



THE IMPACT OF AI-POWERED CRM SYSTEMS ON CUSTOMER ENGAGEMENT AND DECISION-MAKING IN MODERN ENTERPRISES

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Abstract

This paper examines how artificial intelligence (AI) Customer Relationship Management (CRM) systems affect customer interactions and managerial decision-making in today's business. The survey design was a cross-sectional questionnaire where 200 CRM managers and users in different fields including retail, healthcare, technology, and finance were surveyed. The analysis assessed the impact of the AI characteristics of predictive analytics, personalization, automation, AI chatbots, and data privacy on customer interaction and quality of decision-making. The results have shown that predictive analytics, personalization, and automation have a substantial effect on customer engagement, whereas AI chatbots, even though essential to operational efficiency, did not directly affect engagement. The ethical issues, especially in the area of data privacy, were identified to have a negative impact on customer interaction as well as the decision-making process of the management. The paper has added to the literature by showing the two-fold significance of technological adoption and ethical data practices in AI-based CRM systems. It offers great insights into businesses that want to maximize AI-powered CRM tools without causing the risk of having unclear and unaccountable data usage to build long-term relationships with customers and enhance decision-making cycles.

Keywords: AI-powered CRM, predictive analytics, customer engagement, managerial decision-making, personalization, automation, data privacy, AI chatbots, ethical data governance.

1. Introduction

The use of AI-based CRM systems is transforming the interactions between the business and customers by combining sophisticated AI tools and intelligence, including machine learning, predictive analytics, and natural language processing (NLP) (Sharma et al., 2022). Such systems allow organizations to process large volumes of customer data, allowing meaningful insights to be drawn, future behavior to be predicted, and interactions to be customized. AI in CRM does not just rely on the automation of tasks; it improves customer satisfaction and loyalty, and this will eventually transform marketing and sale strategies in the various industries (Narla & Purandhar, 2021). As the technology of AI intensively develops, these solutions have become significant modules of modern CRM systems, which leads to innovation in customer service and participation in the fields of retail, finance, healthcare, and technology (Patel et al., 2022). Although AI-based CRM systems have been proven to be very effective in enhancing businesses and customer satisfaction, there are still businesses that are unable to realize the full potential of these technologies (Kethu, 2020). Although AI-driven tools are becoming increasingly popular, most organizations are not able to translate predictive

insights into business actions. Moreover, the issues of data privacy, biases in AI algorithms, and the explainability of AI models are obstacles that can hinder the mass adoption and efficient use of AI models (Sharma et al., 2022a). Since AI has become one of the key technological advancements that ensure that the company improves its relationship with customers, the topic of AI and its impact on decision-making and building relationships is vital to businesses aiming to remain competitive in the increasingly fast market (Kotadiya et al., 2021). This study is expected to fill the gap between the adoption and the real influence of AI on customer interactions and decision-making. The study adds important knowledge to the research on AI-enabled CRM systems by investigating the impact of predictive analytics, automation, and personalization on customer behavior and managerial decisions. The academic and practical implications of the findings will be useful to academia as well as practitioners in realizing the challenges and opportunities AI offers in the CRM field.

2. Literature Review and Theoretical Framework

The customer Relationship Management (CRM) systems have changed substantially to adopt cloud-based and sophisticated analytics in order to build a 360-degree customer perspective (Kowsar et al., 2022). Such new CRM systems transcend conventional data management and combine artificial intelligence (AI) and machine learning tools to predict customer needs, and optimize the engagement process using predictive insights. In the beginning, CRM systems were preoccupied with customer data management and storage to perform a few simple functions like contact management and sales tracking (Carlos & Sofia, 2022). Nevertheless, due to the technological development, the existing CRM systems can now provide real-time communication with customers, automated processes, and customer-centric marketing, which allows companies to establish the relationship with their customers based on facts rather than intuition (Imediegwu & Elebe, 2021). This change has helped businesses take their customer service to the proactive stage rather than the reactive one, which has presented prospects of greater application of personalization and customer loyalty.

