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Fivi Rahmatus Sofiyah, Ami Dilham, Arif Qaedi Hutagalung, Yulinda Yulinda, Andrew Satria Lubis, Jonathan Liviera Marpaung

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## **The chatbot artificial intelligence as the alternative customer services strategic to improve the customer relationship management in real-time responses**

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Fivi Rahmatus Sofiyah\*

Vocational Faculty,  
Universitas Sumatera Utara,  
Medan, 20155, Indonesia  
Email: fivi.rahmatus@usu.ac.id  
\*Corresponding author

Ami Dilham, Arif Qaedi Hutagalung,  
Yulinda Yulinda and Andrew Satria Lubis

Economics and Business,  
Universitas Sumatera Utara,  
Medan, 20155, Indonesia  
Email: ami.dilham@usu.ac.id  
Email: arifqaedi@usu.ac.id  
Email: yulinda@usu.ac.id  
Email: andrewsatrialubis@usu.ac.id

Jonathan Liviera Marpaung

Mathematics Department,  
Universitas Sumatera Utara,  
Medan, 20155, Indonesia  
Email: jomarpaung4@gmail.com

**Abstract:** One of the primary problems in managing customer relationships is the limited comprehension of the client, requiring a comprehensive awareness of their traits and demands. Increasing the quality of customer service necessitates the implementation of transformative and innovative measures. The implementation of a WhatsApp-based artificial intelligence chatbot in academic services has the potential to increase efficiency and service quality. This is primarily attributed to the user-friendly nature of the platform and its integration with customer management systems. The study surveyed 400 students from various Universitas Sumatera Utara, representing eight different academic programs. The study employed a mixed-method approach to assess customer satisfaction resulting from the implementation of chatbots in academic file management. The analysis involved the use of partial questionnaire analysis using Smart PLS 4.0. The offering of consistent and accurate responses to inquiries and requests from clients and internal users will be ensured through the consistent delivery of services in implementing the AI chatbot. The findings indicated an 83.8% likelihood of customer pleasure,

accompanied by a 75.3% likelihood of customer loyalty. The findings of the study provided empirical evidence that the chatbot's capacity to reduce service time significantly influenced the level of customer satisfaction.

**Keywords:** chatbot; artificial intelligence; AI; modelling; virtual assistant; customer relationship management; CRM.

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**Biographical notes:** Fivi Rahmatus Sofiyah is a Lecturer in the Secretariat Department at the Universitas Sumatera Utara, specialising in human resources and secretariat management.

Ami Dilham is a Management Lecturer at the Universitas Sumatera Utara, specialising in human resources management and entrepreneurship. She made significant contributions to the development of the conceptual framework and survey study, including respondents.

Arif Qaedi Hutagalung is a Management Lecturer at the Universitas Sumatera Utara, specialising in human resources management and entrepreneurship. He made significant contributions to the development of the conceptual framework and survey study, including respondents.

Yulinda Yulinda is a Management Lecturer at the Universitas Sumatera Utara, specialising in human resources management and entrepreneurship. He made significant contributions to the development of the conceptual framework and survey study, including respondents.

Andrew Satria Lubis is a Management Lecturer at the Universitas Sumatera Utara, specialising in human resources management and entrepreneurship. He made significant contributions to the development of the conceptual framework and survey study, including respondents.

Jonathan Liviera Marpaung is a Young Lecturer in the Mathematics Department at the Universitas Sumatera Utara. He participates in chatbot system development and quantitative data analysis.

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## 1 Introduction

Organisations frequently encounter this challenge. Certain challenges have the potential to impede the efficacy and achievement of customer relationship management (CRM) deployment. One of the primary obstacles in managing customer relationships (CRM) refers to the deficiency in comprehending the consumer at a profound level. The realisation of a personalised and relevant experience can be challenging without a comprehensive understanding of client preferences, needs, and behaviour. The reliance of CRM on correct and current the customer data is a consequence of incoherent or incomplete data. If the data provided exhibits inconsistencies or incompleteness, it is imperative to acknowledge that any subsequent analysis and decision-making processes

