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The power of AI: enhancing customer loyalty through satisfaction and efficiency

Pragya Singh[a] and Vandana Singh[b]

[a]Symbiosis Centre for Management Studies (NOIDA), Symbiosis International University, Pune, India; [b]Department of Computer Science, Birla Institute of Technology, Mesra, India

ABSTRACT

In the rapidly evolving landscape of customer service, integrating AI-powered solutions has emerged as a game-changer. This study delves into the intricate dynamics of AI-Powered Customer Service and its profound impact on customer loyalty, specifically focusing on the mediating roles played by customer satisfaction and perceived efficiency. Data were collected from 373 respondents in a cross-sectional study conducted in 2023. A structured questionnaire was administered electronically to individuals with recent experiences with AI-powered customer service within the last six months. The findings provide compelling evidence of the significant influence of AI-Powered Customer Service on customer satisfaction and perceived efficiency, as indicated by path coefficients of 0.91 and 0.95, respectively. Moreover, a strong relationship between customer satisfaction and loyalty (path coefficient = 1.05) and perceived efficiency and customer loyalty (path coefficient = 0.22) underscores their pivotal roles in driving customer loyalty. Organizations should strategically embrace AI-powered customer service, emphasizing efficiency and customer satisfaction. They prioritize customer-centric design in AI solutions to align technology with customer preferences and needs.

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Introduction

Artificial Intelligence (AI) combines cutting-edge technology, such as chatbots, machine learning (ML), and natural language processing (NLP) to automate and customize client interactions, resulting in faster, and more effective service (Mehrotra, 2019). The process involves the examination of consumer data in order to get insights into their preferences, behaviors, and purchasing history. This data assists in customizing interactions, suggestions, and promotions, resulting in a more individualized and captivating client experience (Dwivedi et al., 2021). AI-driven chatbots and virtual assistants facilitate continuous accessibility for client inquiries and support. This practice guarantees that consumers are able to obtain support at any given time, so augmenting their level of satisfaction and fostering a sense of confidence (George & George, 2023). The system has the capability to address common client concerns and commonly encountered inquiries, so allowing human agents to allocate their attention toward more intricate situations. These factors contribute to the expeditious settlement of issues, the reduction of waiting periods and the enhancement of overall customer satisfaction (Zerilli et al., 2019). It uses past data and behavioral patterns to forecast the demands of its customers. To effectively satisfy client expectations, businesses can take proactive measures to resolve complaints, provide pertinent products or services and optimize their strategies (Rygielski et al., 2002). By automating repetitive operations, implementing AI-powered customer services can drastically save operating expenses. Businesses are able to carefully allocate resources and invest in improving overall customer happiness because to this cost-effectiveness

CONTACT Pragya Singh pragya.singh@scmsnoida.ac.in Symbiosis Centre for Management Studies NOIDA, Sector 62, Uttar Pradesh; A constituent of Symbiosis International University, Pune, India

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(Al-Mekhlal et al., 2023). Thus, by providing individualized experiences, increasing service effectiveness and promoting a deeper understanding of client wants and preferences, AI-powered customer services play a critical role in building customer loyalty. Companies are better positioned to create enduring and lucrative relationships with their clientele when they include AI into their customer service operations (Trawnih et al., 2022).

The interconnection between perceived efficiency and customer happiness within the realm of AI-powered customer service is evident. The pleasure of customers is influenced by their perception of the AI system's efficiency in resolving difficulties and offering relevant support (Yeo et al., 2022). On the other hand, a gratifying engagement with the AI system amplifies the perception of its efficacy. Perceived efficiency and customer satisfaction are both significant factors in cultivating customer loyalty through the establishment of trust, the fulfillment of expectations and the cultivation of a favorable brand perception (Floridi et al., 2021). In conclusion, the implementation of a meticulously crafted and optimally performing AI-driven customer service system holds the potential to exert a substantial impact on customer allegiance and the establishment of enduring associations with the organization (Gupta, 2021; Fernando et al., 2023).

The purpose of this study is to investigate how perceived effectiveness and customer satisfaction function as mediators in the relationship between customer loyalty and AI-powered customer service. AI-powered customer service should be strategically implemented by organizations, with an emphasis on both customer satisfaction and efficiency. In order to match technology with client preferences and demands, they give priority to customer-centric design in AI solutions.