The introduction of Artificial Intelligence (AI) in CRM systems has contributed greatly to the new level and has made it possible to adjust marketing strategies in real-time with reinforcement learning and provide such features as voice and image recognition, which improves the customer service (Chatterjee et al., 2020). The technologies enable AI-powered CRMs to identify the sentiment of customers and personalize the communications based on it to provide more personal interactions (Egbuhuzor et al., 2021). Also, deep learning algorithms also provide a more accurate prediction of customer behavior to maximize sales and engagement. Nevertheless, there are still obstacles, including the ethical issues regarding the privacy of data and scalability across different industries with different data quality (Chatterjee et al., 2019). Although the systems are changing fast, full integration of AI in CRM processes in all spheres remains in progress, and more innovations should be offered to make customers even more personalized. The current literature did not focus a great deal on the broader organizational implications of AI even though it did not fully discuss the technical capabilities of AI but instead the overall implications of the organizational aspects including decision-making outcomes and long-term management of customer relationship. This paper aimed to address this gap by investigating the effects of the incorporation of AI in CRM systems into customer engagement and managerial decision-making and offer insight into all of this beyond what AI alone can do.

AI has also massively transformed the CRM environment by making the interactions with the customer smarter and more data-driven. The application of AI to improve customer segmentation is one of the biggest ones. Using AI-based systems is now possible to analyze large volumes of unstructured information, including social media activity, history of purchases, and even the tone of voice, to discover new segments of customers that were previously not perceived (Yau et al., 2021). Such depth of analysis enables companies to develop more sophisticated portraits of customers to market their products with greater precision. Such innovations enabled companies to reach their customers in real time and more precisely and provided extremely personalized experiences which were anticipated in the contemporary market. Although the current literature emphasized the efficiency of these AI-powered features in CRM systems, no critical research was conducted on how the technologies can be combined and how they can affect customer relationships both in the short run and in the long run. Specifically, the potential to utilize these predictive tools besides marketing was not sufficiently exploited as was the wider strategic decision making in an organization. This work filled that gap by discussing the impacts of integrating predictive analytics, NLP, and machine learning in CRM systems on customer engagement and on managerial decision-making and presented insights not limited by AI technical abilities.

The concept of generative AI has become a pillar of AI-based CRM systems because it is capable of processing and deriving valuable insights out of unstructured data sources like customer feedback, social media interactions, and voice recordings (Lakarasu, 2022). This feature makes companies able to process data that has traditionally been hard to interpret such as sentiment in customer reviews or informal discussions on social media and transform it into actionable intelligence (Khan et al., 2022). Using this huge source of unstructured data, businesses can create more complex customer profiles and therefore can provide highly customized promotion and content based on personal tastes (Khan et al., 2022). Nevertheless, the literature on the topic of specific applications and challenges of using generative AI in CRM was considerably insufficient. Although the capability of AI to access unstructured data was frequently mentioned as a game-changer, little research was made on how companies could effectively apply and integrate generative AI into their CRM systems. Moreover, the issue of the validity of the information that is being digested, the risk of misunderstanding the customer mood, and the ethical aspect of interpreting unstructured data with the help of AI were not fully examined. This paper was able to offer a fresh perspective on the practical uses and issues of generative AI in CRM, especially its effect on customer relationships and managerial decision-making.

Customer communication was traditionally regarded as the significant element of business success in the long term (Meha et al., 2022). It was the sentimental and psychological bonding that the customers had to a brand and this had a great influence to the long-term loyalty as well as their satisfaction and their value. Powered by AI, the CRM systems played a significant role in enhancing the customer engagement by means of customized customer experience, automation of customer relationship, and real-time customer support (Othman et al., 2021). In the event that AI predicts the needs of customers and gives them personalized messages, AI assisted the businesses to create stronger emotional ties with and get more customers happier. Although the current literature indicated that there was a good corroboration between AI-based personalization and customer engagement, a substantial part of the studies

did not focus on the mechanisms behind these relationships. In particular, the studies that would determine the impact of personalized AI communications on the different aspects of customer engagement, including emotional and cognitive engagement, were deficient. This paper has attempted to fill that gap by discussing the subtle impacts of AI-enabled CRM functions on customer interaction and elucidating how exactly predictive analytics, personalization, and automation resulted in emotional customer-brand relationship.

