



Enhancing Customer Satisfaction Through AI Chatbots and Electronic Service Quality

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Abstract

The growth of the e-commerce platform has stimulated the utilisation of the digital-based technology as the means of enhancing the service and customer satisfaction. It seeks to explore the relationship between the quality of e-services and AI chatbots to determine customer satisfaction in e-commerce websites Cirebon City. This is a quantitative study in which 200 representatives aged 15-40 years were used to gather data by using a structured questionnaire. Structural Equation Modeling Partial Least Squares (SmartPLS) is employed as the technique of data analysis. The outcome is that the electronic service quality will be more influential with the coefficient of 0.553, and AI chatbots will have a positive influence with the path coefficient of 0.296. The R^2 obtained is 0.613, which is a result that the quality of AI chatbots and electronic services can explain 61.3 percent of the changes in the customer satisfaction. These results demonstrate that the electronic service quality is the dominant factor when it wants to raising the level of customer satisfaction and that chatbots based on artificial intelligence can improve the user experience provided in case of the interaction with the e-commerce websites.

INTRODUCTION

The evolution of digital technology utilizing artificial intelligence (AI) has changed the way consumers and service providers interact in a big way (Kushwaha, Kumar, & Kar, 2021). This trend continues to arise, particularly as the available access to the internet continues to be extended to more citizens of Indonesia. The Central Statistics Agency (BPS) did the 2024 Susenas Survey, which showed that 72.78% of Indonesian citizens were able to access the internet in 2024, compared to 69.21% of citizens in 2023 (Badan Pusat Statistik, 2025). The enhancement of access in itself also indicates a growing need and potential in adopting technology that is grounded in artificial intelligence in online services, such as chatbots in most interactions (Chong, Yu, Keeling, & de Ruyter, 2021). Chatbots are AI-based automated conversation systems that let people and machines talk to each other in a natural way (Lin, Wang, Shao, & Taylor, 2024). Also, based on a study in the TEM Journal by Vergaray et al (2023), using chatbots improves customer satisfaction, responsiveness, and service efficacy, all of which increase customer loyalty (Vergaray et al., 2023). Another findings by Nicolescu & Tudorache (2022) found that other things, like how accurate the answers are when people use chatbots in digital services, anthropomorphic characteristics and problem-solving abilities are crucial factors in determining the customer experience (Nicolescu & Tudorache, 2022). As

a matter of fact, such anthropomorphic capabilities may enhance the emotional connection between the customer and chatbots (Yum & Yoo, 2023).

Cirebon's high e-commerce rate creates both opportunities and challenges for optimizing digital service standards. According to a study (Yum & Yoo, 2023), have found that the quality of e-service has a big impact on customer satisfaction and loyalty, which in turn leads to more business (Yum & Yoo, 2023). Nevertheless, the key problems of the sphere are the slow response of chatbots, online transaction systems' lack of customization and unreliability (Sidlauskienė, Joye, & Aurskevičienė, 2023). In the meantime, the customer satisfaction is significantly influenced by chatbots depending on how helpful and responsive they are to the request of users in a timely and correct way (Zhu, Zhang, & Liang, 2023). Additional research also reveals that the quality of chatbot services such as assurance, responsiveness, and empathy are also important factors that lead to consumer satisfaction and loyalty (Ashfaq et al., 2025). This inquiry ought to be undertaken to have an empirical understanding of the manner in which chat-bot intelligence and if the quality of e-services improved, e-commerce customers in Cirebon City would be happier (Fakhtiratunisa; Zahra, Fadia, & Siska, 2025).

The main focus of the research seeks to find out how AI chatbots and ecommerce services affect how happy ecommerce users in Cirebon City are (Ami Natuz Zahara, Ari Prabowo, & Ety Sri Wahyuni, 2024). The questions' research targeted at quantifying how AI-based chatbots can positively bring impact to the users experiences and customer satisfaction perceptions and determine the dimensions of electronic services that have the biggest impact on consumer satisfaction. The research is expected to address the empirical deficiency in understanding how AI technology has changed how customers act online in complicated ways internet services. Almoghrabi states that the dimension of responsiveness, usefulness, also ease of use is one of the most important things that can define catchbot implementation is effective in terms of e-commerce and improves user satisfaction (Bordbar, Almoghrabi, & Linderström, 2024).

