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Analysis of Online Marketplace User Satisfaction using SERVQUAL, Quality Function Deployment, and Mixed Integer Linear Programming

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ABSTRACT

This study analyzes and optimizes user satisfaction in online marketplaces by integrating SERVQUAL, the Kano Model, Quality Function Deployment (QFD), and Mixed Integer Linear Programming (MILP). Data were collected from 167 Shopee users, with 107 valid responses analyzed. SERVQUAL measured service quality dimensions, the Kano Model derived satisfaction and dissatisfaction parameters, QFD translated user requirements into internal service measures, and MILP selected optimal improvement alternatives under an IDR 90,000,000 budget constraint. The results show that assurance had the highest SERVQUAL weight (0.207), followed by tangibility (0.201), reliability (0.200), empathy (0.198), and responsiveness (0.195). The Pearson correlation-based HoQ approach selected customer service training, automatic delivery update features, and feedback completion incentives, with a total cost of IDR 85,000,000 and a deviation value of 0.191. These findings provide scenario-based decision support to improve the quality of marketplace services.

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1. INTRODUCTION

The rapid growth of online marketplace platforms has changed how consumers evaluate digital services, particularly regarding service reliability, transaction security, response speed, and post-transaction support [1], [2]. In online transactions, user satisfaction is determined not only by product availability or price but also by the platform's ability to provide reliable, responsive, secure, and user-oriented services [3], [4]. As online marketplaces function as digital ecosystems connecting sellers and buyers, service quality has become a strategic factor for maintaining customer satisfaction, trust, and loyalty in an increasingly competitive e-commerce environment [5], [6]. Recent studies on marketplace services also confirm that service quality dimensions and e-service quality attributes significantly influence customer satisfaction and platform loyalty [7], [8].

Although these studies provide important evidence regarding the relationship between service quality and user satisfaction, most of them remain diagnostic or explanatory in nature. They identify significant service quality dimensions, satisfaction determinants, or loyalty effects, but do not formally translate these findings into an optimization model for selecting feasible service improvement alternatives [17], [18]. In practice, online marketplace managers face resource limitations when improving service quality. Each improvement alternative,

such as enhancing customer service response, improving delivery time estimation, or increasing post-transaction feedback, requires different implementation costs and offers different levels of technical effectiveness. Therefore, identifying important service attributes alone is insufficient without a mathematical decision model to determine which improvement alternatives to select under budget constraints.

The primary contribution of this study is the development of an integrated decision-support framework that connects SERVQUAL-based service quality assessment, Kano-based satisfaction parameters, QFD relationship mapping, and MILP-based alternative selection. The study does not propose a new SERVQUAL, Kano, QFD, or MILP method. Instead, it demonstrates how these established approaches can be operationally linked within a single analytical procedure for selecting feasible service improvement alternatives under a budget constraint.

Accordingly, this study aims to evaluate user satisfaction in online marketplaces using SERVQUAL and the Kano Model, translate user requirements into internal service measures through QFD, and formulate a MILP model to select service improvement alternatives under a defined budget constraint. The proposed framework is intended to provide a structured and scenario-based decision-support procedure rather than a universally generalizable optimization solution.

2. RESEARCH METHOD

3.1 Research Design

This study employed a quantitative approach with an integrated computational design to systematically analyze and optimize user satisfaction in online marketplace services [27]. A quantitative approach was selected because it enables objective measurement of relationships among variables and supports the development of mathematical models for data-driven decision-making [28]. This research design integrates the SERVQUAL method, the Kano model, Quality Function Deployment (QFD), and Mixed Integer Linear Programming (MILP) to establish a comprehensive analytical framework for evaluating and optimizing service quality [29]. Accordingly, this design is not only descriptive in nature but also prescriptive in determining optimal solutions.

3.2 Data Source and Variables

The data sources in this study consisted of primary and secondary data. Primary data were collected through an online questionnaire distributed via Google Forms to active Shopee users as a case example of an online marketplace platform [30]. The questionnaire consisted of four main sections: respondent identity; measurement of user perceptions and expectations across the five SERVQUAL dimensions; user preferences toward internal service measures; and Kano-based functional and dysfunctional questions for classifying service attributes [31].

The demographic profile of the valid respondents showed that 30 (28%) were male and 77 (72%) were female. Based on age group, 20 respondents, or 19%, were aged 17–20 years; 36 respondents, or 34%, were aged 21–30 years; 8 respondents, or 7%, were aged 31–40 years; and 43 respondents, or 40%, were above 40 years old. These demographic characteristics indicate that the sample included users from different age groups, with the largest proportion being respondents aged 40 and older.