Review of literature

In contemporary times, there is a notable trend of substituting human chat service operators with conversational software agents or chatbots. These agents are specifically developed to engage in natural language interactions with human users, often employing artificial intelligence (AI) techniques (Adam et al., 2021). The utilization of chatbots has proven to be advantageous for companies, particularly when it is linked to a favorable customer experience. The primary determinants of chatbot effectiveness in customer service are the relevancy of responses provided and the capacity to resolve client issues. These variables typically lead to favorable outcomes, such as customer satisfaction, greater likelihood of continued chatbot usage, product purchases and product recommendations (Nicolescu & Tudorache, 2022). In instances involving tasks of low complexity, consumers perceive AI to possess a higher problem-solving capacity compared to human customer service. Consequently, they exhibit a greater inclination toward utilizing AI. Conversely, for tasks characterized by high complexity, consumers regard human customer service as superior and are more inclined to opt for its utilization over AI (Song et al., 2022; Xu et al., 2020). Nevertheless, the widespread adoption of AI-based chatbots is hindered by a deficiency in user trust. However, there remains a deficiency in the availability of systematically obtained design knowledge pertaining to user confidence in these agents (Yang et al., 2023; Zierau et al., 2020). Although there is a lot of potential for AI to improve competitiveness, there are also a number of issues that could arise. The use of features like convenience, customization and humanization has the benefit of clarifying the value co-creation process. Technology's drawbacks include worry, privacy worries, a loss of control, and a reduction in personal connection, all of which lower the value of shared value. In order to create a service ecosystem that puts the requirements of its customers first, AI-driven value co-creation methods must be carefully integrated while taking care of any problems relating to value co-destruction (Chaturvedi & Verma, 2023). In their 2019 study, Al-Adwan and Al-Horani (2019) emphasized that trust is essential for customers and that customer satisfaction influences their intention to repurchase.

By integrating AI, ML and NLP, enterprises have the ability to examine data in order to discover new insights that can be used to automate operations and propel corporate initiatives. Consequently, companies that want to maintain competitiveness and enhance consumer loyalty have to embrace these practices (Patel & Trivedi, 2020). Both AI and staff service quality have been shown to significantly contribute to the evaluation of overall service quality, as well as customer happiness and loyalty (Prentice et al., 2020). However, it is observed that customers tend to have a more pronounced unfavorable attitude

toward customer service provided by AI as compared to their human counterparts. The primary concerns expressed by consumers with AI customer service are to its limited problem-solving capabilities. Additionally, customers are dissatisfied with the late response and absence of a human touch. The likelihood of customers providing favorable feedback is mostly contingent upon voice features and service attitudes (Zhao et al., 2022). The satisfaction of users is highly influenced by the quality of service recovery and conversational capabilities of AI chatbot systems. In contrast, the quality and pleasure of the core AI chatbot service shown a substantial impact on the loyalty of users using the chatbot (Hsu & Lin, 2023). Customer loyalty is favorably impacted by the quality of AI chatbot services in terms of perceived value, cognitive trust, emotional trust, and satisfaction (Qian et al., 2023). Al-Adwan et al. (2022) examined the role of environmental cues and stimuli in online settings in Jordan and in their study highlighted the importance of policy service quality dimensions in establishing customer trust. Al-Adwan et al. (2020) explored the factors affecting online trust, satisfaction and loyalty in Jordan and provided relevant and beneficial insights for e-commerce businesses in Jordan. Their study also compares relationships between online trust, loyalty and satisfaction in Jordan and internationally.

Upon conducting an extensive analysis of the available scholarly works pertaining to the intermediary function of perceived efficiency and customer satisfaction in the correlation between AI-driven customer service and customer loyalty, it is evident that a significant research void exists in the examination of proactive communication by AI systems. The current body of research has not yet thoroughly investigated the effects of AI-initiated communication on perceived efficiency, customer satisfaction and eventual customer loyalty. AI-initiated communication refers to the proactive approach of AI systems in anticipating consumer requirements and reaching out to give assistance or solutions before customers actively seek aid. Gaining a comprehensive understanding of the ramifications associated with proactive communication within the realm of AI-driven customer service has the potential to provide valuable insights for the optimization of client interactions and the augmentation of customer loyalty.

Methodology

Sampling methodology

We employed a purposive sampling approach to select participants for this cross-sectional study. The target population consisted of individuals who had recent experiences with AI-powered customer service within the last six months in various industries.

Number of respondents

Initially, a total of 478 respondents participated in this study. However, 105 respondents who indicated that they had not had recent experiences with AI-powered customer service within the last six months were eliminated from the study. This resulted in a final sample size of 373 respondents.

Nature of sampling

The nature of sampling was non-probabilistic purposive sampling, with the selection of respondents based on their specific experience with AI-powered customer service. The respondents are customers who were purchasing online and have experienced AI-powered services in various domains, such as a Chatbot service and other personalized services ensuring diversity in the dataset. Purposive sampling was utilized in this research to identify AI applications and services for users and non-user. This method works well for this study because it is challenging to compile a list of people who use AI services to share their opinions and experiences.

Time period of the study

Data collection for this study took place in the year 2023.