The current study describes how the factors of e-commerce services and AI chatbots influence the level of customer satisfaction in the Indonesian local e-commerce market (Fatimah;Siska, 2025). This research is also holistic and comprehensive in that unlike the past studies which mostly tested these two variables independently, this study will bring them together into a more encompassing analytic study. As an illustration, Shahzad et al (2024) bring to light that the issue of AI chatbots service excellence is one of the deciding factors for user experience, trust, and, consequently, customer loyalty, but they failed to consider the aspects of e-service excellence (Shahzad et al., 2024). However, in contrast, per Naqvi et al (2024) analysis of customer interaction, the function of the chatbots playing the roles of the customer services assistants assumes a crucial role in mediating the issue of traditional customer service excellence and the aspects of customer satisfaction and loyalty (Naqvi et al., 2024). Hence, the intention to merge the aspects of e-service quality and AI chatbots into a single study is to not only provide a more integrative theoretical approach for application within the service dynamics in the modern era but can be considered a unique contribution in the form of the regional focus (pertaining to Cirebon's e-commerce users) that is relatively a new approach with a very substantial contribution in expanding our current understanding on the contribution

of digitalization, innovation in technology towards the formation level of customer satisfaction in the era of a digital economy.

Theoretically, this study shall contribute meaning to already established literature insofar as the role of artificial intelligence as it connects with electronic service quality, as well as customer satisfaction, incorporating the element social interaction to research on service quality in the present day. The practical outcomes of this research may function as a benchmark for e-commerce companies aiming at maximizing the efficacy of using AI chatbots and enhancing electronic service quality regarding assurance, dependability also easy to use (Zungu, Amegbe, Hanu, & Asamoah, 2025). The outcomes imply that anticipated to positively influence scholars in advancing the Technology Acceptance Model and the SERVQUAL models within the realm of AI at the virtual services (Sharma, Jangir, Gupta, & Rupeika-Apoga, 2024). Moreover, this research may help transform Cirebon's digital economy by offering suggestions for implementing AI chatbots and e-services that can sustain a satisfied and loyal relationship of the customer with e-commerce both locally and nationally. As stated by Alsadoun & Alnasser (2025), the response to whether digital companies have the potential for future success lies in the development of artificial intelligence enhanced personalized experience (Alsadoun & Alnasser, 2025).

The Relationship Between AI Chatbots (X1) and Customer Satisfaction (Y)

AI chatbots refers to an innovation of artificial intelligence whose primary focus is on improving consumer service interaction by ensuring efficiency in automated dialogue processes (Ruan & Mezei, 2022). Conversation agents of AI chatbots have grown an important part of the customer satisfaction process due to their ability to progress natural languages and respond efficiently and automatically (Vergaray et al., 2023). A study by Nicolescu & Tudorache (2022) determines that chatbots can enhance customer satisfaction in the following three ways: (1) faster response time, (2) personalized communication, and (3) independent problem-solving. Customers' subjective assessments of their interactions with the chatbot system are referred to as customer satisfaction in this context.

Factors for determining the success of the chatbots in AI involve: response correct rate, mean response time, problem solved rate, level of interaction engagement, level of interaction appeal, repeat rate prevention, and how much people interact with each other (Daniel Jurafsky & James H. Martin., 2025). Another finding by Bordbar et al (2024) is relevant in this field as it explains that another factor for the success of chatbots involves being able to contextualize the conversation with backend systems so that chatbots provide the users with a more relevant, faster, and personalized services (Alsadoun & Alnasser, 2025).

H1: Chatbots powered by artificial intelligence exert a substantial favorable influence on customer satisfaction.

The Connection Between E-Service (X2) and Customer Satisfaction (Y)

E-service quality refers to a virtual service benchmark, which is quantified through the suitability of the mobile platform to enable online consumers through the efficient and effective processes of online shopping, transaction, and distribution (Syachrony, Hamdan, & Ilhamalimy, 2023). Past research has demonstrated that digital service standards are an area in which there is an intervention in customer satisfaction also consumer behavior trends in

ecommerce as it including the related factors of experience and intent to re-purchase (Al-Habib & Albari, 2024). This notion incorporates a comprehensive evaluation of digital system functionality on the pre- and post-transactions levels as well as at the point of transaction (Alsadoun & Alnasser, 2025).

