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ANALYSIS OF CHATBOT SERVICE QUALITY AS AN EFFORT TO IMPROVE USER SATISFACTION TOWARDS PT XYZ USING THE SERVQUAL METHOD

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ABSTRACT

This take a look at goals to assess the carrier pleasant of Tokopedia's chatbot in improving person pleasure the Service Quality (SERVQUAL) and Importance Performance Analysis (IPA) methods. Data were collected through questionnaires from 100 active Tokopedia users who have used the chatbot. The results indicate that user satisfaction is generally good, with Empathy identified as the main priority for improvement due to the largest gap between expectation and perception. Responsiveness and Assurance meet user expectations, while Tangible and Reliability exceed them. These findings serve as the basis for developing a service improvement repair flow to enhance Tokopedia's chatbot quality and user satisfaction.

Keywords: *Chatbot, Tokopedia, Service Quality, SERVQUAL, IPA, User Satisfaction*

I. INTRODUCTION (Heading 1) (font 10, Space 1.15 with 6 pt after)

The rapid expansion of Indonesia's e-commerce industry has established Tokopedia as one of the country's leading digital platforms in terms of user traffic and transaction volume. However, alongside this growth, Tokopedia continues to encounter challenges in maintaining user satisfaction, particularly in the area of customer service. Service-related issues such as delayed responses, ineffective complaint handling, and unclear problem resolution may undermine customer loyalty and adversely affect corporate reputation. Consequently, customer service quality has become a critical determinant of competitiveness in the highly dynamic e-commerce market (Ardiansyah et al., 2023).

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In response to increasing service demands, many e-commerce platforms have adopted artificial intelligence (AI) based chatbots as a core component of their customer service strategies. Chatbots operate as virtual assistants that provide automated, real-time support by delivering information, answering inquiries, and facilitating problem resolution. Prior research has demonstrated that chatbots enhance service efficiency through rapid response times, consistency, personalization, and continuous availability, which collectively contribute to improved customer satisfaction and loyalty (Mariyappan et al., 2025). Within digital marketplaces such as Tokopedia, chatbots also serve a strategic role in strengthening service value and customer relationship management (Syafitri & Alfansi, 2025).

Despite the extensive implementation of chatbot technology, evidence suggests that the effectiveness of Tokopedia's chatbot service remains suboptimal. Empirical findings and user sentiment analyses indicate persistent dissatisfaction related to response delays, limited information quality, system reliability issues, and the chatbot's inability to adequately resolve complex customer concerns. These shortcomings have contributed to predominantly negative user perceptions of Tokopedia Care, reflecting low trust and acceptance of chatbot-based customer service as a substitute for human agents (Afrina et al., 2025).

Given these challenges, a systematic evaluation of chatbot service quality is warranted to better understand its influence on user satisfaction. This study adopts the SERVQUAL framework, encompassing five dimensions tangibles, reliability, responsiveness, assurance, and empathy and integrates gap analysis with Importance Performance Analysis (IPA) to identify critical service improvement priorities. The findings are expected to offer both practical implications for enhancing chatbot-based customer service in Tokopedia and theoretical contributions to the growing literature on AI-enabled service quality within the e-commerce context (Wibowo & Muflihah, 2022).

II. LITERATURE REVIEW

A. Customer Satisfaction Theory

Customer Satisfaction Theory constitutes the primary theoretical foundation of this study. The theory posits that customer satisfaction is achieved when perceived service performance meets or exceeds prior expectations. Satisfaction is a critical determinant of customer loyalty, repurchase intention, and positive corporate image. Within digital service contexts such as chatbot-based customer support, satisfaction is influenced not only by service outcomes but also by the quality of the interaction process, including ease of access, response speed, and system capability in understanding user needs (Kotler & Keller, 2016).

According to Oliver (1997), satisfaction results from a cognitive evaluation process in which customers compare expectations with perceived actual performance. When service performance exceeds expectations, customers experience high levels of satisfaction, whereas performance below expectations leads to dissatisfaction. Accordingly, this theory provides a conceptual basis for assessing the ability of Tokopedia's chatbot to meet user expectations and deliver high-quality service.