Variables

We examined a set of key variables to investigate the relationship between AI-powered customer service and customer loyalty. The independent variable (IV), AI-powered customer service, was assessed based on respondents' experiences and perceptions of interactions with AI-driven customer service solutions. Our research also incorporated two mediating variables (MVs), namely Perceived Efficiency and Customer Satisfaction. Perceived Efficiency was gauged by assessing respondents' perceptions of the efficiency of AI-powered customer service in handling queries and tasks. Customer Satisfaction was measured by evaluating respondents' overall satisfaction with their interactions with AI-powered customer service. Finally, the dependent variable (DV), Customer Loyalty, was assessed by examining respondents' intentions, behaviors and loyalty-related attitudes toward companies or brands that employ AI-powered customer service solutions. These variables collectively formed the foundation of our analysis, allowing us to explore the mediating role of Perceived Efficiency and Customer Satisfaction in the relationship between AI-powered customer service and Customer Loyalty.

Data collection

The collection of data involved the use of an electronic questionnaire distributed to participants, considering the sensitive nature of the information provided by the respondents. The questionnaire consisted of 5-point Likert-scale items and was administered electronically through Google Forms (Appendix). This method was chosen to uphold strict ethical considerations regarding the confidentiality of participant information.

Hypothesis

Following are the hypothesis formulated for the study:

H_{01} There is no significant relationship between AI-Powered Customer Service and Customer Satisfaction.
H_{02} There is no significant relationship between AI-Powered Customer Service and Perceived Efficiency.
H_{03} There is no significant relationship between Customer Satisfaction and Customer Loyalty.
H_{04} There is no significant relationship between Perceived Efficiency and Customer Loyalty.
H_{05} The path from AI-Powered Customer Service to Customer Satisfaction to Customer Loyalty does not have a significant effect.
H_{06} The path from AI-Powered Customer Service to Perceived Efficiency to Customer Loyalty does not have a significant effect.

Data analysis

Data analysis was conducted using the PLS-SEM technique, allowing for the assessment of both the direct and indirect effects in the proposed mediation model. The analysis aimed to explore the relationships among AI-powered customer service, perceived efficiency, customer satisfaction and customer loyalty. The mediation analysis specifically examined whether perceived efficiency and customer satisfaction mediate the relationship between AI-powered customer service and customer loyalty.

Data analysis and interpretation

Respondent summary

Table 1 provides a summary of respondents categorized by gender and age groups. The table illustrates the distribution of respondents across different age categories, namely 'Under 18,' '18-24,' '25-34' and

Table 1. Respondent summary.

Gender	Under 18	18–24	25–34	35 years and above
Female	61	32	45	11
Male	84	59	63	18

Source: Author calculation.

'35 years and above,' further broken down by their gender, either 'Female' or 'Male.' The data reveals that among the female respondents, there are 61 individuals under the age of 18, 32 individuals aged 18–24, 45 individuals aged 25–34 and 11 individuals aged 35 years and above. On the other hand, among the male respondents, there are 84 individuals under 18, 59 individuals aged 18–24, 63 individuals aged 25–34, and 18 individuals aged 35 years and above (Figure 1).

Structural equation modeling

Table 2 provides an overview of the outer loadings within the structural equation model, which seeks to examine the relationships among latent variables, including Cross-Cultural Adaptation (CCA), Cultural Intelligence (CI), Key Competencies (KC) and Managerial Success (MS). These outer loadings represent the strength and direction of the relationship between each indicator (item) and its corresponding latent variable. To evaluate the adequacy of these outer loadings, a benchmark value of 0.6, as suggested by Nunnally (1994), serves as a guideline. Indicators with loadings exceeding 0.6 are considered robust measures of their latent variables, effectively capturing the underlying constructs.

Within CCA, items CCA1 through CCA6 exhibit relatively strong outer loadings, ranging from 0.619 to 0.807, suggesting their effectiveness in measuring CCA. Similarly, CI indicators, represented by CI1 through CI5, display substantial outer loadings, ranging from 0.723 to 0.888, indicating their strength as measures of CI. KC indicators, denoted as KC1 through KC4, also demonstrate meaningful outer loadings, ranging from 0.664 to 0.838, signifying their ability to effectively capture KC as a latent variable. MS indicators, encompassing MS1 through MS5, display strong outer loadings ranging from 0.598 to 0.821, establishing their role as robust measures of MS.

In summary, Table 2 provides valuable insights into the strength of the relationships between individual indicators and their respective latent variables within the structural equation model. Higher outer loadings, surpassing the benchmark of 0.6, indicate the effectiveness of these indicators in measuring and contributing to the understanding of the underlying constructs.