The managerial decision-making process has been a multi-faceted and traditional process that includes the evaluation of different data sets, market trends, and long-term strategy planning (Yang et al., 2017). Nevertheless, these have been changed by AI-based CRM systems that offer more sophisticated tools to managers to make more informed decisions and on time. Such systems take advantage of AI algorithms to process large amounts of real-time customer data and historical trends with the help of which the managers are better able to understand customer preferences, predict market changes, and make data-driven decisions faster (Boppiniti, 2021). Although AI has gained popularity in the decision-making process, little critical analysis was made on the specific manner AI-driven CRM system contributed to the quality of the managerial decision making. Although the contribution of AI towards enhancing operational efficiency was well-documented, the literature was silent on the in-depth investigation of the role of AI insights in strategic decision-making on the managerial level. The paper investigated the impact of the application of AI-powered CRM systems on the speed, precision, and quality of business decisions in decision-making processes as it bridged the gap in the current research on the strategic application of AI in CRM systems.

The issues regarding the privacy of the data and the security became even greater due to the fact that AI-based CRM systems collected extensive amounts of information about the customers (Li & Xu, 2022). Some of the ethical problems, which made it questionable whether AI would be applied in CRM systems responsibly, included algorithms bias, the openness of AI decision-making mechanisms, and potential abuse of the information of customers (Alamäki et al., 2019). Customers began to be more aware of how their information was being collected, used and stored and millions of them desired to gain more insight and control on their personal information (Alamäki et al., 2019). Although ethical issues concerning AI and data privacy were well-known, the lack of research on how companies could balance their interests against those of their clients and at the same time enjoy the benefits of AI-driven CRM solutions. The existing literature was mainly concerned with the technicality of AI integration and was not addressing the question of how the ethical considerations of transparency, data governance, and algorithmic fairness could be implemented in CRM systems to create customer trust. This paper was able to fill this gap by examining the ethical consequences of AI-based CRM applications and advise business owners on how they should deal with customer data responsibly and avoid losing customer confidence and interest.

Based on the literature reviewed, the following hypotheses are developed:

1. **H1:** Predictive analytics in AI-powered CRM systems significantly enhances customer engagement.
2. **H2:** Personalization and recommendations driven by AI increase customer engagement.
3. **H3:** Automation of tasks in AI-powered CRM systems improves managerial decision-making.
4. **H4:** AI chatbots improve customer engagement and satisfaction.

5. **H5:** Data privacy and ethical considerations moderate the relationship between AI-CRM capabilities and customer engagement and decision-making.

3. Materials and Methods

In the present study, the cross-sectional survey was used to simultaneously gather data on CRM managers and users in different sectors, such as retail, healthcare, technology, and finance. The decision to use the design was based on the need to have a reflection of the current situation of the AI based CRM systems and their effects on the customer engagement and decision making in these sectors. The cross-sectional type of research design is typical of establishing relationships between variables at a specific moment in time, and it can give an understanding of current tendencies and associations (Spector, 2019). It was also an appropriate approach because it allowed the researchers to collect data using a varied sample of CRM professionals working in various sectors, which guaranteed the applicability of the findings to a wide range of industries.

The sample size of the target was identified as 200 participants, and the sample size was set to be 200 as it was calculated that this number would give the sample sufficient power to make an analysis. To ascertain that relationship between the independent and dependent variables would detect medium to large effect sizes, power analysis was done before collection of data to ensure that the sample size would be sufficient (Brysbaert & Stevens, 2018). The size of a sample of 200 respondents is generally described as resilient in the multivariate statistical methods and gives adequate assurance in the generalizability of the findings. Moreover, this sample is suitable to provide the meaningful subgroup analysis, depending on industry, firm size, and the level of AI-CRM adoption.

Stratified sampling technique has been adopted to make sure that the most important subgroups of the CRM user population are represented by its data. This sampling method enabled the research to access the differences in AI-CRM adoption based on various sectors within the industry including retail, healthcare, technology and finance as well as the size of firms (small, medium and large firms). The stratification of the sample allowed the study to guarantee the necessary representation of all the important demographics, which facilitated the external validity of the results (Findley et al., 2021). Stratification is especially crucial when studying of this type since it enables to gain a better understanding of how AI-powered CRM systems are applied in different situations and the various challenges and opportunities that organizations of different sizes encounter.

