for organizations looking to stay relevant in this demanding market. Bringing advanced technologies like AI and blockchain into CRM has increased its potential exponentially. AI can analyze customer data, predicting behaviors, and personalizing interactions, while blockchain works on data security and transparency. Together, these technologies create an ecosystem that maximizes customer value and optimizes business processes. They let organizations give better customer experiences, and build trust through secure data practices. The result of this is a good competitive edge in a crowded marketplace (Idian et al., 2023). In recent years, businesses have been receptive to an array of emerging technologies to redefine customer engagement across various stages of customer interaction. There are tools like IoT, augmented reality (AR), virtual reality (VR), mixed reality (MR), and chatbots that are changing how customers interact with brands. These technologies create immersive and personalized experiences. AR and VR allow customers to explore products and services in specific ways, bridging the gap between traditional and digital experiences. However, there are things to be worried about, as the rapid adoption of these technologies also brings privacy concerns and overreliance on automation. Businesses must address these issues to ensure technology serves both customer needs and organizational goals (Hoyer et al., 2020). Even with all these challenges, amid these advancements, the role of AI in CRM has gone beyond isolated applications to a more strategic level. Businesses are now focusing on integrating AI technologies into their long-term planning. AI tools such as predictive analytics, machine learning algorithms, and personalized customer experiences are the focus of this transformation. Companies need proper data management systems and a willingness to explore innovative algorithms to maximize the potential of these advancements. A structured way to AI-driven CRM involves managing Big Data effectively, applying AI to solve specific business challenges, and ultimately letting business strategies become fully AI-driven (Ledro et al., 2022). AI is used in CRM across industries, from retail and banking to healthcare and telecommunications. AI-powered tools like chatbots, virtual assistants, and recommendation engines are making customer experiences better by making them more personalized, responsive, and efficient. Businesses now have the capability to predict customer needs and address concerns in real time. It facilitates long-term loyalty from the customer as well. At the same time, organizations must balance technological innovation with ethical considerations such as data privacy, fairness, and inclusivity to maintain trust and integrity. In short, AI is now a driving force behind the evolution of CRM, giving businesses new ways to engage with customers, improve their efficiency, and stay competitive. These technologies need to be not only effective but also equitable and sustainable, and build a customer-centric ecosystem as per the demands of the modern customer, paving the way for long-term success in the digital age.

Literature Review

Artificial Intelligence (AI) has become so common and important in Customer Relationship Management (CRM) as it is redefining customer interactions and business operations across industries. AI-driven tools such as chatbots, predictive analytics, and natural language processing (NLP) are completely changing company-customer interactions. Chatbots make real-time, personalized interactions and increase customer satisfaction by addressing inquiries quickly. Advanced examples like Bank of America's ERICA and Disney's Judy show the extent to which these tools can be used to build brand loyalty and efficiency. The rise of voice-enabled devices like Amazon Alexa is another good example that shows the growing reliance on AI in maintaining competitive advantages in customer service (Boguda & Shailaja, 2019). AI also humanizes digital interactions. This resonates with empathy and customers are bound to feel closer to the brand. But the high implementation costs and privacy concerns are obstacles to maximum utilization (Bu et al., 2022).

Disruptive technologies such as virtual reality (VR) and augmented reality (AR) are reshaping customer experiences by bridging traditional and digital platforms. Luxury brands like Dior and Prada use these tools to immerse customers in the stories behind their collections. This gives them better engagement and personal connections. Farfetch's "Store of the Future" combines online and offline experiences and this is a good example of how technology can improve retail productivity and customer data capture. Despite these benefits, concerns about reduced human interaction and potential job displacement highlight the need for a balanced way of technology adoption (Harba, 2019). Successful AI integration depends on continuous improvement, proper implementation, and tailored training programs to overcome industry-specific challenges (Raj et al., 2024).

Online customer reviews (OCR) are very useful to understand customer experiences. High-rated reviews tend to be analytical and concise, while low-rated reviews are more emotional and expressive. This distinction tells the role of emotional tone in shaping customer perceptions and brand engagement. So with the help of OCR data, businesses can better understand customer needs, address pain points, and satisfy customers better. Such initiatives are particularly useful in competitive markets where customer sentiment influences loyalty and retention (Robertson et al., 2021).