According to the updated E-S-QUAL model that takes into account mobile platform, the accuracy of content recommendation, the completeness of features, the availability of offline features, the stability of the server (uptime), the ease of navigation, the consistency of the interface across devices, and the safeguarding of user data serves as a reference point for measuring the quality of e-services (Yum & Yoo, 2023).

H2: The caliber electronic service markedly enhances customer satisfaction in a positive manner.

The Connection Between AI Chatbot (X1), E-Service (X2), and Customer Satisfaction (Y)

Artificial intelligence chatbots and e-services work well together in the development of an all-encompassing customer experience on ecommerce sites (Bordbar et al., 2024). According to Nicolescu & Tudorache (2022), the reasons why this synergy supports e-service excellence are for the purpose of upgrading the quality of the platform as well as the interface between human and machines at the same time. Customers become satisfied with the system because of its ability to deliver smooth service among chatbots modules also digital frameworks in an integrative model (Chakraborty, Kumar, Patre, & Gupta, 2024).

In this case, customer satisfaction indices are: “Service Quality Satisfaction, Information Satisfaction, security Aspects, Trust Satisfaction, Problem-Solving Satisfaction, and overall Satisfaction indicators”, all of which depend on the extent of satisfaction of the customer with the quality of the offered services, the correctness of the facts disseminated, the guarantee of the security of the transactions, the effectiveness of the mechanisms related to solving the problems, and the general level of satisfaction of the customer after contacting with the ecommerce business (Indriastuti, Putri, Robiansyah, & Anwar, 2022).

H3: The interplay between AI chatbots and the quality of electronic services produces a synergistic influence on customer satisfaction.

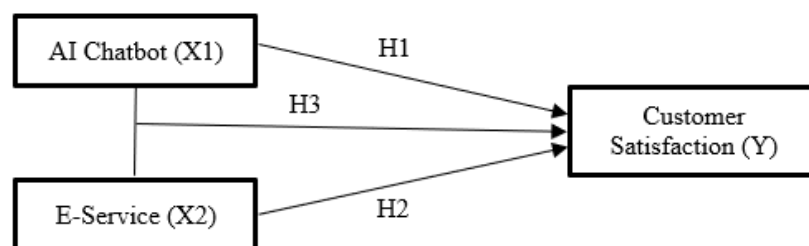


Figure 1. Frame Work

METHOD

This study applies an associative research design and a quantitative methodology. The present study seeks to examine in what way AI chatbots also e-services affect Cirebon City e-commerce users' customer satisfaction. Since associative research focuses on establishing relationships between variables that may be objectively quantified using five-point Likert scale

questionnaires, such an approach fits the research (Abulela & Khalaf, 2024). Primary data was obtained by getting online surveys from people who shop online in Cirebon City.

The target population for this investigation consisted of residents of Cirebon City who had engaged in e-commerce activities or conducted online payments within the preceding 12 months. Given the difficulty in precisely ascertaining the size of this population, non-probability sampling was applied through purposive sampling techniques. In SEM analysis, sample sizes are typically established at 5 to 10 times the count of indicators (Jr, Hopkins, Georgia, & College, 2014). For PLS-SEM, however, (Siswoyo, 2016) recommends the 10-times rule, equivalent to 10 times the highest number of indicators within the model. Given 20 indicators in this research, the smallest sample employed consists of 200 respondents ($20 \times 10 = 200$) (Ketchen, 2013).

This research uses the SmartPLS technique to look at how AI-Chatbots and E-Service affect customer satisfaction (Afrina, Gumay, Ariani, & Febriady, 2025). The stages of data analysis involve the testing of the measurement model (outer model) by the use of loading factor, AVE, CR also HTMT, as well as the use of the regression coefficients, t-values, and p-values from the resampling process of the inner model. The robustness of the model is further measured by employing the R-square (R^2) and f^2 values (Sihombing, Arsani, Oktaviani, & Nugraheni, 2024). The findings of the data analysis will help interpret the contribution of the AI-Chatbots also the E-Service toward the satisfaction of the customers of the e-commerce platform of the Cirebon City.