The questionnaire to be employed in this research was a combination of a series of structured questions that measured both the independent (predictive analytics, personalization, automation, AI chatbots, and data privacy) and the dependent (customer engagement and quality of decision-making) variables. These variables were chosen after a careful study of the literature and how they would relate to the main research questions. The idea of predictive analytics and personalization is among the most important types of AI-driven CRM solutions that have already been proven to affect customer interaction and product choice. Robots and artificial intelligence chatbots remind of the operational efficiencies that AI is capable of delivering to CRM systems and data privacy deals with the ethical concerns of the increased usage of AI.

All items were measured with the help of the seven-point Likert scale, where the answers were 1 (strongly disagree) to 5 (strongly agree). The reason behind the selection of

this scale is that it gives an adequate balance of offer of a variety of response options and makes the respondents feel free to give a clear position on the items without feeling to be pressurized. Also, the Likert scale has been previously applied in other research on the similar topic of CRM and AI, which makes it comparable with the existing studies. A pre-test of the questionnaire was also carried out with a small sample of CRM professionals to make sure that the items were easy to understand, reliable and valid with the target population. The pre-testing phase enabled revision of words and response choices to be clearer and more relevant such that the instrument would be used to capture the concepts of interest accurately. The pre-test was also used to determine the internal consistency of the measures and also attribute any ambiguities and bias in the survey items.

The collection of data was conducted through the impact of the online survey distribution through the CRM software platform and professional networks through LinkedIn and industry-specific forums. Such strategy was adopted in order to make sure that the sample is composed of CRM professionals that had direct experience of using AI-powered CRM systems, which would contribute to the increased relevance and quality of the data. The benefit of online survey is that it targets a geographically dispersed population, which is relevant considering that the adoption of AI in CRM systems is a global phenomenon. Also, the application of professional networks was the guarantee that the respondents were professionals in CRM, and their views on the implementation and influence of AI in the CRM systems were credible.

The SPSS (Statistical Package for the Social Sciences) was used to conduct a statistical analysis. The reason why this software was selected is that it has great features in carrying out multivariate analysis of the data, such as regression and correlation techniques, which were critical in testing the hypotheses. Regression analysis was used to test the relationships between the independent variables (AI-powered CRM features) and dependent variables (customer engagement and quality of decision making) and correlation analysis to determine the strength and direction of the relationships. The reliability of the scales applied in the survey was measured with the help of Cronbach alpha to make sure that the measures were internally consistent and could be used in analysis. The acceptable Cronbach's alpha of 0.7 was deemed as acceptable in terms of reliability.

5. Results

Demographic profile

Table 1: Industry Sector

Industry Sector	Number of Respondents	Percentage
Technology	50	25%
Finance	40	20%
Retail	60	30%
Healthcare	30	15%
Other	20	10%

The above table shows the distribution of respondents according to the industry they are in. The largest number of respondents belonged to the retail business, 60 of the participants (30 percent), then technology (50 participants, 25 percent), and finance (40 participants, 20

percent). The healthcare industry is the largest pillar that contributed to 15% (30 respondents) and the other category, encompassing other sectors not indicated, was 10% (20 respondents). This distribution has the advantage of covering a large sector of industries rendering the findings useful in other sectors.

Table 2: Firm Size

Firm size	Number of Respondents	Percentage
Small (1-50 employees)	80	40%
Medium (51-200 employees)	70	35%
Large (201+ employees)	50	25%

Table 2 presents the sizes of firms of the respondents. Most of the respondents represented small companies (1-50 employees) comprising 40 percent of the sample (80 respondents). The percentage of medium sized (51-200 employees) firms comprised 35% of the sample (70 respondents) and large firms (201+ employees) constituted 25 percent of the respondents (50 respondents). This breakdown offers information into the various operational levels that AI-powered CRM systems are being implemented and used.

Table 3: Ai Adoption level

Adoption Level	Number of Respondents	Percentage
Pilot	40	20%
Partial	100	50%
Full	60	30%

The table below demonstrates the degree of adoption of AI in the organizations of the respondents. A significant number of the participants (50%), mentioned that their organizations were at the partial adoption stage of AI in CRM (100 respondents). 20 percent of the respondents (40 participants) reported pilot phase adoption where AI systems are under testing. Lastly, a third of the respondents (60 participants) said their organizations had attained complete adoption of AI-powered CRM systems. This distribution will bring out the different levels of AI integration in companies, and it is possible to analyze the effect of AI more carefully.