B. Service Quality (SERVQUAL) Model

The SERVQUAL model is a widely adopted framework for measuring service quality by examining the gap between customer expectations and perceived service performance. This model comprises five dimensions: tangibles, reliability, responsiveness, assurance, and empathy. These dimensions are employed to evaluate the influence of service quality on customer satisfaction and to identify service attributes requiring improvement (Wibowo & Muflihah, 2022).

Service quality gaps arise when discrepancies exist between expected and perceived service delivery, thereby affecting overall customer satisfaction. Consequently, the SERVQUAL model provides a systematic approach for assessing service quality in both conventional and digital service environments.

C. Chatbots E-Commerce

Chatbots are artificial intelligence–based systems designed to simulate human interaction through text or voice interfaces and deliver automated customer service. In e-commerce environments, chatbots contribute to enhanced customer satisfaction by providing instant responses, continuous service availability, consistent information delivery, personalized interactions, and data-driven insights (Harisi & Hiwono, 2024).

The effectiveness of chatbot services can be evaluated using the Importance–Performance Analysis (IPA) method, which maps service attributes according to their perceived importance and performance levels (Martilla & James, 1977). When integrated with the SERVQUAL model, IPA enables a comprehensive assessment of chatbot service quality and facilitates the identification of priority areas for improvement.

Tokopedia, as a leading e-commerce platform in Indonesia, has implemented chatbot technology as part of its digital service strategy to enhance operational efficiency and user experience. Supported by Artificial Intelligence (AI) and Natural Language Processing (NLP), Tokopedia's chatbot assists users in transaction processing, complaint handling, and information retrieval in an automated and efficient manner. Despite these advantages, chatbots continue to face limitations in handling complex language structures, contextual understanding, and emotional expressions. Such limitations may result in inaccurate or irrelevant responses, thereby reducing perceived service quality and user satisfaction (Shawar & Atwell, 2007).

D. Users

Users are defined as individuals who interact with digital systems or online platforms to achieve specific objectives. Customer satisfaction represents an affective response resulting from a comparison between perceived service performance and prior expectations (Kotler & Keller, 2016). Customer perceptions and expectations are shaped by multiple factors, including prior experiences, marketing communications, and social influences such as peer recommendations (Zeithaml et al., 2018).

In quantitative research, instrument quality is ensured through validity and reliability testing. Validity testing confirms that questionnaire items accurately measure the intended constructs, while reliability testing assesses the consistency and stability of measurement results. Validity is commonly examined using Pearson Product Moment correlation, whereas reliability is evaluated using Cronbach's Alpha coefficient (Ghozali, 2018; Sugiyono, 2019).

III. METHOD

This study employs a quantitative research approach with a survey design to examine the role of chatbot service quality in influencing user satisfaction on the Tokopedia platform. Service quality is measured using the SERVQUAL model, which comprises five dimensions: *tangible, reliability, responsiveness, assurance,* and *empathy*. User satisfaction is treated as the dependent variable, reflecting users' overall evaluation of their interaction with the chatbot service.

Primary data were collected through an online questionnaire using a five-point Likert scale. The sampling technique applied was purposive sampling, with respondents selected based on specific criteria: Tokopedia users who had used the platform for at least one month, had prior experience with the chatbot feature, and belonged to the productive age group (Generation Z). A total of 100 valid responses were obtained and considered sufficient for statistical analysis. Secondary data were sourced from relevant academic literature to support the theoretical framework of the study.

The research instruments were tested to ensure their quality and suitability prior to data collection. The instrument testing consisted of validity, reliability, normality, t-test, and coefficient of determination analyses, which were conducted using SPSS as the statistical analysis tool.