The research variables included service quality dimensions measured using SERVQUAL, namely tangibility, reliability, responsiveness, assurance, and empathy; user preferences toward internal service measures, including customer service response speed, delivery notification accuracy, and post-transaction feedback; and attribute classifications based on the Kano Model [31]. In addition, technical parameters, such as implementation costs and technical effectiveness scores, were incorporated into the MILP optimization model to determine the optimal combination of service improvement alternatives subject to budget constraints. Secondary data were obtained from books, journal articles, and other relevant literature related to SERVQUAL, the Kano Model, QFD, MILP, online marketplaces, and user satisfaction.

Table 1. Demographic Profile of Respondents

Characteristic	Category	Frequency	Percentage
Gender	Male	30	28%
	Female	77	72%
Age	17-20 years	20	19%
	21-30 years	36	34%
	31-40 years	8	7%
	> 40 years	43	40%
Total	Valid respondents	107	100%

3.3 Data Collection Procedure

Data collection was conducted by distributing an online questionnaire through Google Forms to respondents who met the research criteria. The questionnaire consisted of four sections: respondent identity, SERVQUAL-based service quality assessment, user preferences toward internal service measures, and Kano-based functional and dysfunctional questions for classifying service attributes [31], [32]. The SERVQUAL section measured five dimensions, namely tangibility, reliability, responsiveness, assurance, and empathy. Each

dimension was represented by four items, for a total of 20 SERVQUAL items used to measure users' perceptions and expectations of online marketplace service quality [33].

3.4 Analytical Methods or Algorithms

The analytical procedure in this study consisted of four integrated stages. First, SERVQUAL was used to measure service quality across five dimensions: tangibility, reliability, responsiveness, assurance, and empathy. Second, the Kano Model was applied to classify service attributes and calculate the satisfaction and dissatisfaction coefficients. Third, Quality Function Deployment (QFD) was employed to translate user requirements into internal service measures through the House of Quality (HoQ), enabling the prioritization of technical responses based on customer needs [23]. Fourth, a Mixed Integer Linear Programming (MILP) model was formulated to determine the optimal combination of service improvement alternatives subject to a budget constraint, providing a systematic approach to selecting the most effective strategies while accounting for limited resources [35].

The internal service measures used in this study consisted of customer service response speed, delivery time estimation accuracy, and user feedback after transactions. Each internal service measure had three technical alternatives with different implementation costs and technical scores, as presented in Table 2.

Table 2. Technical Alternatives, Cost Structure, and Technical Scores for Service Improvement Measures

Internal Measure	Technical Alternatives	Cost (in million IDR)	Cost Type	Technical Score
Customer service response speed	1. Adding customer service agents (1 person/month)	5	Variable/Month	0.6
	2. Implementing an AI chatbot	20	Fixed/One-time	0.9
	3. Intensive training for customer service staff	7.5	Fixed/Per Batch	0.75
Delivery time estimation accuracy	1. Real-time system integration with couriers	20	Fixed/One-time	0.9
	2. Delivery time prediction system (simple machine learning)	15	Fixed/One-time	0.75
	3. Automatic update feature in the application	10	Fixed/One-time	0.6
User feedback after transactions	1. Feedback completion incentives (voucher IDR 5,000 × 1,000 users)	5	Variable/1,000 Users	0.9
	2. Redesigning the feedback form user interface	8	Fixed/One-time	0.75
	3. Automatic reminder notifications	1	Fixed/One-time	0.6

The technical alternatives, implementation costs, and technical effectiveness scores presented in Table 2 were used as scenario parameters in the MILP model. The cost values were not obtained from Shopee's internal accounting or procurement records. Instead, they were constructed as illustrative estimates to represent plausible differences in resource requirements among the alternatives. Similarly, the technical scores of 0.60, 0.75, and 0.90 were assigned to represent low, moderate, and high relative effectiveness within the demonstration scenario.