reliant upon said data may provide erroneous or inconsequential outcomes. The integration of sophisticated systems inside large organisations that encompass numerous departments and systems can provide challenges. Specifically, the integration of CRM systems with other systems, such as those related to sales, finance, or service, can be intricate and need a significant investment of time. Insufficient integration might hinder operational efficiency and limit the ability to achieve comprehensive visibility of data. If the organisational culture fails to endorse these endeavours, employees may not be fully engaged in utilising the CRM system to its fullest potential. It is imperative to prioritise the significance of security and privacy concerns to safeguard client data from unauthorised access and potential security breaches. The efficacy of CRM can be hindered by a dearth of interdepartmental communication, which underscores the importance of fostering collaboration among various organisational units, including sales, marketing, and customer support. The lack of efficient interdepartmental communication and collaboration has the potential to diminish the efficacy of CRM systems in delivering a cohesive and unified customer experience. The failure of regular updates and enhancements necessitates the need for the CRM system to be regularly updated and upgraded to align with the evolving demands of the business and its customers. Insufficient allocation of resources towards updating and enhancing CRM systems might lead to their obsolescence and diminished effectiveness in the long run. The significance of integrating an AI Chatbot into secretarial services may be examined from multiple perspectives, encompassing operational efficiency, service excellence, and stakeholder contentment, both among customers and internal users (Sowa et al., 2020). The use of efficient and productive systems can facilitate the automation of routine and straightforward duties commonly performed by secretaries. These tasks include responding to frequently asked queries, offering fundamental information, organising schedules, and handling electronic correspondence. The Smutny and Schreiberova (2020) chatbot is an AI system that serves as a paradigm for human-computer interaction. The advancement of artificial intelligence (AI) technology has facilitated the capacity of a chatbot to engage in human-like communication. The implementation of the Chatbot ensures a constant and correct provision of services, hence enabling the delivery of reliable responses to inquiries and requests from both clients and internal users. AI enables chatbots to function as personal assistants, offering a diverse array of services and information, including but not limited to the facilitation of airline ticket bookings and restaurant reservations. Currently, chatbots are integrated with several messaging platforms such as WhatsApp, Line, Telegram, and Slack, facilitating convenient and personalised access for users. The successful implementation of an AI Chatbot system is anticipated to enhance both customer and internal user satisfaction (Motulsky et al., 2023). An AI chatbot that is responsive and accurate has the potential to offer efficient and timely services, minimise client waiting periods, and deliver immediate resolutions to frequently encountered issues. Consequently, both clients and internal users have a heightened sense of appreciation and support, thereby fostering a favourable picture of the organisation. The use of an AI Chatbot enables organisations to offer round-the-clock customer support services, thereby eliminating the need to depend solely on the availability of human secretaries during specific working hours (Ashfaq et al., 2020). This holds significance for firms or organisations who maintain clientele or overseas branches dispersed throughout many time zones. Clients and internal users will experience a sense of accommodation and support, even outside the regular working hours. AI chatbots have the capability to gather data through interactions with both

clients and internal users. The provided data possesses the potential for analysis in order to discern patterns, repeating requirements, and prevalent issues. The provision of this information can be crucial in assisting management and the secretariat team in enhancing decision-making processes that are grounded in data, so facilitating the enhancement of service quality on a broader scale. According to State and Generation (2022), it has been suggested that technology has the potential to enhance an individual's quality of life. The availability of online information, particularly through social media platforms, incites individuals to develop a sense of curiosity and acquire knowledge pertaining to their personal health status. This project aims to model the Chatbot AI in order to enhance the efficiency of CRM in academic administration, based on a set of identified challenges.