Assessment of the measurement model

Table 3 presents important metrics related to the reliability and validity of the constructs in the study, including Cronbach's Alpha, Composite Reliability and Average Variance Extracted (AVE). These metrics provide insights into the internal consistency, convergent validity and discriminant validity of the constructs. The table shows that for all constructs, including AI-Powered Customer Service, Customer Loyalty, Customer Satisfaction and Perceived Efficiency, the Cronbach's Alpha values exceed the recommended threshold of 0.7. This indicates strong internal consistency within each construct, suggesting that the items measuring these constructs are reliable and consistently measure the same underlying concept. Specifically, AI-Powered Customer Service, Customer Loyalty, Customer Satisfaction and Perceived Efficiency exhibit high Cronbach's Alpha values of 0.95, 0.93, 0.92 and 0.94, respectively. Additionally, the Composite Reliability values are consistently high, further confirming the reliability of

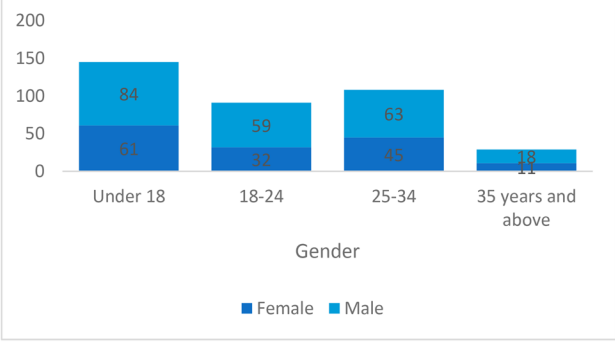

Figure 1. Respondent summary. Source: MS Excel.

Table 2. Outer loadings of latent variables.

	AI-Powered customer service	Customer loyalty	Customer satisfaction	Perceived efficiency
AI1	0.857			
AI2	0.824			
AI3	0.9			
AI4	0.866			
AI5	0.872			
AI6	0.83			
AI7	0.862			
AI8	0.824			
CL1		0.872		
CL2		0.838		
CL3		0.854		
CL4		0.872		
CL5		0.752		
CL6		0.714		
CL7		0.72		
CL8		0.71		
CS1			0.799	
CS2			0.669	
CS3			0.83	
CS4			0.705	
CS5			0.793	
CS6			0.803	
CS7			0.839	
CS8			0.722	
PE1				0.843
PE2				0.809
PE3				0.879
PE4				0.865
PE5				0.84
PE6				0.854
PE7				0.838
PE8				0.658

Source: SMART-PLS calculation.

Table 3. Descriptive statistics, reliability and validity assessment.

Latent variables	Mean	Std dev	Cronbach's alpha	Composite reliability	AVE
AI-Powered customer service	29.02	9.47	0.95	0.95	0.73
Customer loyalty	27.98	9.28	0.93	0.93	0.63
Customer satisfaction	27.49	9.16	0.92	0.92	0.59
Perceived efficiency	26.28	8.91	0.94	0.94	0.68

Source: SMART-PLS calculation.

the constructs. The AVE values calculated for each construct in the study are shown in Table 3. Convergent validity assesses whether the items within a construct converge to measure the same underlying concept. All AVE values in the table exceed the recommended threshold of 0.5 (Fornell & Larcker, 1981), indicating that a substantial proportion of the variance in the observed variables can be attributed to the underlying constructs. Specifically, AI-Powered Customer Service, Customer Loyalty, Customer Satisfaction and Perceived Efficiency demonstrate AVE values of 0.73, 0.63, 0.59 and 0.68, respectively. These results confirm that the items effectively measure their respective constructs and provide evidence of convergent validity.

Discriminant validity assesses whether the constructs are distinct from each other. It ensures that each construct measures a unique and separate underlying concept. In this context, discriminant validity was evaluated using heterotrait-monotrait (HTMT) values, with a threshold of 0.85 (Henseler et al., 2015). The key criterion is that HTMT values between constructs should not exceed 0.85 to confirm discriminant validity (Table 4).

Structural model and hypothesis testing

The structural model's integrity and the relationships among key variables were rigorously examined by analyzing standardized path coefficients (β values), t statistics and associated p values. These path

Table 4. Heterotrait-monotrait ratio.

	AI-Powered customer service	Customer loyalty	Customer satisfaction
AI-Powered Customer Service			
Customer loyalty	0.78		
Customer satisfaction	0.65	0.72	
Perceived efficiency	0.80	0.82	0.79

Source: SMART-PLS calculation.

Table 5. Hypothesis testing.

Hypothesis	Path coefficients	*t* Statistics	*p* Values
AI-Powered customer service -> Customer satisfaction	0.91	59.13	0.00
AI-Powered customer service -> Perceived efficiency	0.95	85.61	0.00
Customer satisfaction -> Customer loyalty	1.05	9.45	0.00
Perceived efficiency -> Customer loyalty	0.22	3.00	0.00

Source: SMART-PLS calculation.