a. Validity Test

Validity testing was conducted to assess the extent to which the research instrument accurately measures the intended construct. The validity of each questionnaire item was evaluated using the Pearson Product Moment correlation, where an item is considered valid if it appropriately represents the measured variable (Sekaran & Bougie, 2013). Pearson Product Moment formula, which is as follows:

$$r_{xy} = \frac{N\,\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{\{N\,\Sigma X^2 - (\Sigma X)^2\}\{N\,\Sigma Y^2 - (\Sigma Y)^2\}}}$$

b. Reliability Test
reliability testing was performed to examine the consistency of the instrument using Cronbach's Alpha, with a threshold value of $\alpha \geq 0.6$ indicating acceptable reliability. The formula used for reliability testing in this study is as follows:

$$r_{11} = \left[\frac{k}{(k-1)}\right]\left[1 - \frac{\Sigma\sigma_b^2}{\sigma_t^2}\right]$$

c. Normality Test
Data normality was examined to determine whether the dataset followed a normal distribution, which is a fundamental assumption for parametric statistical analysis. The data were considered normally distributed if the significance value (p-value) obtained from the Kolmogorov–Smirnov or Shapiro–Wilk test exceeded 0.05.

d. T Test (Paired Sample t-Test)
Paired sample t-test to identify statistically significant differences between paired observations.

e. Coefficient of determination
Coefficient of determination (R^2) was employed to measure the proportion of variance in the dependent variable that can be explained by the independent variables in the regression model. The R^2 value ranges from 0 to 1, where values closer to 1 indicate a stronger explanatory power of the model.

IV. RESULTS AND DISCUSSION

This study investigates user perceptions of Tokopedia's chatbot service quality using the SERVQUAL framework combined with Importance–Performance Analysis (IPA). A total of 104 valid responses were analyzed, providing an adequate empirical basis for examining service quality performance in the context of digital customer service within Indonesian e-commerce platforms.

A. Respondent Characteristics

This study involved 104 respondents who had previously interacted with the Tokopedia chatbot. Respondent characteristics were analyzed based on gender and age to provide a comprehensive overview of the user profile. Based on the results of the questionnaire distribution, data on the respondents' gender were obtained as shown in Table 1 below.

Table 1. Respondents Based on Gender

Gender	Frequency	Percentage (%)
Women	52	50
Men	52	50
Total	104	100

Source: Processed primary data

The results indicate a balanced gender distribution, with 52 female respondents (50%) and 52 male respondents (50%). This proportional composition minimizes gender bias and allows for an objective evaluation of user perceptions toward chatbot services. Based on the results of grouping respondent characteristic data obtained through the distribution of questionnaires, the age distribution of respondents is presented in Table 2 below.

Tabel 2. Respondents Based on Age

Age	Frequency	Percentage (%)
≤ 20 years	8	7,7
21 – 30 years	84	80,8
> 30 years	12	11,5
Total	104	100

Source: Processed primary data

In terms of age distribution, the majority of respondents were between 21 and 30 years old, accounting for 80.8% of the total sample. Respondents under 20 years old represented 7.7%, while those over 30 years old accounted for 11.5%. These findings suggest that most chatbot users belong to the productive age group, which is generally more familiar with digital technology and online service platforms. Consequently, the sample adequately represents the primary users of e-commerce chatbot services.

B. Instrument Testing Results

a. Validity testing

Validity testing was conducted to examine the ability of each questionnaire item to accurately measure the intended construct. The Pearson Product Moment correlation method was applied by correlating each item score with the total score of its respective variable. With a sample size of 104 respondents and a significance level of 0.05, the critical r-value was 0.195.

The results demonstrate that all items across the service quality dimensions—tangible, reliability, responsiveness, assurance, and empathy—as well as the user satisfaction variable, achieved correlation coefficients exceeding the critical value. Therefore, all measurement items are considered valid and appropriate for further analysis.

b. Reliability Test

Reliability testing was performed using Cronbach's Alpha to assess the internal consistency of the research instrument. The findings reveal that all variables obtained Cronbach's Alpha values greater than 0.60, indicating acceptable reliability. The Cronbach's Alpha values obtained for each variable are presented in the following Table 3.

Table 3. Reliability Test Results

Variable	*Alpha Cronbach*
Tangible	0,654
Reliability	0,665
Responsiveness	0,655
Assurance	0,691
Emphaty	0,629
User Satisfaction	0,623

Source: processed primary data, 2025

These results confirm that the questionnaire items consistently measure the constructs under investigation and that the instrument is reliable for assessing service quality and user satisfaction in this study.

c. Normality Test

The normality of the data was examined using the One-Sample Kolmogorov–Smirnov test. The analysis produced an Asymp. Sig. (2-tailed) value of 0.018, which is below the 0.05 threshold, indicating that the residual data do not fully follow a normal distribution.