## **2 Literature review**

### *2.1 Chatbot satisfaction and acceptance*

Prior research has indicated that the key determinant of chatbot acceptance is user happiness. The experience of satisfaction entails the presence of a favourable disposition towards the performance of chatbots and information systems (Sucupira Furtado et al., 2023). The pleasure of users can be influenced by their impression of many functionalities of chatbots, such as ease of use, compatibility with the user, as well as the perceived accuracy and completeness of information provided by the chatbot (Nagarajan, 2023). Furthermore, the factor associated with the enjoyment derived from the chatbot service has the potential to enhance the overall user experience. Research has shown that individuals generally exhibit higher levels of satisfaction when engaging with chatbots that possess enhanced interactivity, human-like qualities, anthropomorphic attributes, a sense of intimacy, and a perception of empowerment (Jenneboer et al., 2022). Ultimately, with a multitude of gratifications including utilitarian, hedonic, technological, and social advantages that have the potential to enhance pleasure with chatbots, it is important to acknowledge that the perceived privacy risks by users can have a diminishing effect on this contentment (Lee et al., 2021). Despite the existing body of research on chatbot experiences, there remains a need for a thorough and systematic approach to examine the underlying factors influencing chatbot satisfaction (Kumar et al., 2022; Pallathaadka et al., 2023; Chakraborty et al., 2023). Hence, previous scholarly works frequently examined the goal to utilise chatbots from a certain standpoint. There is a scarcity of comprehensive research that have developed a holistic framework to encompass the multifaceted dimensions of user views about different facets of chatbot performance. This study posits the assumption that chatbots are task-oriented entities that can be classified as a form of information system (Yang and Feng, 2023). Hence, it is imperative to consider three key characteristics of quality in order to ensure satisfaction and adoption of chatbots. Insufficient system quality of a chatbot may lead to user issues, which in turn can result in impaired decision-making and reduced user motivation to utilise the chatbot. Likewise, the impact of the information presented by a high-quality chatbot on user appraisal and dependence on the chatbot system is a relevant consideration (Jo, 2022). If the quality of service provided by chatbots is unsatisfactory, it is possible that they may be unable to adequately fulfil the requirements and expectations of users. While certain studies have shown data supporting the favourable influence of the three categories of perceived quality on chatbot satisfaction, additional research is required to ascertain the

precise constituents that contribute to each aspect of perceptual quality (Farrow, 2022; Ng et al., 2021). It is important to acknowledge that the initial dimensions and scales of quality may not be suitable when applied to a novel task-oriented chatbot context. Considering the novelty of chatbot technology, the evaluation of its perceived quality may encompass a range of distinct aspects in contrast to the circumstances under which the original idea was formulated. Nevertheless, prior research has incorporated perceived quality factors as an integral component of the comprehensive assessment of the operational procedure. In order to enhance understanding, the primary objective of this study is to elucidate the impacts of factors that are unique to each dimension of quality (Hsu et al., 2023; Agnihotri et al., 2023; Kecht et al., 2023).

## 2.2 Chatbot modelling

To effectively implement chatbot modelling for student academic administration, it is necessary to integrate a chatbot-based approach with WhatsApp and supplement it with a comprehensive database containing information on academic administrative procedures. This database should include details on course registration, academic leave submissions, application for transcripts of grades, and other relevant processes. In order to handle interactions effectively, chatbots need to be trained using a labelled conversation dataset to accurately identify and comprehend a wide range of student inquiries, and deliver suitable and useful replies. Algorithms such as long short-term memory (LSTM) or Transformer are utilised to comprehend the context of a conversation, guaranteeing that the chatbot can maintain a coherent dialogue without losing context. By integrating with university academic database systems, chatbots can retrieve current information and carry out essential data activities, such as updating enrollment status or verifying student academic standing, over secure APIs. Chatbots should possess effective fallback methods to handle scenarios where they are unable to process or comprehend queries, such as diverting to human agents for additional assistance.