AI-driven advancements in CRM systems extend to sophisticated models like Deep Support Vector Machines (SVMs). They excel in analyzing complex customer data and these models outperform traditional methods in predicting customer behaviors. They can segment audiences better and give better actionable inputs. Enhanced metrics such as accuracy, recall, and F1 scores also show the effectiveness of AI in CRM (Girimurugan et al., 2024).

Going industry-specific, AI's impact is particularly evident in industries like banking and telecommunications, where personalized customer service and optimized support systems significantly influence customer experiences. AI reduces wait times and improves service efficiency, giving customers more satisfaction and they will be more loyal as well. However, challenges like high costs and limited technical skills in certain regions restrict broader adoption. It is important to make sure that AI complements human efforts rather than replacing them too (Daqar & Smoudy, 2019). Small and medium-sized businesses (SMBs) are also increasingly using AI-powered CRM systems to maintain their spot in the market, or even

climb higher. These systems give data-driven insights, process automation, and personalized customer experiences (Deep & Zanke, 2024).

The integration of AI into CRM systems also enhances organizational agility. Businesses can adapt quickly to market changes and customer needs this way. Factors like stakeholder trust, employee attitudes, and strategic alignment are needed for successful adoption. Companies must develop frameworks and methods to assess readiness and address barriers to implementation, and this should be a continuous process. This ensures that AI-driven CRM systems align with organizational goals and deliver sustained benefits (Chatterjee et al., 2021). Supplier-customer relationships are also influenced positively by AI as it enhances communication, interaction, and general customer satisfaction. Tools like sentiment analysis, voice recognition, and self-service portals enable real-time and personalized support, improving engagement and loyalty. These systems also have contextual insights that help businesses better understand customer emotions and behaviors. As AI technologies advance, opportunities for better personalization and predictive capabilities are expected to grow (Alshurideh et al., 2024).

AI-powered tools such as product recommenders, virtual agents, and visual perception systems influence customer experiences. These tools drive awareness, effectiveness, and loyalty, positioning businesses for future growth. As AI integrates itself into traditional business models, it also creates opportunities for innovation, all the while challenging outdated practices. Companies investing in AI research and development are better equipped to capitalize on these opportunities and provide superior customer engagement and satisfaction (Deb et al., 2018).

Issues like data privacy, fairness, and inclusivity must be addressed to maintain trust and integrity. Companies adopting advanced AI capabilities such as conversational AI and augmented intelligence gain a competitive edge by delivering personalized, multichannel interactions (Kalaiyarasan et al., 2023).

Objective

To study the impact of AI and ML on Customer Relationship Management"

Methodology

This study employs a quantitative research approach to examine the impact of Artificial Intelligence (AI) and Machine Learning (ML) on Customer Relationship Management (CRM). A structured methodology was followed to ensure data accuracy, reliability, and meaningful insights.

Sampling and Data Collection

A total of 219 participants were selected from diverse industry sectors, including Banking & Insurance (31.51%), Retail (37.90%), and Hospitality & Tourism (30.59%). The sampling method employed was **stratified random sampling** to ensure representation across different industries and job roles. The data was collected through a structured questionnaire distributed via online surveys and direct communication with respondents.

The questionnaire consisted of **Likert-scale items (ranging from 1 to 5)**, allowing respondents to rate their experiences and perceptions regarding AI and ML integration in CRM. The survey was pre-tested on a small sample (n=30) to ensure clarity and reliability before full-scale distribution.

Measures and Variables

The study focused on four key factors affecting CRM through AI and ML:

1. **Personalization and Customer Experience** (e.g., AI-driven personalized recommendations, real-time offers, dynamic pricing)
2. **Data Processing and Management** (e.g., AI-enabled data structuring, real-time data processing, automated accuracy checks)
3. **Enhanced Decision-Making** (e.g., AI-assisted campaign performance assessment, predictive analytics for customer behavior)
4. **System Automation** (e.g., automated task management, chatbot efficiency, lead prioritization models)

The **Cronbach's Alpha** for reliability testing was **0.892**, indicating high internal consistency among survey items.