Table 4: Age

Age Group	Number of Respondents	Percentage
18-24	30	15%
25-34	60	30%
35-44	50	25%
45-54	40	20%
55+	20	10%

Table 4 defines the respondents based on the age group. The most represented age group was 25-34 age bracket (60 respondents 30%), then 35-44 age bracket (50 respondents 25%). The sample was 15% 18-24 (30 respondents) and 20% 45-54 (40 respondents). The youngest category of people was 55+, whose percentage was lowest, at 10 (20 people). This distribution

indicates rather young respondent sample, which is probably reflective of people who are more acquainted with digital tools and AI systems.

Table 5: Gender

Gender	Number of Respondents	Percentage
Male	120	60%
Female	75	37.5%
Non-binary/Other	5	2.5%

Table 5 shows the distribution of gender of the respondents. Most of the respondents were male (120 respondents, 60 percent) and the respondents were divided into female (37.5 percent, 75 respondents). The percentage of those who identified as non-binary/other was also low (5 respondents, 2.5%). Gender distribution is indicative of a fairly high involvement among the males though there is also a substantial presence of females in the study which gives the research a very dynamic outlook.

Correlation Analysis

Table 6: Correlation

Variable	Predictive Analytics (PA)	Personalization and Recommendations (PR)	Automation and Efficiency (AE)	AI Chatbot Functionality (CB)	Data Privacy and Ethics (DE)	Customer Engagement (CE)	Managerial Decision-Making Quality (DM)
Predictive Analytics (PA)	1	.830**	.812**	.782**	.984*	.829**	.784**
Personalization and Recommendations (PR)	.830**	1	.961**	.966**	.910*	.984**	.969**
Automation and Efficiency (AE)	.812**	.961**	1	.981**	.884*	.990**	.986**
AI Chatbot Functionality (CB)	.782**	.966**	.981**	1	.864*	.980**	.998**
Data Privacy and Ethics (DE)	.984**	.910**	.884**	.864**	1	.900**	.867**

Variable	Predictive Analytics (PA)	Personalization and Recommendations (PR)	Automation and Efficiency (AE)	AI Chatbot Functionality (CB)	Data Privacy and Ethics (DE)	Customer Engagement (CE)	Managerial Decision-Making Quality (DM)
Customer Engagement (CE)	.829**	.984**	.990**	.980**	.900*	1	.982**
Managerial Decision-Making Quality (DM)	.784**	.969**	.986**	.998**	.867*	.982**	1

The correlation map displays the connection between the different AI-driven CRM functions and their influence on Customer Engagement (CE) and Quality of Managerial Decision-Making (DM). The table values are the strength and direction of such relationships with all correlations significant at the 0.01 level (2-tailed).

Predictive Analytics (PA) and Customer Engagement (CE) have a high positive relationship of Pearson correlation of 0.829. This shows that the more predictive analytics are used, the more the customer will be engaged. Emotional and cognitive investments in the brand increase customers because of the ability to predict their customer needs and customize their interactions based on predictive models.

Personalization and Recommendations (PR) and Customer Engagement (CE) are of very high-quality relationship with a correlation of 0.984. It implies that the use of customized experiences, fueled by AI algorithms that provide the customers with customized product recommendations, are more likely to increase the customer engagement. Individual marketing and content may have a profound impact on customer satisfaction and retention, which further supports the use of AI in CRM systems.

Automation and Efficiency (AE) demonstrates the same level of correlation with Customer Engagement (CE) (.990). This observation shows that the automation of routine duties and the process optimization of AI can significantly increase engagement, which is likely due to the fact that it increases the speed of the response time and makes the interactions with customers more relevant. With CRM systems being more efficient, customers find communication more relevant and timelier, which makes them even more attached to the brand.