**Figure 1** Chatbot modelling on cloud (see online version for colours)

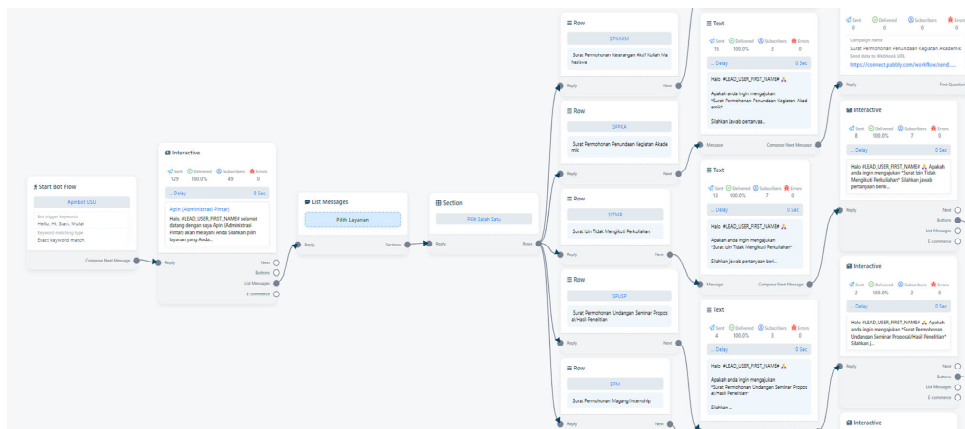
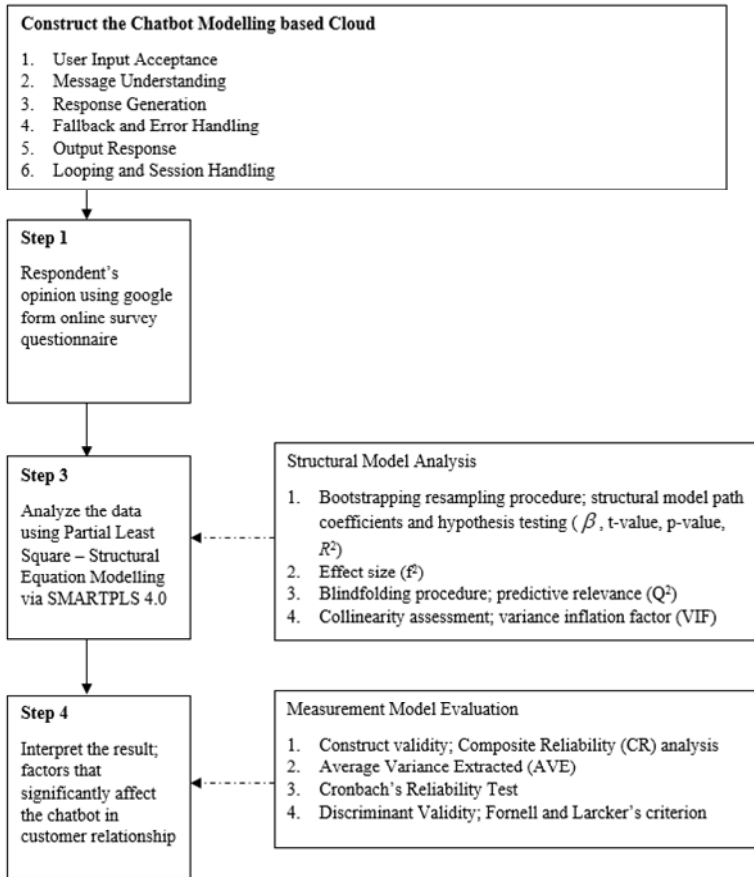


Figure 2 Chatbot modelling



The implemented modelling framework efficiently caters to students by capturing their requirements. This enables academic services to reduce inefficiencies, such as unnecessary printing of proposal files and waiting times. The management of academic files only requires basic student data for mail management.

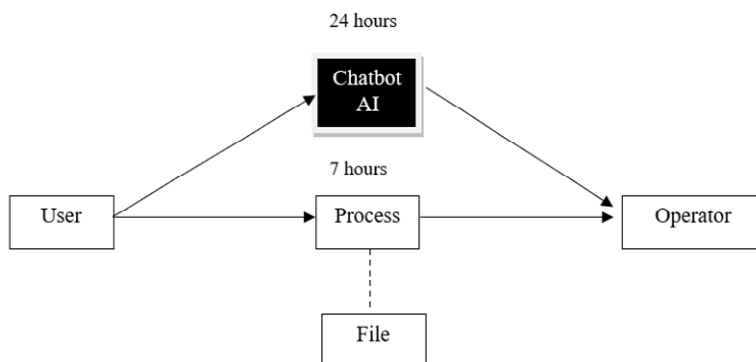
Based on the conducted satisfaction survey, it is evident that chatbot services have a substantial and positive influence on students. During the testing phase, there are still certain areas for improvement where chatbots fail to reply owing to disparities in the call code or the initial trigger word used when initiating the chatbot.

In this study, the researchers have enhanced the framework of the chatbot structure to make it more streamlined and capable of delivering more efficient service. In general, studies have been conducted on the implementation of chatbots in several industries, including healthcare, business marketing, and e-commerce. The existing chatbots are mostly designed for certain platforms, necessitating users to download and install the corresponding application in order to utilise the chatbot.