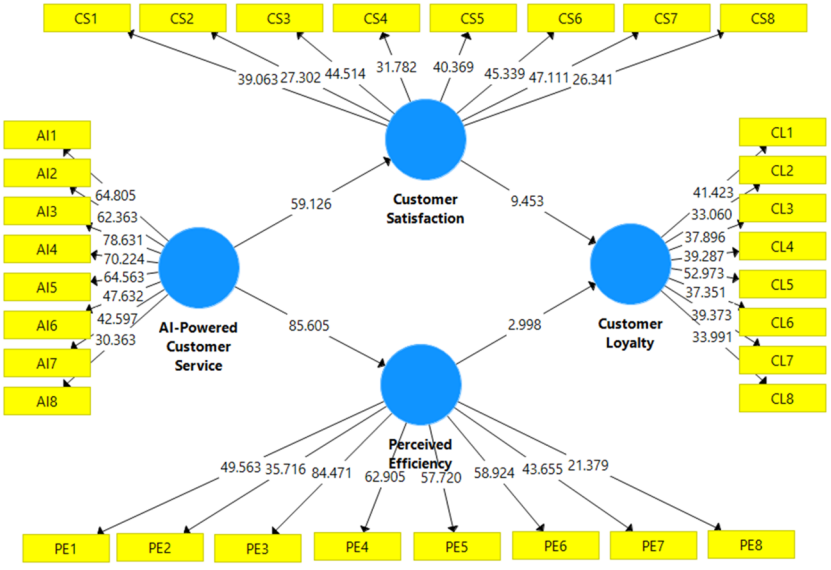

Figure 2. Structured model. Source: SMART-PLS calculation.

coefficients serve as standardized regression coefficients and offer critical insights into the strength and significance of relationships between independent and DVs (Hair et al., 2021). The results, as displayed in Table 5, decisively confirm the validity of all hypothesized relationships. The path from AI-Powered Customer Service to Customer Satisfaction is marked by a substantial path coefficient of 0.91. This relationship is supported by a remarkably high *t* statistic of 59.13 and an associated *p* value of 0.00, strongly validating the hypothesized link between AI-Powered Customer Service and Customer Satisfaction. Likewise, the path from AI-Powered Customer Service to Perceived Efficiency reveals a robust path coefficient of 0.95, supported by an exceedingly high *t* statistic of 85.61 and an associated *p* value of 0.00. This outcome underscores the hypothesized relationship's statistical significance, affirming the positive influence of AI-Powered Customer Service on Perceived Efficiency. Moving to the subsequent relationship, Customer Satisfaction to Customer Loyalty, the path coefficient stands at 1.05. This is coupled with a notable *t* statistic of 9.45 and an associated *p* value of 0.00, providing compelling evidence that Customer Satisfaction has a significant positive effect on Customer Loyalty. Lastly, the path from Perceived Efficiency to Customer Loyalty is characterized by a path coefficient of 0.22. This relationship is supported by a *t* statistic of 3.00 and an associated *p* value of 0.00, clearly demonstrating the statistical significance of the influence of Perceived Efficiency on Customer Loyalty. Hence, the null hypothesis formulated H_{01}, H_{02}, H_{03} and H_{04} are rejected (Figure 2).

Table 6. Mediation effect hypothesis testing.

Mediation effect	*t* Statistics	*p* Values
AI-Powered customer service -> Customer satisfaction -> Customer loyalty	9.42	0.00
AI-Powered customer service -> Perceived efficiency -> Customer loyalty	3.00	0.00

Source: SMART-PLS calculation.

Table 7. Coefficient of determination.

Dependent variables	R^2
Customer loyalty	0.845
Customer satisfaction	0.837
Perceived efficiency	0.898

Source: SMART-PLS calculation.

Mediation indirect effect

The mediation effect representing the path from AI-Powered Customer Service to Customer Satisfaction to Customer Loyalty is particularly notable. It is accompanied by a remarkably high T statistic of 9.42 and an associated p-value of 0.00. This outcome unequivocally confirms the presence of a significant mediation effect. It indicates that the influence of AI-Powered Customer Service on Customer Loyalty is mediated, at least in part, by the intermediary role of Customer Satisfaction. In simpler terms, AI-Powered Customer Service has a substantial indirect impact on Customer Loyalty through its positive influence on Customer Satisfaction. Similarly, the mediation effect corresponding to the path from AI-Powered Customer Service to Perceived Efficiency to Customer Loyalty also demonstrates statistical significance. This mediation effect is supported by a *t* statistic of 3.00 and an associated *p* value of 0.00. These findings provide robust evidence that AI-Powered Customer Service Influences Customer Loyalty through its impact on Perceived Efficiency. In essence, AI-Powered Customer Service exerts an indirect positive effect on Customer Loyalty by enhancing Perceived Efficiency.