Data Analysis

The collected data was analyzed using **Exploratory Factor Analysis (EFA)** to identify underlying constructs influencing AI and ML-driven CRM. The **Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy** was **0.782**, confirming that the dataset was suitable for factor analysis. **Bartlett's Test of Sphericity** was significant (**$p < 0.000$**), supporting the suitability of factor analysis.

A **Principal Component Analysis (PCA) with Varimax Rotation** was conducted, identifying four factors that together explained **87.004% of the total variance**. Factor loadings above **0.50** were retained, ensuring strong associations between variables and their respective constructs.

Ethical Considerations

- Participation in the study was **voluntary**, with informed consent obtained before data collection.
- Anonymity and confidentiality of responses were maintained to protect participant privacy.
- The study adhered to **ethical research guidelines**, ensuring transparency and fairness in data analysis and reporting.

Limitations and Future Scope

While the study provides valuable insights, certain limitations should be acknowledged:

1. The study focuses on **three specific industry sectors**, limiting generalizability across other domains.
2. Data collection was based on **self-reported responses**, which may introduce bias.
3. A **longitudinal study** could provide deeper insights into AI's evolving impact on CRM over time.

Future research could explore **cross-industry comparisons, AI adoption in SMEs vs. large enterprises**, and the **role of AI in predictive customer analytics** to further enrich the understanding of disruptive technologies in CRM.

Findings

The table demonstrates demographic details, it shows that 51.60% are Male, 48.40% are female. Looking at the age, 35.16% are between 28 to 32 years of age, 36.98% are between 32 to 45 years of age, and 27.86% are above 45 years of age. With regards to Sector type, 31.51% are from Banking & Insurance, 37.90% are from Retail, and 30.59% are from Hospitality & Tourism.

Participant's Details

Variables	**Participants**	**Percentage**
Gender		
Male	113	51.60%
Female	106	48.40%
Total	**219**	**100**
Ages in years		
28 to 32	77	35.16%
32 to 45	81	36.98%
Above 45	61	27.86%
Total	**219**	**100**
Sector Type		
Banking & Insurance	69	31.51%
Retail	83	37.90%
Hospitality & Tourism	67	30.59%
Total	**219**	**100**

"Factor Analysis"

"KMO and Bartlett's Test"

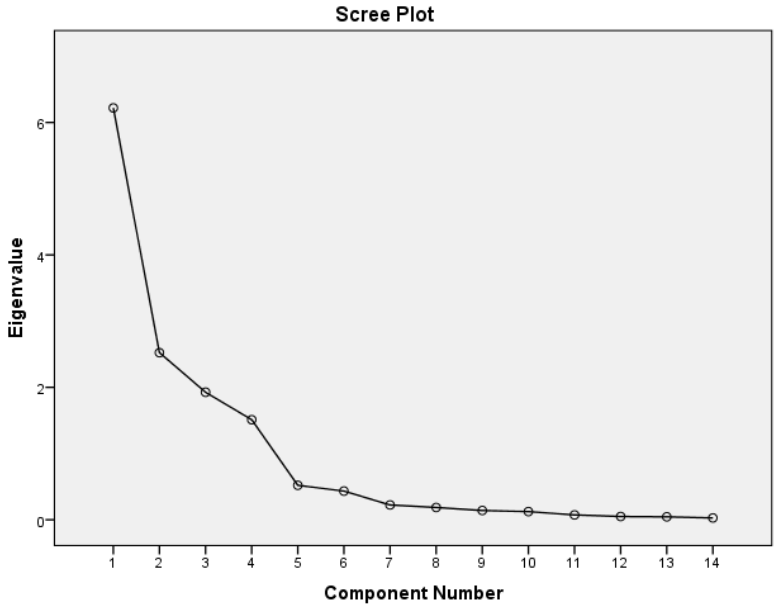
"Kaiser-Meyer-Olkin Measure of Sampling Adequacy"		.782
"Bartlett's Test of Sphericity"	"Approx. Chi-Square"	3665.268
	df	91
	Significance	.000

"KMO and Bartlett's Test", value of KMO is .782

"Total Variance Explained"