However, this condition does not affect the primary analysis, as the Importance–Performance Analysis (IPA) method applied in this study does not require normally distributed data. Therefore, the normality test results serve only as supplementary information.

d. T-Test

The T-test was conducted to examine the individual influence of service quality indicators on user satisfaction. The results indicate that most indicators across the Tangible, Reliability, Responsiveness, Assurance, and Empathy dimensions did not show statistically significant effects at the 0.05 level.

Nevertheless, several indicators demonstrated significance values approaching the threshold, suggesting relatively stronger contributions compared to others. It is important to note that the t-test serves as a supporting analysis, while the main conclusions of this study are derived from the Importance–Performance Analysis (IPA).

e. Coefficient of Determination

The coefficient of determination (R^2) obtained from the regression analysis was 0.203. This result indicates that 20.3% of the variation in user

satisfaction can be explained by the service quality dimensions included in the research model.

The remaining 79.7% of the variation is influenced by other factors not examined in this study, such as prior user experience, pricing policies, or external service features. These findings suggest that while the model has moderate explanatory power, future studies may incorporate additional variables to enhance its comprehensiveness.

C. Analysis of Chatbot Service Quality at Tokopedia Using the SERVQUAL Method

The SERVQUAL gap analysis revealed that all service quality dimensions exhibited positive gap values, indicating that users' perceptions consistently exceeded their expectations. This finding suggests that Tokopedia's chatbot service has been successful in delivering service quality that not only meets but slightly surpasses user expectations. Such results are particularly noteworthy in the context of automated service systems, where achieving user satisfaction can be challenging due to the absence of human interaction. Based on the results of the calculations from the completed questionnaire, the results are as follows:

Table 4. Gap between Perception and Expectation

No	Quality Dimensions	Mean		*gap*
		Perception	Expectation	
1	Tangible	4,32	4,30	0,02
2	Reliability	4,36	4,25	0,11
3	Responsiveness	4,38	4,27	0,11
4	Assurance	4,41	4,30	0,10
5	Emphaty	4,39	4,10	0,28
6	User Satisfaction	4,34	4,26	0,08

Source: Processed primary data

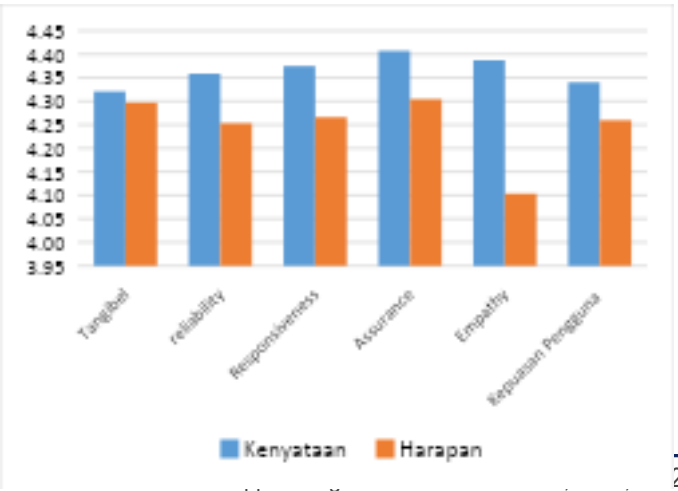

Figure 1. Gap Between Expectations and Perceptions

Among the five SERVQUAL dimensions, empathy recorded the highest positive gap, followed by responsiveness, reliability, assurance, and tangible aspects. The dominance of empathy highlights the importance of emotional and relational elements in chatbot interactions, even though the service is fully digital. This supports the notion that users increasingly expect chatbots to deliver not only functional efficiency but also a sense of understanding and support.

a. Tangible Dimension

The tangible dimension reflects users' perceptions of the chatbot's visual appearance, interface design, and feature availability. The results show that the overall gap for this dimension is relatively small, indicating that user perceptions are closely aligned with expectations. Interface design achieved a neutral gap, suggesting that the visual layout and navigation structure are considered adequate and consistent with user expectations. Based on the results of the gap score calculation between user expectations and perceptions using the SERVQUAL method in the tangible dimension, the following data were obtained.