In summary, the results indicate that both proposed mediation effects are statistically significant within the structural model. The high *t* statistics and associated *p* values affirm the presence of these mediating pathways, demonstrating the importance of Customer Satisfaction and Perceived Efficiency in transmitting the influence of AI-Powered Customer Service to Customer Loyalty. Hence the null hypothesis formulated H_5 and H_6 are rejected (Table 6).

Coefficient of determination

The R-squared (R^2) values provided for the DVs in the analysis offer valuable insights into the explanatory power of the structural model. For Customer Loyalty, the R^2 value stands impressively at 0.845, indicating that approximately 84.5% of the variability in Customer Loyalty can be attributed to the collective influence of the IVs within the model. This high R^2 value underscores the effectiveness of the model in elucidating and predicting variations in customer loyalty, emphasizing the significance of AI-Powered Customer Service, Customer Satisfaction and Perceived Efficiency as key contributors to this crucial outcome. Similarly, for Customer Satisfaction, the R^2 value of 0.837 signifies that roughly 83.7% of the variance in Customer Satisfaction is accounted for by the explanatory variables, highlighting the model's ability to capture the drivers of customer satisfaction. Additionally, the R^2 value of 0.898 for Perceived Efficiency underscores its substantial impact, with nearly 89.8% of its variability elucidated by the model. In essence, these R^2 values collectively affirm the robustness of the structural model and its capacity to shed light on the complex relationships and influential factors at play in the realm of customer loyalty, satisfaction and perceived efficiency (Table 7).

Discussion

To investigate the impact of AI-powered customer service on customer loyalty, with a particular focus on the mediating roles of customer satisfaction and perceived efficiency. Our findings offer valuable insights into the complex dynamics between these key variables. The first two hypotheses proposed a significant

positive relationship between AI-Powered Customer Service and Customer Satisfaction and between AI-Powered Customer Service and Perceived Efficiency. The results strongly support both hypotheses. The path coefficients of 0.91 and 0.95, along with remarkably high *t* statistics of 59.13 and 85.61, indicate that AI-Powered Customer Service indeed has a substantial influence on both Customer Satisfaction and Perceived Efficiency. This implies that businesses investing in AI-powered customer service can expect to enhance customer satisfaction and efficiency significantly. The third and fourth hypotheses postulated a significant positive relationship between Customer Satisfaction and Customer Loyalty and between Perceived Efficiency and Customer Loyalty. The results provide robust support for both hypotheses. A path coefficient of 1.05 for the relationship between Customer Satisfaction and Customer Loyalty, coupled with a notable *t* statistic of 9.45, highlights the strong impact of Customer Satisfaction on customer loyalty. Similarly, the path coefficient of 0.22 for the relationship between Perceived Efficiency and Customer Loyalty, with a t statistic of 3.00, signifies the importance of Perceived Efficiency in driving customer loyalty. These findings underscore that satisfied and efficiently served customers are more likely to exhibit loyalty to a brand.

Furthermore, our analysis revealed compelling mediation effects in the model. The mediation pathways from AI-Powered Customer Service to Customer Satisfaction to Customer Loyalty and from AI-Powered Customer Service to Perceived Efficiency to Customer Loyalty both exhibited statistically significant relationships. These results confirm that AI-Powered Customer Service not only directly impacts Customer Loyalty but also does so indirectly through its influence on Customer Satisfaction and Perceived Efficiency. This highlights the multifaceted role of AI-powered customer service in shaping customer loyalty. The R^2 values for the DVs are notably high, with Customer Loyalty at 0.845, Customer Satisfaction at 0.837, and Perceived Efficiency at 0.898. These values demonstrate that a substantial proportion of the variance in these variables is explained by the IVs in our model. This emphasizes the model's effectiveness in elucidating and predicting customer loyalty, satisfaction, and perceived efficiency based on the interplay of AI-Powered Customer Service, Customer Satisfaction, and Perceived Efficiency.

Conclusion

This research has provided insight into the significant intermediary function of perceived efficiency and customer pleasure in the correlation between AI-driven customer service and customer loyalty. After doing a thorough analysis of these interconnected variables, it becomes apparent that the effective implementation of an AI-driven customer service system can have a substantial impact on consumer perceptions and behaviors.

The first driver of perceived efficiency plays a crucial function in molding customers' impressions of the AI system's capacity to promptly and accurately meet their requirements. The apparent velocity, efficacy, and availability of the AI system collectively contribute to an augmented overall perception of efficiency. The notion of efficiency subsequently has a cascading effect on customer satisfaction, so influencing customers' perceptions of the service, the brand and their whole experience. The cultivation of consumer loyalty is contingent upon customer satisfaction, thereby emphasizing its significance. When customers express contentment with the contacts, services, and customized experiences offered by the AI system, there is a higher probability of them establishing robust emotional affiliations with the business. The establishment of an emotional bond between the consumer and the brand results in heightened levels of loyalty, which in turn leads to a greater likelihood of repeat patronage, favorable word-of-mouth promotion and an increased inclination to endorse the brand to others. Gaining insight into the intermediary function of perceived efficiency and customer happiness holds significant importance for enterprises aiming to enhance the effectiveness of their customer service strategies driven by AI. Organizations may cultivate deeper relationships with their consumers, develop loyalty, and ultimately generate sustainable growth and success in today's competitive market scenario by prioritizing the improvement of perceived efficiency and the delivery of pleasant customer experiences.