RESULT AND DISCUSSION

Tabel 1. Responden Demografi

Kategori	Possible Answer	F	%
Gender	Female	123	61,5 %
	Male	77	38,5 %
Age	15 – 20 Years Old	30	15,0 %
	21 – 25 Years Old	150	75,0 %
	26 – 30 Years Old	10	5,0 %
	31 – 35 Years Old	8	4,0 %
	36 – 40 Years Old	2	1,0 %
Status	Student	10	5,0 %
	University Student	121	60,5 %
	Worker	69	34,5 %
Frequently utilized e-commerce platforms	TiktokShop	91	45,5%
	Shopee	89	44,5 %
	Tokopedia	20	10 %

From Table 1, it can be noted that the present study comprised 200 participants, the majority of whom were females and belonged to the young category of age. A large number of them were students, while the remaining were employees and school-going children. Moreover, the online shopping platforms mostly used by the participants were the TikTok Shop and the Shopee.

To measure suitability, reliability and validity were measured. In establishing how well the indicators measured the constructs under study and the internal consistency of the variables of the research model, diverse methods of analysis were used, namely: external loading, average variance extracted (AVE), Cronbachs Alpha and construct reliability.

Table 2 indicates that a values of the outer loadings of the various indicators are at the threshold with the scores being greater than 0.7. The mean values of AVE are also more than 0.5. Each of the metrics studied in the current research is deemed valid, which is reflected in the findings. Besides that, the results of the reliability tests demonstrate that the test has been passed by the composite and Cronbach alpha values. In that way, we may also conclude that the structure of the given research is reliable and valid, which is why it could be analyzed further.

The model test would attempt to examine the structural model testing for estimating causal influence between latent variables wherein latent variables are defined as those variables which are not possible to be measured confrontally. The analysis was conducted based on the R-Squared (R2), F-Squared (f2) also adjusted R-Squared (R2 adjusted) as displayed in Table 3.

Tabel 2. Model Measurement Test

Variabel	Indicator	Outer Loading	AVE	Cronbach's Alpha	Composite Reability
AI Chatbot	X1.1	0,793	0,606	0,927	0,939
	X1.2	0,838			
	X1.3	0,717			
	X1.4	0,707			
	X1.5	0,807			
	X1.6	0,774			
	X1.7	0,805			
	X1.8	0,783			
	X1.9	0,751			
	X1.10	0,796			
E- Service	X2.1	0,813	0,735	0,940	0,951
	X2.2	0,790			
	X2.3	0,803			
	X2.4	0,796			
	X2.5	0,703			
	X2.6	0,728			
	X2.7	0,825			
	X2.8	0,840			
	X2.9	0,840			
	X2.10	0,797			
	X2.11	0,796			
Customer Satisfaction	Y.1	0,826	0,632	0,941	0,950
	Y.2	0,875			
	Y.3	0,873			
	Y.4	0,853			
	Y.5	0,866			
	Y.6	0,833			
	Y.7	0,872			

Tabel 3. Output R Square and Adjusted R Square

Model	R Square	Adjusted R Square
X1 & X2 to Y	0,613	0,610

According to basis of the data provided in Table 3, it can be ascertained that R2 is equal to 0.613, leading to the result that X1 & X2 collectively define 61.3 percentage of variations

for variable Y. Therefore, it can be ascertained that most of the variations for variable Y is caused by variables X1 & X2 on the model developed for this research work.

More importantly, Adjusted R2 value of 0.610 dictates that, upon taking into account how many independent variables there are, 61.0% of the changes in variable Y could probably be described by this research model. The quite marginal deviation in the R2 value for the Adjusted R Square values signifies that the efficiency of the given model is rather good. However, 38.7% of the Y variation remains affected by the parameters outside the given boundaries of the particular research study.

Tabel 4. Output F Square

Variable	Customer Satisfaction
AI Chatbots	0,125
E- Services	0,435

The Table 4 reveals that for the AI Chatbot, its effect on Customer Satisfaction is comparatively small, whereas for the E-Service variable, it has a larger impact. This shows that out of these two variables, the most dominant impact on customer satisfaction is created by the E-Service rather than the AI Chatbot. Result of path analysis might be obtained from Figure 2.