### 3 Research method

This study followed a mixed-method approach, incorporating focus group studies and online questionnaires (Premant and Arun, 2019). The mixed methods approach has the capability to examine the backdrop of pleasure and usage intentions from both qualitative and quantitative perspectives (Lubis and Amalia, 2021; Tulus et al., 2023). Additionally, it has the potential to enhance our understanding by facilitating the development of a novel framework. The initial step was the implementation of a focus group interview in order to examine the underlying factors influencing usage intentions, drawing upon the chatbot success model and the notion of privacy focus. The research study was centred around the concept of privacy, specifically in relation to the exploration of new technologies. This particular technique was chosen as it provided an opportunity for the collecting of qualitative data. Qualitative methodologies also enable the identification of unanticipated elements. In order to give greater clarity, the study involved the implementation of two focus group interviews. These interviews were done with individuals who had direct involvement with academic service providers and student users of administrative services. The primary objective of these interviews was to delve into the participants' experiences and cognitive requirements, emotional encounters, as well as privacy concerns pertaining to chatbot technology. The study involved a sample of 400 students who were enrolled in 14 different courses. Every individual included in the study has had an opportunity to engage with a task-oriented chatbot. For instance, the participants will be granted access to academic mail services through the utilisation of the chatbot service on the WhatsApp chatbot platform (Selamat and Windasari, 2021; Illescas-Manzano et al., 2021; Wei and Pardo, 2022).

**Figure 3** An illustration of administrative management



#### 3.1 Chatbot Administrasi Pintar

The objective of this project is to develop an AI chatbot system referred to as 'Intelligent Administration'. This chatbot has been connected with the messaging platform WhatsApp, thereby enhancing its operational efficiency. The client data kept on the chatbot will be securely stored in a cloud-based database, ensuring continuous real-time storage of consumer information throughout the day, every day. The underlying concept behind Chatbot AI is to provide real-time assistance to clients in the realm of student



academic administration. By doing so, it aims to enhance the efficiency of the current manual administrative management system, which is primarily focused on working hours. The concept of administrative administration is depicted in Figure 1.

Figure 3 shows the representation of administrative management, highlighting the observed variation in the period of service provided. The manual service length spans seven working hours, however, the Chatbot AI can provide real-time client care for 24 hours. The length of service will have an impact on the management of customer relationships inside an organisation.

### *3.2 Research hypotheses*

The analysis of the interview transcript revealed the presence of multiple themes and sub-themes. Through conducting interviews, it was discovered that user satisfaction with task-oriented chatbots and their intentions to utilise them might be influenced by three distinct sorts of concerns related to perceived quality and privacy. The variables that might significantly impact user happiness and hence influence loyalty towards chatbots are system quality (comprising flexibility, availability, and reaction speed), information quality (encompassing relevance and completeness), and service quality (comprising pleasure, certainty, and empathy).

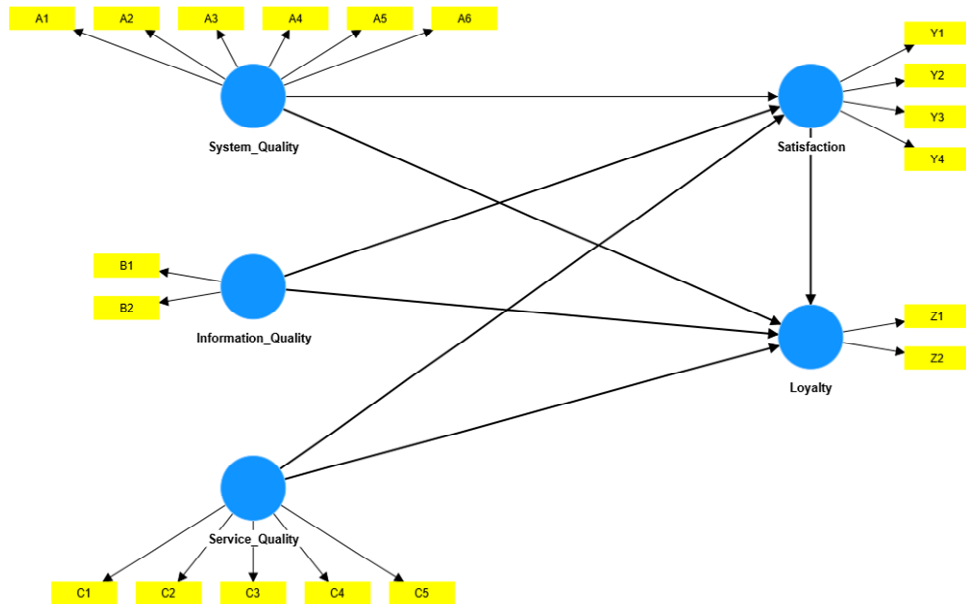
- H1a System quality will have a positive impact on user satisfaction with chatbots.
- H1b System quality will have a positive impact on the Loyalty of users with chatbots.
- H2a Information quality will have a positive impact on user satisfaction with chatbots.
- H2b Information quality will have a positive impact on user loyalty with chatbots.
- H3a Service quality will positively affect user satisfaction with chatbots.
- H3b Service quality will positively affect user loyalty with chatbots.
- H4 Satisfaction will positively affect user satisfaction with chatbots.
- H5a Satisfaction mediates system quality on loyalty.
- H5b Satisfaction mediates information quality on loyalty.
- H5c Satisfaction mediates service quality on loyalty.