As the evolution of AI progresses and its integration into customer service strategies becomes more prominent, it is imperative to conduct additional research and explore the underlying mechanisms involved. This will yield valuable insights that can be utilized by businesses to enhance their approaches and formulate strategies that effectively leverage AI's capabilities in fostering long-lasting customer loyalty.

Limitations and future scope

This study has yielded significant findings regarding the intermediary function of perceived efficiency and customer satisfaction in the association between AI-driven customer service and customer loyalty. However, it is crucial to recognize certain constraints that could potentially affect the understanding and applicability of these results. First, the study's sample size may not adequately represent the myriad of demographic and market subgroups. The generalizability of the study is constrained by its narrow focus on a single environment, industry, or geographical area. It is important to use caution when extrapolating the findings to other industries or countries, as there may be significant variances in customer behavior and attitudes that need to be taken into account. Subjective measures are used to assess perceived efficiency and customer satisfaction, employing self-reported surveys. The precision of these measurements was contingent upon the participants' perceptions and interpretations, which have the potential to induce response bias or subjective judgment. The study has failed to consider the potential disparities in the maturity and integration levels of AI systems among various enterprises. The efficacy and influence of customer service powered by AI might exhibit variability contingent upon the level of advancement and implementation of AI technologies within individual organizations. The study did not take into account the potential impact of external factors of a broader nature, such as economic conditions and industry competition, on consumer loyalty.

This study provides a robust basis for future investigations and progress in the domains of customer service, AI technology, and consumer behavior. Longitudinal research can be conducted to examine the correlation between customer service utilizing AI, perceived efficiency, customer happiness and customer loyalty over an extended duration. This analysis would yield valuable insights into the temporal evolution and mutual influence of these variables. The perception and impact of AI on customer loyalty might be influenced by the distinct customer needs and expectations observed in various industries. Hence, this study can be carried out in context of specific industries. In order to assess variations in perceived effectiveness, customer happiness and the ensuing customer loyalty, compare the customer service provided by AI-powered firms. Examine the effects of different AI implementation levels on these factors in various organizational contexts. Examine how customers' impressions of AI-powered customer service are shaped by providing them with information about the potential and limitations of AI. Strategies for customer education can be more effectively guided by an understanding of how customer knowledge affects customer happiness and loyalty. Investigate how AI-powered customer support functions in cutting-edge fields including Internet of Things (IoT), virtual reality (VR) and augmented reality (AR). This study aims to examine the impact of various technologies on customer experience and its subsequent influence on customer loyalty. By embarking on these prospective avenues of inquiry, one may augment our comprehension of the subtle dynamics that will steer firms in maximizing their AI strategies to cultivate enduring consumer interactions and attain sustainable success.

Policy implications

The policy implications can provide guidance to firms and governments in effectively utilizing AI technologies to augment consumer pleasure and cultivate customer loyalty. AI Integration Strategy is imperative to advocate for businesses to formulate a comprehensive strategy aimed at facilitating the smooth integration of customer service powered by AI into their operational framework. The Standards for Perceived Efficiency Management establishes industry benchmarks for gauging the perceived effectiveness of AI-powered customer support. Also, establishing the key performance indicators (KPIs) that companies should use to gauge the effectiveness of their AI systems in order to provide a uniform and standardized evaluation process. AI technologies can also be used for various Customer Education Initiatives. They propose and execute strategies aimed at enlightening consumers regarding the intricacies of AI technology and its many implementations within the realm of customer service. This communication aims to raise knowledge on the advantages and constraints associated with AI-enabled interactions in the context of customer management, with the objective of improving customer

expectations and augmenting their comprehension. Data Privacy and Security Regulations are also imperative to enhance legislation pertaining to data privacy and security in order to guarantee responsible handling of customer data employed in AI-driven customer service, while also ensuring compliance with privacy laws. To ensure the preservation of customer trust, it is imperative to institute consequences for instances of non-compliance. Incentives for customer-centric AI solutions provide incentives, subsidies, or tax advantages to enterprises that engage in the development and execution of AI solutions with a specific emphasis on enhancing customer happiness and fostering loyalty. Promote the advancement of research and innovation in AI technologies with the aim of augmenting customer experiences. Customer Feedback Integration mechanisms into AI-powered customer service platforms for enterprises should be encouraged. The significance of leveraging consumer insights to optimize system efficiency, personalization and overall customer satisfaction should be underscored.