Tabel 5. Gap Tangible Dimension

No	Description	Mean		gap
		Perception	Expectation	
1	Interface Design	4,34	4,33	0,00
2	Feature Availability	4,37	4,31	0,05
3	Display Quality	4,22	4,23	-0,01
	Total gap	4,31	4,29	0,01

Source: Processed primary data

Feature availability showed a small positive gap, implying that users perceive the chatbot as offering sufficiently comprehensive features to address common inquiries and issues. However, the visual quality indicator exhibited a marginal negative gap, suggesting that certain aspects of the interface—such as color composition, typography, or layout aesthetics—may not fully meet user expectations. Although the deviation is minimal, it indicates an opportunity for incremental improvement, particularly as visual appeal and usability increasingly influence user satisfaction in digital platforms.

b. Reliability Dimension

The reliability dimension assesses the chatbot's ability to deliver accurate, consistent, and dependable service. The findings indicate a positive overall gap, demonstrating that users perceive the chatbot as reliable in providing information and handling requests. Information accuracy emerged as the strongest indicator within this dimension, reflecting users' confidence in the

correctness of responses provided by the chatbot. Based on the research results, data was obtained regarding the gap score between expectations and perceptions of Tokopedia chatbot users using the SERVQUAL method in the reliability dimension as follows:

Table 6. Reliability Dimension Gap

No	Description	Mean		gap
		Perception	Expectation	
1	Information Accuracy	4,34	4,17	0,16
2	Answer Consistency	4,34	4,21	0,13
3	Problem-Solving Skills	4,40	4,38	0,03
	Total gap	4,36	4,25	0,11

Source: Processed primary data

Consistency of answers also showed a positive gap, suggesting that the chatbot performs well in maintaining uniform responses across similar queries. However, the ability to resolve problems recorded the smallest gap within this dimension. This suggests that while the chatbot effectively handles standard inquiries, it may encounter limitations when addressing more complex or atypical issues. Enhancing problem-solving capabilities through improved natural language processing or escalation mechanisms could further strengthen this dimension.

c. Responsiveness Dimension

Responsiveness refers to the chatbot's speed, availability, and ease of interaction. The analysis indicates that this dimension performs well overall, with a positive gap across all indicators. Service availability recorded the highest gap, highlighting users' appreciation for the chatbot's 24/7 accessibility. This feature significantly enhances perceived service responsiveness, particularly in e-commerce contexts where users expect immediate assistance at any time.

Table 7. Dimension Gap of Responsiveness

No	Description	Mean		gap
		Perception	Expectation	
1	Response Time	4,36	4,31	0,05
2	Ease of Interaction	4,40	4,32	0,09
3	Availability	4,37	4,17	0,19
	Total gap	4,38	4,27	0,11

Sumber: Data primer yang sudah diolah

Ease of interaction also demonstrated a positive gap, suggesting that users find the chatbot intuitive and user-friendly. The smallest gap was observed in response speed, indicating that although the chatbot responds quickly, users still perceive potential for improvement. In highly competitive digital environments, even minor delays can influence user satisfaction; therefore, optimizing response time remains an important consideration.

d. Assurance Dimension

The assurance dimension reflects users' trust in the chatbot's professionalism, information credibility, and data security. The results show a positive overall gap, indicating that users generally feel confident when interacting with the chatbot. Confidence in the information provided recorded the highest gap within this dimension, reinforcing the importance of accurate and clear communication in building trust.