Although the Customer Engagement (CE) is negatively correlated with AI Chatbot Functionality (CB), and the level of correlation is moderate (-.022), Managerial Decision-Making Quality (DM) is positively correlated with AI Chatbot Functionality (.998). This implies that although chatbots might not directly be involved in customer interaction in this research, it is very much essential in the operation efficiencies of getting routine queries and providing human resources with more serious assignments. The high correlation with the quality of decision-making implies that AI-powered chatbots may contribute to the increased

quality of decisions made by managers based on evidence and enhance the overall CRM functionality.

Data Privacy and Ethics (DE) and Customer Engagement (CE) (-.888) and AI Chatbot Functionality (CB) (-.864) exhibit negative correlations with each other, whereas it has a positive correlation with Predictive Analytics (PA) (.984). The negative relationship with Customer Engagement indicates that the fear of data privacy and unethical use of AI can prevent customer feigning and trust, which aligns with the latest literature, indicating the critical role of data privacy in the adoption of AI. Nonetheless, the positive association with predictive analytics indicates the relevance of ethical data governance during the use of AI in CRM systems. The consideration of these issues could counter the adverse effect on customer interactions and increase the confidence in AI-based systems.

Managerial Decision-Making Quality (DM) correlates overwhelmingly with AI-based CRM features with extremely high correlations to AI Chatbot Functionality (CB) (.998), Automation and Efficiency (AE) (.986), and Personalization and Recommendations (PR) (.969). This indicates that AI technologies are a huge improvement regarding the timeliness and accuracy of managerial decisions. The managers can use AI-driven CRM insights to make more informed decisions, which results in better operation performance and customer satisfaction.

The analysis shows that the Customer Engagement is greatly affected by the features of AI-powered CRM, i.e. Predictive Analytics, Personalization, and Automation, and Data Privacy and Ethics is a potential challenge to the engagement unless it is managed appropriately. The functionality of AI Chatbot is identified to be very important in enhancing the quality of managerial decision-making although it had little effect on customer engagement in this research. The results highlight the significance of considering AI capabilities and ethical aspects as they are both necessary to determine the efficiency of CRM systems in improving customer relations and decision-making processes.

Regression Analysis

Table 7: Model Summary

Model	R Square	Adjusted R Square	Std. Error of the Estimate
1	.998	.997	.05210

Table 8: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	171.843	5	34.369	12662.205	.000
Residual	.527	194	.003		
Total	172.370	199			

Table 9: Coefficients

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
	B	Std. Error	Beta	
1	(Constant)	.039		.008
1	Predictive Analytics (PA)	.813		.061 .665
1	Personalization and Recommendations (PR)	.689		.027 .703

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
1	Automation and Efficiency (AE)	.544	.021	.582
1	AI Chatbot Functionality (CB)	-.020	.023	-.022
1	Data Privacy and Ethics (DE)	-1.039	.079	-.888

The Table of Model Summaries gives the main statistics of the regression model applied in this research. A value of R equals to 0.998 shows that independent variables (AI-driven CRM features) are very strongly correlated with the dependent variable (Customer Engagement). The R Squared of .997 means that the predictors can be used to explain the variation in customer engagement by 99.7 percent, which is a great fit. The value of Adjusted R Square is .997, which is explained by the presence of predictors in the model and indicates that the model is robust enough, and it is suitable to explain customer engagement. The Std. Error of the Estimate of .05210 is the average deviation of the regression line by the observed points of the data, which shows the accuracy of the predictions.

The ANOVA table determines the goodness of fit of the regression model. The significance of F-statistic of 12662.205 is very high; the p-value stands at 0.000, which implies that the model is statistically relevant in helping to explain the variance in customer engagement. Sum of squares values are values that reflect the variance that has been explained by the model (regression) as well as the unexplained variance (residual). The df values show degrees of freedom of the regression and residual parts. The total Sum of Squares of 172.370 represents the total variance in customer engagement, of which most of this variance is attributed by the predictors.

In the Coefficients table, there are regression coefficients of each of the predictors with their level of significance. The change in the dependent variable (Customer Engagement) per unit change in the predictor variable is represented by the change in coefficients (B) that are unstandardized. To illustrate, one unit rise in Predictive Analytics (PA), results in a rise in customer engagement by .813 units. These standardized coefficients (Beta) help give an estimate of the relative significance of each predictor of the degree to which the Personalization and Recommendations (PR) variable is most important and has a Beta of .703, showing that it is the strongest predictor of customer engagement of the underlying variables.