The hypothesis of the study will be shown in Figure 4. with the relationship between the latent variables connected to one mediator variable.

In order to perform a more comprehensive analysis of the outcomes derived from the qualitative investigation, a subsequent online survey was administered to a sample of 400 students. The survey was facilitated through the utilisation of chatbots on the WhatsApp platform. Prior to engaging in the survey, all participants indicated their consensus. The survey is comprised of three distinct sections. Initially, the participants were instructed to peruse the introductory section and examine a few instances of task-oriented chatbots. Subsequently, they were required to respond to a filtering question, indicating whether or not they had prior experience with this particular sort of chatbot. Participants who lacked prior experience with task-oriented chatbots were removed from the study and their data was eliminated from the subsequent analysis. Next, participants are instructed to indicate the frequency of their interactions with a task-oriented chatbot. Participants were also

requested to respond to inquiries aimed at assessing variables within the established theoretical framework. Pleasure is assessed using a semantic differential scale, whilst all other variables are assessed using a 5-point Likert scale, with participants indicating their level of agreement with items on a scale ranging from 1 (strongly disagree) to 5 (strongly agree). Ultimately, the researchers gathered demographic data encompassing age, gender, educational attainment, and monthly income.

**Figure 4** Structural model of research (see online version for colours)



#### 4 Result and discussions

The respondents of this study are students who possess a keen interest in overseeing academic documents at the Faculty of Vocations of the University of North Sumatra. The study employs a mixed-method approach to facilitate a more comprehensive investigation. It involves conducting interviews with stakeholders involved in academic file management and distributing questionnaires to gather information about their experiences with an AI chatbot. The chatbot is designed to provide real-time responses to their needs. The sample measurement was undertaken in accordance with the research phases, utilising a structural model implemented by SMARTPLS 4.0.

Table 1 illustrates the distribution of participants who utilised AI chatbots, as well as those who engaged with AI chatbots through CRM enhancement surveys.

**Table 1** Analysis of respondent data

Measure	Type	Frequency	Percentage
Gender	Male	180	45%
	Female	220	55%

**Table 1** Analysis of respondent data (continued)

Measure	Type	Frequency	Percentage
Age	20–25	400	100%
	26–30	0	0%
Program	Secretary	109	27.25%
	Finance	93	23.25%
	Statistics	75	18.75%
	Computer Engineering	123	30.75%

4.1 Structural model

In order to make predictions based on the parameter estimates derived from the analysis of the questionnaire results, we employ SMARTPLS 4. This software allows us to conduct a weight test of the indicators using the PLS Algorithm as the fundamental test. Subsequently, we perform bootstrapping with 5000 subsamples, employing a significance tolerance of 0.05 (5%) and utilising a two-way test. Once the bootstrapping study has been completed, the structural model will undergo a Blindfolding test to assess the model’s reliability. This test will involve omitting a distance of 7 samples for each iteration. The outcomes of the structural model testing are depicted in Figure 5.

The test results obtained from the sample depicted in Figure 5 demonstrate a significant correlation between the variables, indicating a strong and very probable association.