Table 8. Assurance Dimension Gap

No	Description	Mean		gap
		Perception	Expectation	
1	Trust in Information	4,42	4,25	0,17
2	Trust in Data Security	4,38	4,32	0,06
3	Perception of Professionalism	4,42	4,35	0,08
	Total gap	4,41	4,30	0,10

Source: Processed primary data

Perceived professionalism also contributed positively, suggesting that the chatbot's tone, language use, and response structure convey a professional image. However, the indicator related to data security exhibited a relatively smaller gap, indicating that while users feel reasonably secure, concerns regarding privacy and data protection persist. Given the increasing awareness of data security issues, continuous enhancement of transparency and security measures is essential to maintain user trust.

e. Empathy Dimension

Empathy emerged as the strongest performing dimension in this study, with the highest overall gap value. Indicators related to responsiveness to complaints and availability of additional support recorded particularly high gaps, demonstrating that users highly value personalized attention and the option to receive further assistance when needed. This finding underscores the growing expectation that chatbots should emulate human-like understanding and responsiveness.

Tabel 9. Gap Dimensi *Emphaty*

No	Description	Mean		gap
		Perception	Expectation	

1	Understanding Needs	4,35	4,15	0,19
2	Responsive to Complaints	4,37	4,06	0,31
3	Additional Support	4,46	4,14	0,32
	Total gap	4,39	4,12	0,27

Source: Processed primary data

The ability to understand user needs also showed a significant positive gap, indicating that users perceive the chatbot as capable of interpreting their queries effectively. These results suggest that emotional and relational factors play a critical role in shaping user satisfaction, even in automated service contexts. Enhancing empathetic interaction through contextual awareness and adaptive responses could further strengthen user engagement and loyalty.

f. Customer Satisfaction

Customer satisfaction assessment is conducted by comparing the perception and expectation values regarding Tokopedia's chatbot service. Here are the summary results of the mean values and gaps for each indicator:

Table 10. Customer Satisfaction Gap

No	Description	Mean		gap
		Perception	Expectation	
1	Satisfaction Level	4,31	4,18	0,13
2	Comparison of Experiences	4,34	4,19	0,14
3	General Assessment (overall satisfaction with the chatbot)	4,38	4,40	-0,03
	Total gap	4,34	4,26	0,08

Source: Processed primary data

Based on the table above, it can be seen that the overall average gap is 0.08, indicating that, in general, customers are satisfied with Tokopedia's chatbot service. The largest positive gap is in the Experience Comparison indicator (0.14), showing that many customers feel that using the chatbot is better compared to previous service methods (such as human customer service via email or phone). The small negative gap in Overall Rating (-0.03) could be caused by the chatbot's limitations in handling complex issues, or responses that are too automated and impersonal.

D. Importance–Performance Analysis (IPA)

Importance–Performance Analysis (IPA) is used to identify the level of alignment between service performance (perception) and the importance of the service (expectation) from users regarding the Tokopedia chatbot. This approach aims to map service attributes into four Cartesian quadrants, allowing the company to determine strategic priorities in improving service quality more effectively and efficiently. In this study, the level of importance is proxied through users' expectation values, while the level of performance is proxied through users' perception values.

Table 11. IPA Analysis per Indicator

Dimension	Item	Average Score		Quadrant
		Perception	Expectation	
Tangible	Interface Design	4.34	4.33	B
	Feature Availability	4.37	4.31	B
	Display Quality	4.22	4.23	A
Reliability	Information Accuracy	4,34	4,17	D
	Answer Consistency	4,34	4,21	B
	Problem-Solving Skills	4,40	4,38	B
Responsiveness	Response Time	4,36	4,31	B
	Ease of Interaction	4,40	4,32	B
	Availability	4,37	4,17	D
Assurance	Trust in Information	4,42	4,25	B
	Trust in Data Security	4,38	4,32	B
	Perception of Professionalism	4,42	4,35	B
Emphaty	Understanding Needs	4,35	4,15	D
	Responsive to Complaints	4,37	4,06	D
	Additional Support	4,46	4,14	D

Source: Processed primary data

The measurement results indicate that, in general, the average user perception scores are above the average expectation scores. These findings suggest that Tokopedia's chatbot service has generally been able to meet or even exceed user expectations. Consequently, the level of user satisfaction can be categorized as good. Nevertheless, further analysis through IPA mapping is still necessary to identify service attributes that require special attention, both in terms of quality improvement and resource optimization.