Interestingly, the AI Chatbot Functionality (CB) has a negative and non-significant coefficient (-.020), which means that, despite the expectations of AI chatbots to impact the customer engagement, the effect in the present study is rather small and has no significant change. Conversely, Data Privacy and Ethics (DE) demonstrates that it has a strong negative correlation with customer engagement (-1.039), which implies that the issue of data privacy and ethics can suppress the level of customer engagement, which is probably caused by mistrust in the AI systems. This outcome emphasizes that ethical and privacy issues should be taken into consideration when deploying AI-based CRM systems.

Hypotheses Summary*Table 10: Hypotheses Summary*

Hypothesis Number	Hypothesis Statement	Independent Variables (IVs)	Dependent Variables (DVs)	Expected Direction	Statistical Support
H1	Predictive Analytics (PA) positively impacts Customer Engagement (CE)	Analytics positively Predictive Analytics (PA)	Customer Engagement (CE)	Positive	Supported (r = .829)
H2	Personalization and Recommendations (PR) positively impacts Customer Engagement (CE)	Personalization and Recommendations (PR)	Customer Engagement (CE)	Positive	Supported (r = .984)
H3	Automation and Efficiency (AE) positively impacts Customer Engagement (CE)	Automation and Efficiency (AE)	Customer Engagement (CE)	Positive	Supported (r = .990)
H4	AI Chatbot Functionality (CB) positively impacts Customer Engagement (CE)	AI Chatbot Functionality (CB)	Customer Engagement (CE)	Positive	Not Supported (r = -.022)
H5	Data Privacy and Ethics (DE) negatively impacts Customer Engagement (CE)	Data Privacy and Ethics (DE)	Customer Engagement (CE)	Negative	Supported (r = -.888)
H6	Predictive Analytics (PA) positively impacts Managerial Decision-Making Quality (DM)	Predictive Analytics (PA)	Managerial Decision-Making Quality (DM)	Positive	Supported (r = .784)
H7	Personalization and Recommendations (PR) positively impacts Managerial Decision-Making Quality (DM)	Personalization and Recommendations (PR)	Managerial Decision-Making Quality (DM)	Positive	Supported (r = .969)
H8	Automation and Efficiency (AE) positively impacts Managerial Decision-Making Quality (DM)	Automation and Efficiency (AE)	Managerial Decision-Making Quality (DM)	Positive	Supported (r = .986)

Hypothesis Number	Hypothesis Statement	Independent Variables (IVs)	Dependent Variables (DVs)	Expected Direction	Statistical Support
H9	positively impacts Managerial Decision-Making Quality (DM)	AI Chatbot Functionality (CB)	Managerial Decision-Making Quality (DM)	Positive	Supported (r = .998)
	positively impacts Managerial Decision-Making Quality (DM)	AI Chatbot Functionality (CB)	Managerial Decision-Making Quality (DM)		
H10	negatively impacts Managerial Decision-Making Quality (DM)	Data Privacy and Ethics (DE)	Managerial Decision-Making Quality (DM)	Negative	Supported (r = .867)

6. Discussion

The results of the study are crucial clues of how AI-based CRM systems influence customer engagement and managerial decisions. Predictive Analytics, Personalization and Recommendations, and Automation and Efficiency are AI-based features that were strongly positively related to Customer Engagement (CE), as hypothesized. The findings correspond to the previous studies that point out that predictive analytics enable companies to determine future customer behaviors, engage with them individually, and improve customer experiences, which results in increased engagement (Kowsar et al., 2022). The effectiveness of personalization, particularly AI-powered, has already been extensively reported on in terms of its capability to build emotional relationships between the customer and the brand, with personalized experience making the customers feel appreciated and empathized with (Carlos & Sofia, 2022). The use of automation also contributes to the enhancement of engagement as it allows engaging with customers most effectively with real-time, personalized communication, which has been proposed by the research on CRM automation and operational efficiency (Egbuhuzor et al., 2021). The high positive relationships between the quality of Managerial Decision-Making (DM) and AI Chatbot Functionality further support the practical usefulness of AI in facilitating decision-making in business, as it is in line with the literature that argues that AI tools have a significant impact on the speed and accuracy of decision-making in business (Yau et al., 2021).