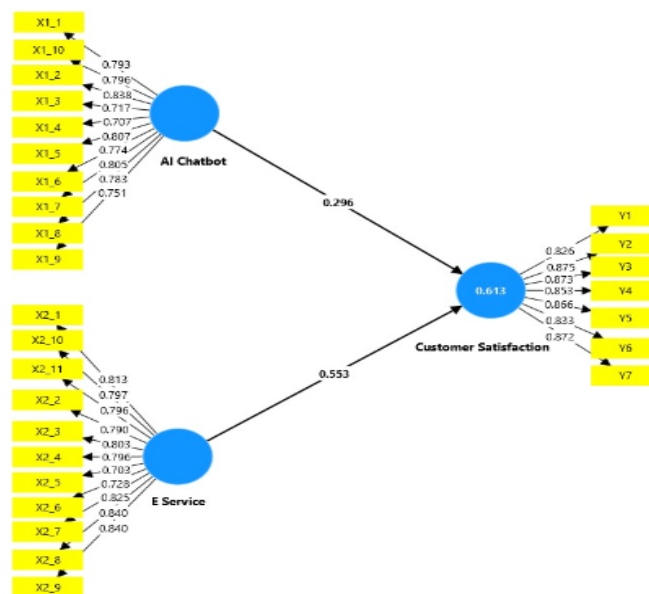


Figure 2. Path Analysis Output

Tabel 5. Summary of Hypothesis Testing

Hypothesis	Variables	Path Analysis	t value	P Value
H1	AI Chatbots → Customer Satisfaction	0,296	3,882	0,000
H2	E Services → Customer Satisfaction	0,553	6,186	0,000
H3	AI Chatbots × E-Services → Customer Satisfaction	0,613	-	-

According to data in Table 5, the outcome indicated that AI Chatbot significantly also positively influenced customer satisfaction with the path coefficient of positive 0.296, t-statistic of the 3.882, and p-value of the 0.000. Therefore, customer satisfaction can be raised by optimizing the AI chatbot's quality.

Moreover, the affect of E-Service on customer satisfaction is much stronger, and the t-statistic value of 6.186, also p-value of 0.000, which is statistically significant. Such results suggest that the extent of customer satisfaction is more affected by E-Service.

Additionally, the analysis reveals that the combined impact of AI chatbots and electronic services on customer satisfaction produces a path coefficient of 0.613. Such outcomes confirm that the concurrent deployment of AI chatbots and electronic services serves to augment customer satisfaction. This finding can be further explained using the Technology Acceptance Model (TAM), where the integration of Ai Chatbots and E- service enhances perceived usefulness through efficiency and problem-solving capabilities as well as perceived ease of use through seamless and accessible system, both of wich contribute directly to higher user satisfaction.

The study's findings suggest that AI chatbots can affect how satisfied e-commerce customers are. These findings suggest that the quality of the interaction between people and platforms can be enhanced by the availability of AI Chatbots due to the rapid, responsive, and efficient processes of automated conversations. The AI Chatbots also allow customers to get information and resolve their issues on their own, thus providing a better interaction experience. From the perspective of User Experience Design, this reflects improved usability, interaction efficiency, and user engagement, which contribute to a more positive experience.

These study findings coincide with the previous literature that affirm that AI Chatbots are one of the products of artificial intelligence that aid and contribute to increasing the level of satisfaction, relationship, and interactions between service providers and their clients (Ruan & Mezei, 2022). This further validates the opinion of Vergaray et al (2023) that AI Chatbots as an essential part in enhancing customer satisfaction are attributable to natural language processing possibilities and automatic reactions. That the results of this research have similarities to those conducted in the research of Nicolescu & Tudorache (2022) could be clarified on the pretext of the process of customer satisfaction promotion, which is caused by the rapidity of receipt, personalization of interactions, and the fact that the chatbot is able to resolve issues on its own. These characteristics are consistent with TAM, particularly in enhancing perceived usefulness, as well as UX theory through personalization and efficiency of interaction.

Also, the findings of this study can be also connected to the idea of customer satisfaction offered by Chakraborty et al (2024), which perceives user satisfaction as a subjective perceptions of how they interact with the system. Customer satisfaction levels can be expected to rise when the AI Chatbots can use the correct response and prevent repetitiveness and show the appearance of a humanistic approach to conversation. Thus, the outcome of this research corroborate past research showing that AI chatbots' utility improves customer satisfaction. From a UX perspective, this supports emotional engagement and perceived interaction quality, which are key drivers of satisfaction.