"Component"	"Initial Eigenvalues"			"Rotation Sums of Squared Loadings"		
	"Total"	"% Of Variance"	"Cumulative %"	"Total"	"% Of Variance"	"Cumulative %"
1.	6.220	44.429	44.429	**3.754**	26.811	26.811
2.	2.523	18.023	62.452	**3.610**	25.787	52.599
3.	1.926	13.755	76.208	**2.573**	18.376	70.975
4.	1.511	10.796	87.004	**2.244**	16.029	**87.004**
5.	.520	3.717	90.721			
6.	.433	3.095	93.816			
7.	.223	1.593	95.410			
8.	.186	1.327	96.736			
9.	.140	.996	97.733			
10.	.123	.880	98.613			
11.	.073	.521	99.134			
12.	.050	.356	99.489			
13.	.044	.313	99.802			
14.	.028	.198	100.000			

The four factors contribute towards explaining total 87.004% of variance. Variance that is explained by Personalization and Customer Experience is 26.811, Data Processing and Management is 25.787%, Enhanced Decision-Making is 18.376%, and System Automation is 16.029%.



Scree Plot

"Rotated Component Matrix"

S. No.	Statements	Factor Loading	Factor Reliability
	Personalization and Customer Experience		**.950**
1.	By sending personalized messages and offers based on real-time data	.950	
2.	Permits dynamic pricing strategies based on customer profiles and their demand	.897	
3.	Offers product recommendations personalized to individual preferences	.853	
4.	Tools like chatbots, and virtual assistants are making customer experiences better	.847	
	Data Processing and Management		**.957**
1.	AI and ML can process massive amounts of structured and unstructured data from multiple sources	.951	
2.	AI processes data in real time, allowing businesses to respond instantly to customer needs	.902	

3.	Automated tools ensure data is accurate, consistent, and usable across CRM platforms	.889	
4.	Proper data management needed to explore innovative algorithms	.885	
	Enhanced Decision-Making		**.884**
1.	AI makes complex datasets into actionable insights, helping in informed decisions	.922	
2.	AI assesses campaign performance and recommends areas for improvement	.866	
3.	Businesses can better understand and optimize the customer journey across channels through AI & ML	.836	
	System Automation		**.817**
1.	Automates repetitive tasks like data entry, email responses, and scheduling	.935	
2.	Chatbots and virtual assistants handle common queries, rising it to human agents	.925	
3.	Prioritizes leads based on scoring systems, ensuring sales teams concentrate on high-potential prospects	.589	

Factors of the study and its related variables

Personalization and Customer Experience is the first factor of the study, the variables it includes are by sending personalized messages and offers based on real-time data, permits dynamic pricing strategies based on customer profiles and their demand, offers product recommendations personalized to individual preferences, and Tools like chatbots, and virtual assistants are making customer experiences better. Second factor is Data Processing and Management, it includes variables like AI and ML can process massive amounts of structured and unstructured data from multiple sources, AI processes data in real time, allowing businesses to respond instantly to customer needs, Automated tools ensure data is accurate, consistent, and usable across CRM platforms, and Proper data management needed to explore innovative algorithms. Enhanced Decision-Making is the third factor of the study, its variables are AI makes complex datasets into actionable insights, helping in informed decisions, AI assesses campaign performance and recommends areas for improvement, and Businesses can better understand and optimize the customer journey across channels through AI & ML. Last and fourth factor is System Automation, the variables it includes are Automates repetitive tasks like data entry, email responses, and scheduling, Chatbots and virtual assistants handle common queries, rising it to human agents, and Prioritizes leads based on scoring systems, ensuring sales teams concentrate on high-potential prospects.

“Reliability Statistics”

"Cronbach's Alpha"	"Number of Items"
.892	14

Total reliability of 14 items that includes variables for impact of AI and ML on Customer Relationship Management is 0.892

Conclusion

AI brings so many exciting possibilities to CRM. It lets businesses respond to customers in an instant, give personalized recommendations, and even create fun and interactive experiences with tools like augmented reality. This means customers can get what they need more easily, and businesses can keep up with changing expectations. However, just like with everything else, with these benefits come challenges. Companies need to make sure they use AI in a fair and secure way, protect customer privacy, and balance automation with human interaction. Looking forward, AI has the potential to make customer experiences even better. It is a space and a tool for businesses to go beyond just selling products and instead focus on creating meaningful relationships with their customers. As businesses use AI responsibly, they can build trust, grow their customer base, and set themselves up for success in the future. The factors identify the impact of AI and ML on Customer Relationship Management are Personalization and Customer Experience, Data Processing and Management, Enhanced Decision-Making, and System Automation.