By applying the aforementioned policy implications, firms and policymakers can effectively utilize AI-powered customer service to augment perceived operational effectiveness, customer contentment and eventually foster customer allegiance. The establishment of durable and meaningful relationships between organizations and their consumers will depend on the careful equilibrium between technical improvements, ethical considerations and customer-centric initiatives.

Author contribution details

Dr Pragya Singh – conceptualized the article. She also contributed in writing the introduction and the literature review of the article. Upon completion revised the article for intellectual content.

Vandana Singh – Helped in designing the questionnaire. She took active participation in the research methodology part and also did the interpretation of the analysis.

Both the authors agree to be accountable for all aspects of the work.

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About the authors

Dr Pragya Singh is associated with Symbiosis Centre for Management Studies NOIDA, Symbiosis International University Pune India since 2018. Her research areas include Digital Marketing, Entrepreneurship and Leadership Studies. She has published research papers, case studies and books with international publishers.

Vandana Singh is a research scholar in the department of Computer Science, Birla Institute of Technology Mesra Ranchi. Her research area includes Traffic Signal Management, AI Driven customer service. She has published papers with international publishers of repute.

Data availability statement

My study involved the collection of data through a self-prepared questionnaire stored in an Excel sheet format. Considering the sensitive nature of the participant information and ethical considerations surrounding confidentiality, we are unable to share the raw dataset publicly. In light of this, we are seeking your valuable guidance on potential alternatives or acceptable practices that would comply with the Taylor & Francis Open Data Policy while maintaining the confidentiality of our participants. My aim to uphold the principles of transparency and reproducibility while respecting ethical boundaries. If there are specific protocols or methods that would better align with the policy while safeguarding participant confidentiality, I would greatly appreciate your expertise and suggestions in this regard.

Your insights and guidance on potential solutions or acceptable practices for sharing data while ensuring participant confidentiality would be immensely helpful for me to adhere to the journal's policies effectively.

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Appendix

Questionnaire

Demographic Information

1. Age:
2. Under 18
3. 18–24
4. 25–34
5. 35 or older
6. Gender:
7. Male
8. Female

Please rate your agreement with the following statements on a scale from 1 (Strongly Disagree) to 7 (Strongly Agree):

Section 1: AI-Powered Customer Service

i. AI-powered customer service provides quick and efficient responses to my queries.
ii. I find AI-powered customer service interactions to be helpful in resolving my issues.
iii. Using AI-powered customer service makes my overall experience with a company more convenient.
iv. AI-powered customer service is reliable and consistent in its performance.
v. I prefer using AI-powered customer service over traditional customer service methods.
vi. AI-powered customer service has a positive impact on my perception of the company's technological capabilities.
vii. AI-powered customer service is an essential part of my interactions with companies.
viii. Overall, I am satisfied with the AI-powered customer service I have experienced.

Section 2: Perceived Efficiency

i. AI-powered customer service interactions save me time compared to traditional customer service.
ii. AI-powered customer service responses are timely and meet my expectations.
iii. I perceive AI-powered customer service as efficient in handling routine inquiries.
iv. AI-powered customer service streamlines the process of resolving issues or getting information.
v. The speed and accuracy of AI-powered customer service contribute to my perception of its efficiency.
vi. AI-powered customer service effectively manages high volumes of customer queries.
vii. I believe that AI-powered customer service has the potential to improve its efficiency further.
viii. Overall, I find AI-powered customer service to be efficient in its operations.

Section 3: Customer Satisfaction

i. I am satisfied with the level of service provided by AI-powered customer service.
ii. AI-powered customer service meets my expectations for quality customer service.
iii. Using AI-powered customer service enhances my overall satisfaction with the company.
iv. AI-powered customer service interactions leave me with a positive impression of the company.
v. I am likely to recommend a company that offers effective AI-powered customer service.
vi. AI-powered customer service contributes to my overall satisfaction as a customer.
vii. I feel valued as a customer when interacting with AI-powered customer service.
viii. Overall, I am satisfied with my experiences with AI-powered customer service.

Section 4: Customer Loyalty

i. I am loyal to companies that provide efficient AI-powered customer service.
ii. My positive experiences with AI-powered customer service make me more loyal to a company.
iii. AI-powered customer service plays a significant role in my decision to continue using a company's products or services.
iv. I am more likely to remain a customer of a company that offers AI-powered customer service.
v. Efficient AI-powered customer service enhances my loyalty to a brand.
vi. I would choose a company that uses AI-powered customer service over competitors that do not.
vii. AI-powered customer service positively influences my long-term commitment to a company.
viii. Overall, I am loyal to companies that excel in AI-powered customer service.