The Kano satisfaction and dissatisfaction coefficients were calculated as follows:

$$CS_i = \frac{A_i + O_i}{A_i + O_i + M_i + I_i} \quad (1)$$

$$DS_i = -\frac{O_i + M_i}{A_i + O_i + M_i + I_i} \quad (2)$$

In the QFD stage, the HoQ relationship matrix was developed using two approaches, namely Pearson correlation and judgment-based assessment. In the Pearson correlation-based approach, the average SERVQUAL dimension score was correlated with the ordinally transformed score of each internal service measure. The correlation values were then converted into the HoQ scale of 0, 1, 3, and 9, representing no, weak, moderate, and very strong relationships. The initial HoQ relationship values were then normalized using the following equation:

$$R_{ij}^{norm} = \frac{\sum_{k=1}^{N} R_{ik}\gamma_{kj}}{\sum_{j=1}^{N}\sum_{k=1}^{N} R_{ij}\gamma_{jk}} \quad (3)$$

The MILP model was formulated to minimize the weighted deviation between the achieved satisfaction level and the maximum target satisfaction level. The objective function is expressed as follows:

$$\min \sum_{i \in I} (w_{1i} + w_{2i}) d_i \quad (4)$$

Furthermore, the model was complemented with several constraints to ensure that the resulting solution satisfied realistic system conditions. The relationship between SERVQUAL dimensions and internal technical attributes was expressed as follows:

$$\sum\nolimits_{j \in J} R_{ij}^{norm}\ x_j = y_i, \forall i \in I \quad (5)$$

$$y_i + d_i \geq 1, \forall i \in I \quad (6)$$

$$\sum_{a \in A_j} l_{ja} = 1, \forall j \in J \quad (7)$$

$$x_j = \sum_{a \in A_j} s_{ja}\ l_{ja}, \forall j \in J \quad (8)$$

$$\sum_{j \in J}\sum_{a \in A_j} c_{ja}\ l_{ja} \leq B \quad (9)$$

$$\sum_{j \in J} R_{ij}^{norm} = 1, \forall i \in I \quad (10)$$

Finally, the decision variable constraints in this model were expressed as follows:

$$0 \leq x_j \leq 1, \forall j \in J \quad (11)$$

$$0 \leq y_i \leq 1, \forall i \in I \quad (12)$$

$$l_{ja} \in \{0,1\}, \forall j \in J, \forall a \in A_j \quad (13)$$

$$d_i \geq 0, \forall i \in I \quad (14)$$

3.5 Software and Tools

The software used in this study included Microsoft Excel for preliminary data processing and of constructing the House of Quality (HoQ) matrix, and Python for implementing the MILP optimization model. Python was selected for its ability to efficiently solve complex optimization problems via various mathematical programming libraries. In addition, statistical analyses, including correlation analysis and data validation, were conducted using computational methods to ensure the accuracy of the research findings [28].

In terms of research ethics, the entire data collection process was conducted to ensure that participation was voluntary and anonymous, and that no sensitive information was collected that could harm respondents. This study also ensured that the collected data were used solely for academic purposes and analyzed objectively without manipulation. Accordingly, all research procedures complied with the applicable principles of scientific research ethics.

3. RESULT AND ANALYSIS

3.1 Service Quality Analysis Using SERVQUAL and the Kano Model

Service quality analysis was conducted using the SERVQUAL method to identify gaps between user perceptions and expectations of online marketplace services. The analysis results indicated that each dimension had a different level of importance in influencing user satisfaction, thereby reflecting systematic priorities for service improvement. Service quality is a primary factor in determining user satisfaction in digital systems, particularly on e-commerce platforms.

Table 3. Weights of SERVQUAL Dimensions and Parameters from the Kano Questionnaire

	Tangibility	Reliability	Responsiveness	Assurance	Empathy
Weight	0.201	0.200	0.195	0.207	0.198
CS_i	0.340	0.387	0.378	0.424	0.347
DS_i	0.372	0.301	0.344	0.424	0.326
w_{1i}	0.340	0.387	0.378	0.424	0.347
w_{2i}	0.032	-0.086	-0.033	0.000	-0.021

Based on Table 4, the assurance dimension had the highest importance weight, indicating that security, trust, and service guarantees were the dominant factors influencing user satisfaction. These findings suggest that users strongly consider transaction protection and system reliability when interacting with digital platforms. This result is consistent with previous studies indicating that the assurance dimension significantly influences digital service user satisfaction [13].

3.2 Quality Function Deployment (QFD)

The next stage involved translating user requirements into internal technical attributes using the Quality Function Deployment (QFD) method. This method was employed to connect user requirements to technical actions that service providers could implement [19].