IPA mapping is carried out using the overall average perception and expectation scores as the cut-off point (mean cut-off) on a Cartesian diagram, resulting in four quadrants: Quadrant A (Top Priority), Quadrant B (Maintain

Performance), Quadrant C (Low Priority), and Quadrant D (Excessive Performance). Each service attribute is then positioned based on the comparison between perception scores and expectation scores.

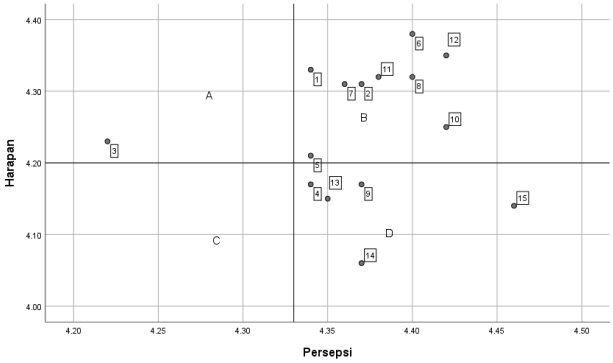

Figure 2. Cartesian Diagram per Indicator

Based on the mapping results per indicator, the majority of Tokopedia chatbot service attributes are in Quadrant B, indicating that service performance has been in line with user expectations and needs to be maintained. Attributes in this quadrant reflect a balance between expectations and service realization, so the recommended strategy is to maintain quality consistency through regular monitoring and evaluation. On the other hand, only one attribute, namely interface display quality, is in Quadrant A, making it the top priority for improvement. This condition indicates that although the interface design is generally considered good, users still have higher expectations regarding aesthetics and visual comfort.

Further analysis based on the SERVQUAL dimensions shows variations in the position of each dimension within the IPA quadrant. The Empathy dimension was found in Quadrant A (Top Priority), indicating a significant gap between user expectations and perceptions. Users have high expectations regarding the chatbot's ability to understand their needs, respond to complaints personally, and provide relevant additional support. However, the perceptions received do not fully meet these expectations. Therefore, the Empathy dimension needs to be the primary focus in the development of Tokopedia's chatbot services, particularly in improving the ability to engage in contextual interactions that are oriented towards users' emotional needs.

Table 12. IPA Analysis by Dimension

Dimension	Average Score		Quadrant
	Perception	Expectation	
Tangible	4.31	4.29	D
Reliability	4,36	4,25	D

Responsivenes s	4,38	4,27	B
Assurance	4,41	4,30	B
Empathy	4,39	4,12	A

Source:Processed primary dat

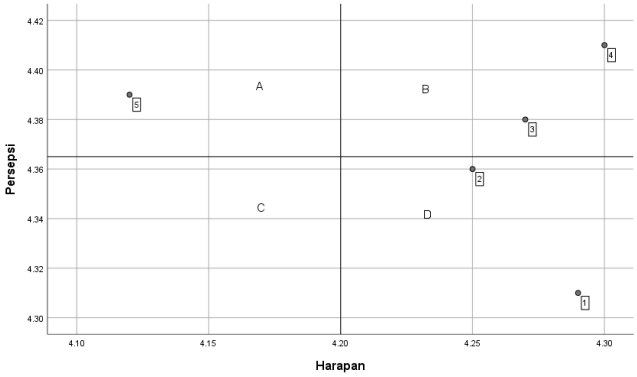

Figure 3. Cartesian Diagram of Science by Dimension

The Responsiveness and Assurance dimensions are in Quadrant B (Maintain Performance), indicating that response speed, ease of interaction, service professionalism, and the level of trust in data security have met user expectations. The recommended strategy for both dimensions is to maintain the already good service quality through continuous monitoring, technology competency improvements, and regular evaluation of user feedback. Considering the dynamic nature of digital services, periodic monitoring is important to ensure that service quality remains relevant to the evolving needs of users.

Meanwhile, the Tangible and Reliability dimensions are located in Quadrant D (Excessive Performance), indicating that service performance in these two dimensions exceeds the level of importance perceived by users. This condition suggests the potential for overdelivery or inefficient use of resources, particularly in terms of physical appearance and system accuracy that surpass user needs. Therefore, the organization may consider optimizing or reallocating resources from these two dimensions to those that require more attention, especially the Empathy dimension.