References

1. Alshurideh, M., Al Kurdi, B., Hamadneh, S., Chatra, K., Snoussi, T., Alzoubi, H., Alzboun, N., & Ahmed, G. (2024). Utilizing Artificial Intelligence (AI) in enhancing customer-supplier relationship: An exploratory study in the banking industry. *Uncertain Supply Chain Management*, *12*. https://doi.org/10.5267/j.uscm.2024.5.005
2. Boguda, S. K., & Shailaja, A. (2019). The Future of Customer Experience in the Information Age of Artificial Intelligence – Get Ready for Change. *International Journal of Engineering Research and Technology*, *8*(6). https://doi.org/10.17577/ijertv8is060622
3. Bu, Y., Quach, S., & Thaichon, P. (2022). Artificial intelligence (AI)-empowered customer relationship management. *Artificial Intelligence for Marketing Management*, 142–159. https://doi.org/10.4324/9781003280392-11
4. Chatterjee, S., Chaudhuri, R., Vrontis, D., Thrassou, A., & Ghosh, S. K. (2021). Adoption of artificial intelligence-integrated CRM systems in agile organizations in India. *Technological Forecasting and Social Change*, *168*, 120783. https://doi.org/10.1016/j.techfore.2021.120783
5. Daqar, M. A. M. A., & Smoudy, A. K. A. (2019). THE ROLE OF ARTIFICIAL INTELLIGENCE ON ENHANCING CUSTOMER EXPERIENCE. *International Review of Management and Marketing*, *9*(4), 22–31. Researchgate. https://doi.org/10.32479/irmm.8166
6. Deb, S. K., Jain, R., & Deb, V. (2018). Artificial Intelligence ―Creating Automated Insights for Customer Relationship Management. *IEEE Xplore*, 758–764. https://doi.org/10.1109/CONFLUENCE.2018.8442900
7. Deep, S., & Zanke, P. (2024). Digital Transformation Strategy with CRM and AI for SMB's Sustainable Growth . *International Journal of Current Science*, *14*(2), 601–612. https://doi.org/10.13140/RG.2.2.35510.51529
8. Girimurugan, B., Gokul K, Sasank, M. S. S., Pokuri, V. N., Kurra, N. K., & Reddy, V. Dinesh. (2024). Leveraging Artificial Intelligence And Machine Learning For Advanced Customer Relationship Management In The Retail Industry. *2024 2nd International Conference on Disruptive Technologies (ICDT)*. https://doi.org/10.1109/icdt61202.2024.10488981
9. Harba, J.-N. (2019). New Approaches to Customer experience: Where Disruptive Technological Innovation Meets Luxury Fashion. *Proceedings of the International Conference on Business Excellence*, *13*(1), 740–758.
10. Hoyer, W. D., Kroschke, M., Schmitt, B., Kraume, K., & Shankar, V. (2020). Transforming the Customer Experience through New Technologies. *Journal of Interactive Marketing*, *51*(1), 57–71. https://doi.org/10.1016/j.intmar.2020.04.001
11. 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*(1), 16–20. https://doi.org/10.56741/bst.v2i01.276
12. Kalaiyarasan, B., Kamalakannan, A., & Gurumoorthy, K. (2023). AI-Driven Customer Relationship Management (CRM): A Review of Implementation Strategies. *International Conference on Computing Paradigms*, 33–38.
13. Ledro, C., Nosella, A., & Vinelli, A. (2022). Artificial intelligence in customer relationship management: literature review and future research directions. *Journal of Business & Industrial Marketing*, *37*(13), 48–63. https://doi.org/10.1108/jbim-07-2021-0332

14. Raj, K., Fredrick, D. P., Kurahattidesai, C., & Hegde, C. (2024). Artificial Intelligence Driven Customer Relationship Management: Harnessing the power of technology to improve business efficiency. *International Journal of Communication Networks and Information Security*, *16*(4), 58–65.
15. Robertson, J., Ferreira, C., & Paschen, J. (2021). Reading Between the Lines: Understanding Customer Experience With Disruptive Technology Through Online Reviews. *Australasian Marketing Journal*, 183933492199948. https://doi.org/10.1177/1839334921999487