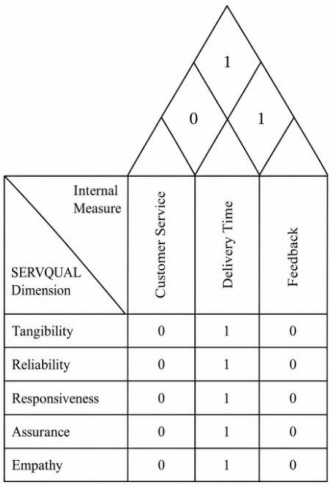

Figure 1. Initial HoQ Plot (Pearson Correlation)

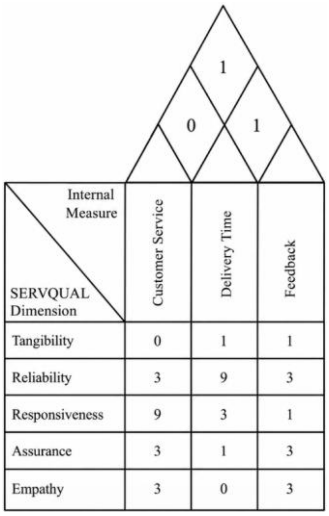

Figure 2. Initial HoQ Plot (judgment)

Table 4. Rationale for Determining the Initial HoQ Plot (Judgment-Based Approach)

SERVQUAL Dimension	Customer Service Response	Delivery Time Estimation	Feedback	Rationale
Tangibility	0	1	1	The presentation of delivery information and user reviews contributes to the visual aspects.
Reliability	3	9	3	Customer service and delivery estimation are related to promises and service reliability.
Responsiveness	9	3	1	Response speed and readiness to assist are highly relevant to customer service.

SERVQUAL Dimension	Customer Service Response	Delivery Time Estimation	Feedback	Rationale
Assurance	3	1	3	Customer service builds a sense of security, while user feedback increases trust.
Empathy	3	0	3	Customer service and feedback reflect personal attention and concern toward users.

After obtaining the initial HoQ plot, normalization was performed using the following formula:

$$R_{ij}^{norm} = \frac{\sum_{k=1}^{N} R_{ik}\gamma_{kj}}{\sum_{j=1}^{N}\sum_{k=1}^{N} R_{ij}\gamma_{jk}} \quad (12)$$

where R_{ik} represents the relationship between the i-th SERVQUAL dimension and the k-th internal measure. R_{ij} denotes the relationship between the i-th SERVQUAL dimension and the j-th internal measure. Furthermore, $\gamma_{kj} = \gamma_{jk}$ represents the relationship between internal measures $k$and j.

Table 5. (a) Normalization Results for the Pearson Correlation Approach, (b) Normalization Results for the Judgment-Based Approach

(a)

Internal Measure / SERVQ-UAL Dimension	Customer Service	Delivery Time	Feedback
Tangibility	0	0	1
Reliability	0	0	1
Responsiveness	0	0	1
Assurance	0	0	1
Empathy	0	0	1

(b)

Internal Measure / SERVQ-UAL Dimension	Customer Service	Delivery Time	Feedback
Tangibility	0.333	0.333	0.333
Reliability	0.167	0.167	0.667
Responsiveness	0.071	0.071	0.857
Assurance	0.3	0.3	0.4
Empathy	0.333	0.333	0.333

3.3 Mixed Integer Linear Programming (MILP)

The MILP parameters were obtained from the preceding SERVQUAL, Kano, and QFD stages. Kano-derived weights were used in the objective function, while the normalized HoQ values represented the relationships between SERVQUAL dimensions and internal service measures. The technical effectiveness scores represented the assumed contribution of each alternative to the fulfillment of its corresponding internal measure, and the cost parameters represented the assumed resource requirements for implementation.

The final optimization outputs are summarized in table 6 and table 7. This table presents the selected alternatives, total implementation cost, deviation value, and final satisfaction values for each SERVQUAL dimension under both HoQ approaches.

Table 6. Selected Service Improvement Alternatives under the Pearson Correlation-Based and Judgment-Based HoQ Approaches

HoQ Approach	Internal Service Measure	Selected Alternative
Pearson Correlation	Customer service response	Intensive training for customer service staff
	Delivery-time estimation	Automatic update feature in the application

	Post-transaction feedback	Feedback completion incentives
Judgment	Customer service response	Intensive training for customer service staff
	Delivery-time estimation	Delivery time prediction system
	Post-transaction feedback	Feedback completion incentives

Table 7. Optimization Metrics and Final SERVQUAL Satisfaction Values under Both HoQ Approaches

HoQ Approach	Total Cost (million IDR)	Deviation	Tangibility	Reliability	Responsiveness	Assurance	Empathy
Pearson Correlation	85	0.191	0.9	0.9	0.9	0.9	0.9
Judgment	90	0.329	0.799	0.851	0.878	0.810	0.799

As shown in Table 10(a), the Pearson correlation-based HoQ approach selected intensive training for customer service staff, an automatic update feature in the application, and feedback-completion incentives. Table 10(b) shows that this combination required IDR 85,000,000, remaining below the available budget of IDR 90,000,000. It produced a deviation value of 0.191 and a final satisfaction value of 0.900 for each SERVQUAL dimension.