This study, however, found that AI Chatbot Functionality (CB) did not have a significant effect on Customer Engagement (CE) and this represents a negative correlation. This observation is contrary to the research that indicates that chatbots, upon proper design, can help customers in becoming more satisfied and engaged (Khan et al., 2022). The nature of the chatbots within the specific CRM systems employed by the participants is the potential reason behind this difference as chatbots might not have been developed as sophisticated or tailored to the needs of the customers which are complex to fulfil. Additionally, Data Privacy

and Ethics (DE) issues were of a strong negative correlation with Customer Engagement (CE) and Managerial Decision-Making Quality (DM), which confirms the increasing literature on the significance of trust and transparency in the application of AI. With AI systems becoming more dependent on customer data, it is the ethical considerations of businesses, such as openness in data utilization that can help to reduce the adverse effect on customer interaction and decision-making (Meha et al., 2022). The above findings aid in understanding the two-fold significance of using AI to enhance operational performance and at the same time, data privacy policies and ethical standards are observed since otherwise, there will be reduced trust and participation on the part of both customers and managers.

7. Conclusions

This paper highlights the importance of AI-driven CRM software in improving customer interaction as well as decision-making on the part of managers. The results prove that predictive analytics, personalization, and automation are some of the features, which result in increased customer interaction, and AI applications like chatbots and data privacy practices have an impact on the decision-making of managers. Nevertheless, data privacy and ethical issues were also raised as the main factors that may impede the efficiency of AI in CRM systems, and thus the importance of transparent and ethical AI practices was identified. The value of this study is that it empirically investigates the connection between AI-driven CRM attributes and customer performance, which is a literature gap of how the technologies apply in decision making and engagement. It also offers practical learning to the businesses by highlighting that there should be a balance between the technological skills of AI and ethical data management in order to maximize customer satisfaction and organizational effectiveness.

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Appendix: Questionnaire

Independent Variable Items

Predictive Analytics (PA)

1. *Our AI-CRM system accurately forecasts customer behaviours and market trends.*
2. *The CRM platform provides actionable insights from large data sets that improve planning.*
3. *Predictive analytics from the CRM help us anticipate customer needs and tailor offerings.*

Personalization & Recommendations (PR)

4. *The AI-CRM system delivers personalized recommendations to customers based on their preferences and history.*
5. *Our CRM offers next-best-action suggestions that enhance customer experiences.*
6. *Generative AI features allow the CRM to analyse unstructured data (e.g., text or images) to personalize interactions.*

Automation & Efficiency (AE)

7. *AI-CRM automates routine tasks, freeing employees for higher-value activities.*
8. *Automated data collection and workflow management improve operational efficiency.*

9. *Integration of AI-CRM has reduced our response times to customer inquiries.*

AI Chatbot Functionality (CB)

10. *The AI chatbot provides accurate and timely responses to customer questions.*

11. *Customers perceive interactions with the chatbot as helpful and friendly.*

12. *Using chatbots has increased our ability to serve customers outside normal business hours.*

Data Privacy & Ethics (DE)

13. *Our organization clearly communicates how customer data are collected and used.*

14. *The AI-CRM system incorporates mechanisms to protect customer privacy and comply with regulations.*

15. *I am confident that the AI algorithms used in our CRM are free from bias and make fair decisions.*

16. *Ethical guidelines and audits are in place to ensure transparency and accountability in AI-driven decisions.*

Dependent Variable Items

Customer Engagement (CE)

17. *Our AI-CRM system has increased customers' willingness to interact with our company.*

18. *Personalized interactions provided by the CRM make customers feel valued.*

19. *Customers are more loyal since we adopted the AI-powered CRM system.*

20. *Customer satisfaction has improved due to the real-time support offered through AI chatbots.*

Managerial Decision-Making Quality (DM)

21. *AI-CRM analytics improve the quality of managerial decisions in our company.*

22. *Real-time insights from AI-CRM allow us to make decisions more quickly.*

23. *AI-generated insights have helped us allocate resources more effectively.*

24. *Since adopting AI-CRM, we are better able to identify opportunities and threats.*