Based on this mapping, a division of strategic zones in the IPA analysis is established, consisting of three main zones. The first zone is the Focus on Improvement (Critical Improvement Zone), which includes the Empathy dimension and requires prioritization of service development. The second zone is Maintain

Performance (Maintain Performance Zone), which covers the dimensions of Responsiveness and Assurance, where the quality of service meets user expectations and needs to be consistently maintained. The third zone is Resource Optimization (Resource Optimization Zone), which includes the Tangible and Reliability dimensions, where the company can reassess resource allocation to be more efficient and strategic.

Table 13. Main Components of the Analysis Structure

Strategic Zone	IPA Criteria	Dimensions That Enter	Main Strategy
Zone 1: Critical Improvement Zone	Quadrant A (Perception < High expectations)	Empathy	Prioritizing the improvement of service quality in the Empathy dimension by emphasizing attention, care, and understanding of users' emotional needs.
Zone 2: Maintain Performance	Quadrant B (Perception ≈ High expectation)	Responsiveness, Assurance	Maintain the quality of service that already meets user expectations. Monitor it regularly.
Zone 3: Resource Optimization	Quadrant D (Perception > Low Expectations)	Tangible, Reliability	Evaluate the possibility of reducing resource allocation. Refocus on priority areas.

Overall, the results of the Importance–Performance Analysis indicate that the Tokopedia chatbot has been able to deliver service performance that is satisfactory and aligns well with user expectations. Although no indicators requiring urgent improvement were found, continuous enhancement is still necessary, particularly in the aspect of service empathy. This IPA and SERVQUAL-based approach provides a comprehensive strategic framework for the company in determining service development priorities, maintaining the already good quality, and optimizing the use of resources. With the proper implementation of strategies and continuous evaluation, the Tokopedia chatbot is expected to continuously

improve user satisfaction and loyalty amid increasing competition in the e-commerce industry.

V. CONCLUSION AND RECOMMENDATION

A. Conclusion

This study concludes that overall user satisfaction with Tokopedia's chatbot service is at a satisfactory level, as indicated by relatively high perception scores across the SERVQUAL dimensions. Nevertheless, the Importance–Performance Analysis (IPA) highlights differences in improvement priorities among service attributes, suggesting that not all dimensions perform equally in meeting user expectations.

The *Empathy* dimension is identified as the most critical area for improvement, as it is positioned in Quadrant A with a substantial gap between perceived performance and user expectations. This finding indicates that users expect the chatbot to demonstrate a higher level of understanding, personalized attention, and responsiveness to their concerns, which has not yet been optimally achieved.

In contrast, the *Responsiveness* and *Assurance* dimensions are classified in Quadrant B, indicating adequate performance that meets user expectations and should be sustained. Meanwhile, the *Tangible* and *Reliability* dimensions are located in Quadrant D, implying performance that exceeds expectations and presents opportunities for resource optimization. Based on the IPA results, a strategic service improvement framework is proposed, categorizing service dimensions into priority development, performance maintenance, and efficiency zones, to support continuous improvement of chatbot-based customer service.

B. Recommendation

Based on the research findings and the results of the analysis obtained, the author proposes the following suggestions:

1. Tokopedia is recommended to prioritize the development of empathetic chatbot features by enhancing personalization, contextual understanding, and response accuracy in handling user complaints and inquiries.
2. The service quality within the Responsiveness and Assurance dimensions should be consistently maintained through regular system updates, continuous training for chatbot management teams, and routine monitoring of interaction quality.
3. An evaluation of resource allocation in the Tangible and Reliability dimensions is suggested, considering that user perceptions have exceeded expectations. Resources may be optimized and redirected toward dimensions requiring greater improvement, particularly Empathy.

4. The implementation of continuous evaluation using the Importance Performance Analysis (IPA) framework is recommended to ensure that chatbot development remains data-driven and responsive to evolving user expectations.
5. Future studies are encouraged to incorporate additional variables such as user experience (UX) or user loyalty as extensions of customer satisfaction, as well as to conduct comparative analyses across different e-commerce platforms.

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