Under the judgment-based HoQ approach, Table 10(a) shows that customer service training and feedback-completion incentives remained selected, while the delivery alternative changed to a delivery-time prediction system. As reported in Table 10(b), this solution exhausted the IDR 90,000,000 budget and produced a higher deviation value of 0.329. Its final satisfaction values were 0.799 for tangibility, 0.851 for reliability, 0.878 for responsiveness, 0.810 for assurance, and 0.799 for empathy, indicating greater variation across dimensions than in the Pearson-based scenario.

3.4 Implications and Research Contributions

The contribution of this study is centered on the integration of established service quality and optimization methods into a single decision-support procedure. SERVQUAL identifies the relative importance of service quality dimensions, the Kano Model provides satisfaction and dissatisfaction parameters, QFD translates customer requirements into internal service measures, and MILP selects feasible technical alternatives under resource constraints. The value of the framework, therefore, lies in the connections among these analytical stages rather than in the development of a new individual method.

4. CONCLUSION

This study analyzed user satisfaction on online marketplaces by integrating SERVQUAL, the Kano Model, Quality Function Deployment (QFD), and Mixed Integer Linear Programming (MILP). Based on 107 valid responses from Shopee users, the SERVQUAL and Kano analyses identified assurance, reliability, and responsiveness as important service quality dimensions for improving user satisfaction. These user requirements were translated into internal service measures through the House of Quality, namely customer service response speed, delivery time estimation accuracy, and user feedback after transactions.

The MILP model was used to select service improvement alternatives under a budget constraint of IDR 90,000,000. Under the Pearson correlation-based HoQ approach, the selected alternatives were intensive training for customer service staff, automatic update features in the application, and feedback completion incentives, with a total cost of IDR 85,000,000 and a deviation value of 0.191. Under the judgment-based HoQ approach, the selected alternatives were intensive training for customer service staff, a delivery time prediction system, and feedback completion incentives, with a total cost of IDR 90,000,000 and a deviation value of 0.329. These results indicate that the optimization outputs vary with the HoQ relationship-mapping approach used.

However, the findings should be interpreted within the defined analytical scenario. The sample was limited to 107 valid Shopee users, the internal service responses were transformed from ordinal categories into numerical scores, and the cost and technical effectiveness parameters were not obtained from actual organizational records. Therefore, the optimization results demonstrate the application of the framework but do not constitute implementation-ready recommendations for Shopee or other online marketplace platforms.

Future studies are recommended to expand the sample size, include multiple online marketplace platforms, compare alternative ordinal-data methods such as Spearman or polychoric correlation, and incorporate additional constraints such as implementation time, workforce capacity, and minimum satisfaction targets. These extensions may improve the stability, applicability, and scalability of the proposed QFD–MILP decision-support model.

5. REFERENCES

[1] D. Sadeli and Y. Aritonang, "Analysis of the influence of e-service quality, e-word of mouth, and promotion and ads on consumer loyalty in the marketplace," *Jurnal Rekayasa Sistem Industri*, vol. 13, no. 2, pp. 127–142, 2024, doi: 10.26593/jrsi.v13i2.7278.127-142.

[2] I. Wulan, S. Safuan, and E. Erwin, "Tinjauan pustaka dampak keandalan e-SERVQUAL terhadap kepuasan pelanggan dalam e-commerce," *Jesya: Jurnal Ekonomi dan Ekonomi Syariah*, vol. 7, no. 2, pp. 1911–1925, 2024, doi: 10.36778/jesya.v7i2.1734.

[3] B. Yang, M. Bakri, and G. De Mello, "Determinant of satisfaction towards e-commerce among youth customer in Malaysia," *International Journal of Academic Research in Business and Social Sciences*, vol. 14, no. 7, 2024, doi: 10.6007/ijarbss/v14-i7/21808.