**Figure 5** Inner model path coefficients and t values (see online version for colours)

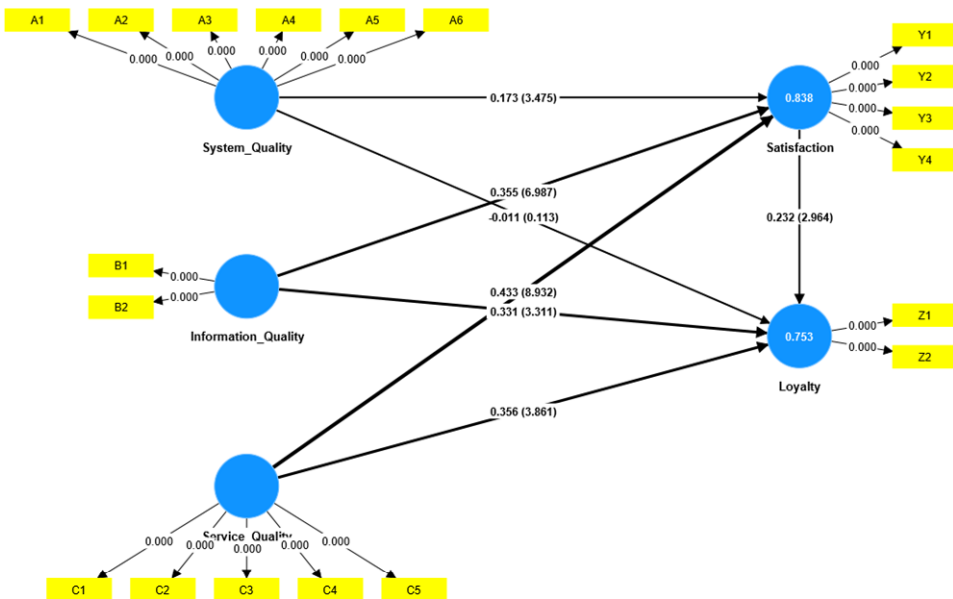


Table 2 presents the correlation coefficients of each latent variable, with the satisfaction variable serving as the mediator between the three latent variables and loyalty. Based on the findings of the test results, it can be shown that there exists a robust correlation between service quality and satisfaction, with a coefficient of determination of 62%. Notably, the variable of system quality exhibits the lowest correlation value, amounting to 54%, when considering its link with loyalty. While the minimal correlation value does not exhibit a statistically significant lack of association, it is important to note that the variables as a whole have a strong relationship. In order to optimise the efficacy of the latent variable, a satisfaction mediator variable is included with the purpose of facilitating mediation between endogenous and exogenous variables. The statistical test results are presented in Table 3.

**Table 2** Latent variable correlation

	<i>Information_</i> <i>Quality</i>	<i>Loyalty</i>	<i>Satisfaction</i>	<i>Service_</i> <i>Quality</i>	<i>System_</i> <i>Quality</i>
Quality	1,00	0,57	0,60	0,59	0,58
Loyalty	0,57	1,00	0,57	0,58	0,54
Satisfaction	0,60	0,57	1,00	0,62	0,59
Service_					
Quality	0,59	0,58	0,62	1,00	0,61
System_					
Quality	0,58	0,54	0,59	0,61	1,00

**Table 3** The effect of satisfaction as a mediator of loyalty

<i>Model</i>	<i>Direct effects</i>	<i>Indirect effects</i>	<i>Total effects</i>
Information_ quality -> satisfaction -> loyalty	0.083	0.082	0.411
System_ quality -> satisfaction -> loyalty	0.040	0.100	0.454
Service_ quality -> satisfaction -> loyalty	0.102	0.040	0.034