Results from the study highlight that the level of E-Services brings a meaningful influence to the degree of customer satisfaction. The findings support the affirmation that the quality of e-services is a crucial determinant aspect influencing the degree of customer satisfaction within the studied ecommerce sites. In particular, customers will assess quality of digital services based on how efficient and convenient the system is to use to guide the shopping, transaction and after-sales processes. From the perspective of SERVQUAL, this

reflects key dimensions such as reliability (system consistency), responsiveness (service speed), and assurance (security and trust), which directly influence customer satisfaction.

The above results concur with existing research, which stated that the quality of e-services is a result of calculating the ability of e-commerce to appropriately carry out shopping and transaction services (Syachrony et al., 2023). Moreover, these findings are corroborated by studies that digital quality of services is significant in determining customer satisfaction also consumer behavior within the e-commerce scenario (Al-Habib & Albari, 2024). When the electronic services have the capability of satisfying the user expectations, the customers will be more satisfied with the e-commerce services. Hence, the quality of electronic services is one of the most substantial indicators of customer satisfaction, based on the study's findings. This finding reinforces SERVQUAL, particularly in terms of reliability and assurance as determinants of perceived service quality.

The finding of this research indicate that the quality of AI-based chatbots also E-Services is whole customer experience components and the key influencer of customer satisfaction. These results demonstrate that, besides the quality of interactions supported by AI, the quality of digital service that these engagements support determines how happy customers are with e-commerce sites. This combined effect reflects the integration of Technology Acceptance Model, SERVQUAL, and User Experience Design, which together explain how satisfaction is formed holistically.

These results are aligned with past research indicating that the combination of AI-based chatbots and E-Service resulted in the collaborative working of creating the holistic customer experience on the websites of e-commerce (Bordbar et al., 2024). Also, Nicolescu & Tudorache (2022) stress that human-machinery contacts, along with the quality of the digital platforms, can allow improving service excellence at the same time. The correlation of these study findings with the opinions of Chakraborty et al (2024) demonstrates that the satisfaction of the customers is the result of the fact that the system manages to offer smooth service in the interaction of chatbot elements and digital infrastructure. From a theoretical perspective, TAM explains user acceptance, SERVQUAL explains perceived service quality, and UX theory explains the overall experience perceived by users.

The researchers utilized the E-S-QUAL framework, as customer satisfaction within e-commerce settings is primarily shaped by the caliber of electronic services delivered, and given its role in bolstering service experience quality and operational efficiency through the integration of AI chatbots as interactive mechanisms. Findings from the analysis reveal that incorporating AI chatbots into the E-S-QUAL dimensions advances theoretical insights into customer satisfaction formation by encompassing: “system quality, interaction quality, and digital service reliability”.

In addition, the above-mentioned research findings can also match the indicators of customer satisfaction assumed by Indriastuti et al (2022), including satisfaction of quality service, information, security, trust, solving problems, and overall experience. Combining AI chatbots with e-services can make all these aspects of satisfaction possible within the e-commerce sites to create a favorable experience for customers. From a theoretical standpoint, TAM explains user acceptance of these system, SERVQUAL explains how the elements are perceived holistically by user, ultimately shaping their satisfaction.

CONCLUSION

Resting on the findings obtained from research and analysis conducted, it becomes possible to confirm that chatbots AI Chatbots and E-Services are relevant in customer satisfaction improvement among the users of the e-commerce website. How AI chatbots help customers is a rapid response and targeted interaction, so that people can get to information and solving problems. In contrast, the role of E-Services should not be overlooked in the construction of customer satisfaction, because they have a close relationship with a number of aspects related to the digital service quality offered, including: “system navigation, functionality, stability and consumer data protection”. Thus, it is hereby recommended that all consumers of the online business services offered via the e-commerce platform take advantage of the AI Chatbot service offered by the online business service providers. In addition, future studies should focus on widening the boundaries of research variables to their studies for a broader comprehension of the factors that determine consumer satisfaction regarding online business.

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