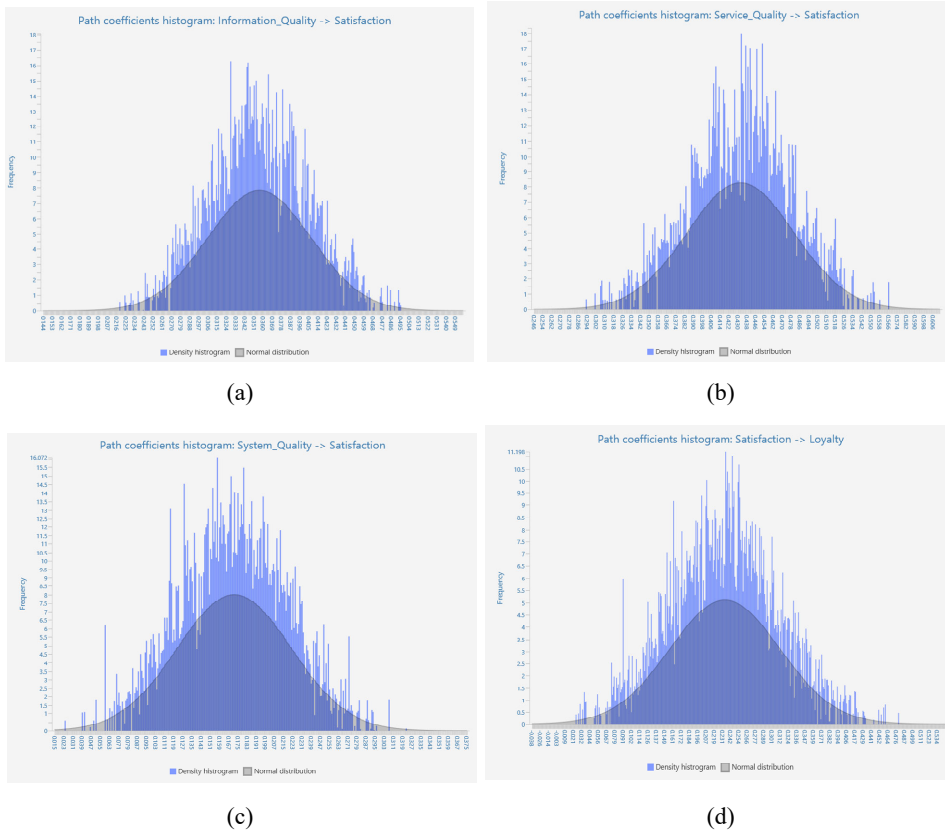
The test values in Table 3 provide the result that the satisfaction variable can mediate the exogenous variable to the endogenous variable indicated with the total value of the effect of each variable where the t-test value > 0.02 then the accepted hypothesis or satisfaction can be the mediator in the mediation of the exogenic-endogenic variable. The sample distribution results of the test are shown in Figure 6.

The sample distribution in the hypothesis test provides insights into the dispersion of data across two variables, highlighting the association between the density of the histogram and the normal distribution. The findings of the hypothesis are presented in Table 4.

Based on the data shown in Table 4, it is clear that the test results consistently indicate that the use of chatbot AI has the potential to significantly enhance CRM service. Based on the test results, it has been determined that there is a positive relationship between system quality and user satisfaction with chatbots (3.475, 0.001), thereby accepting hypothesis H1a. However, in relation to hypothesis H2a, which posits that

system quality would have a positive influence on user loyalty with chatbots, the obtained p-value is negative (0.320, 0.001), leading to the rejection of hypothesis H2a.

**Figure 6** Path coefficients Pada Laten Variabel (a) path coefficients information quality – satisfaction (b) path coefficients service quality – satisfaction (c) path coefficients system quality – satisfaction (d) path coefficients satisfaction-loyalty (see online version for colours)



**Table 4** Hypothesis test results

<i>Hypotheses</i>		<i>Path coefficients</i>	<i>Support</i>
H1a	System quality will have a positive impact on user satisfaction with chatbots	0.172	Yes
H1b	System quality will have a positive impact on the loyalty of users with chatbots	-0.006	No
H2a	Information quality will have a positive impact on user satisfaction with chatbots	0.356	Yes
H2b	Information quality will have a positive impact on user loyalty with chatbots	0.328	Yes
H3a	Service quality will positively affect user satisfaction with chatbots	0.432	Yes

**Table 4** Hypothesis test results (continued)

<i>Hypotheses</i>	<i>Path coefficients</i>	<i>Support</i>
H3b Service quality will positively affect user loyalty with chatbots	0.352	Yes
H4 Satisfaction will positively affect user satisfaction with chatbots	0.234	Yes
H5a Satisfaction mediates system quality on loyalty	0.020	Yes
H5b Satisfaction mediates information quality on loyalty	0.005	Yes
H5c Satisfaction mediates service quality on loyalty	0.009	Yes

## 5 Conclusions

Based on the findings of the conducted research, it can be inferred that the use of chatbot AI in enhancing CRM services, as indicated by the established structural model, is likely to yield a favourable influence on customer loyalty. This analysis yields a customer satisfaction probability of 83.8% and a client loyalty probability of 75.3%. This finding provides evidence for the efficacy of chatbots in customer service, as their ability to reduce service time has a substantial influence on customer satisfaction. The AI chatbot is an AI product that has been developed using the WhatsApp platform, hence ensuring user-friendly operation and convenient utilisation of the suggested functionalities.

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