[4] W. Wisnel, T. Cantika, and E. Wirdianto, "Analysis of the effect of e-service quality on e-commerce customer satisfaction and loyalty," *Motivection: Journal of Mechanical, Electrical and Industrial Engineering*, vol. 4, no. 3, pp. 210–220, 2022, doi: 10.46574/motivection.v4i3.145.

[5] Y. Jou *et al.*, "An integrated multi-criteria decision analysis and structural equation modeling application for the attributes influencing the customer's satisfaction and trust in e-commerce applications," *Sustainability*, vol. 16, no. 5, 2024, doi: 10.3390/su16051727.

[6] S. Zainah, "Analisis kualitas layanan e-commerce Shopee menggunakan metode E-SERVQUAL dan Kano," *JATISI*, vol. 10, no. 2, pp. 1220–1232, 2023, doi: 10.35957/jatisi.v10i2.4544.

[7] R. R. Mardhotillah and B. M. Wibawa, "E-service quality factors and customer satisfaction in Shopee's e-commerce platform," *Journal of Applied Management and Business*, vol. 6, no. 1, pp. 1–12, 2025, doi: 10.37802/jamb.v6i1.1050.

[8] W. G. S. Parwita, "Penerapan metode e-service quality terhadap pengukuran tingkat kepuasan penggunaan marketplace," *SINTECH Journal*, vol. 5, no. 1, pp. 44–52, 2022, doi: 10.31598/sintechjournal.v5i1.1236.

[9] Y. Kristanto, "Analysis of the relationship between e-service quality, e-satisfaction, and e-loyalty in Indonesia e-commerce sector," *Indonesian Journal of Economics, Business, Accounting, and Management*, vol. 3, no. 3, 2025, doi: 10.63901/ijebam.v3i3.133.

[10] S. Billyarta and E. Sudarusman, "Pengaruh kualitas layanan elektronik (E-SERVQUAL) terhadap kepuasan konsumen pada marketplace Shopee," *Optimal Jurnal Ekonomi dan Bisnis Aktual*, vol. 18, no. 1, pp. 41–53, 2021, doi: 10.53845/optimal.v18i1.193.

[11] M. Suryaman and M. Tukiran, "The impact of SERVQUAL dimensions on customer satisfaction in education and training: An economic perspective," *International Journal of Economics Development Research*, vol. 6, no. 2, 2025, doi: 10.37385/ijedr.v6i2.7322.

[12] X. J. Mamakou, P. Zaharias, and M. Milesi, "Measuring customer satisfaction in electronic commerce: The impact of e-service quality and user experience," *International Journal of Quality & Reliability Management*, vol. 41, no. 3, pp. 915–943, 2024, doi: 10.1108/IJQRM-07-2021-0215.

[13] W. Hoo *et al.*, "Customer satisfaction through service quality dimensions: A study on perishable products purchased through online mobile apps in Klang Valley, Malaysia," *Journal of Infrastructure, Policy and Development*, 2024, doi: 10.24294/jipd8791.

[14] R. Ashiq and A. Hussain, "Exploring the effects of e-service quality and e-trust on consumers' e-satisfaction and e-loyalty," *Journal of Electronic Business & Digital Economics*, vol. 3, no. 2, pp. 117–141, 2024, doi: 10.1108/JEBDE-09-2023-0019.

[15] J. Valencia, S. Alie, R. Wulandari, and S. Hamali, "Effect of security, privacy, and customer satisfaction on e-commerce consumer trust," in *2024 International Conference on Informatics, Multimedia, Cyber and Information System (ICIMCIS)*, 2024, pp. 429–434. doi: 10.1109/ICIMCIS63449.2024.10957101.

[16] E. Wulandary, M. Mas'ud, Arifin, and M. Ashoer, "Pengaruh kualitas layanan era digitalisasi media pemasaran online e-commerce dengan menggunakan e-service quality untuk mengetahui kepuasan pelanggan," *Center of Economic Students Journal*, vol. 6, no. 1, pp. 44–59, 2023, doi: 10.56750/csej.v6i1.568.

[17] D. Arli, P. Van Esch, and S. Weaven, "The impact of SERVQUAL on consumers' satisfaction, loyalty, and intention to use online food delivery services," *Journal of Promotion Management*, vol. 30, pp. 1159–1188, 2024, doi: 10.1080/10496491.2024.2372858.

[18] R. W. Hendratno, I. Febrilia, and R. Rahmi, "Analisis kepuasan konsumen pada e-commerce Shopee," *Jurnal Ilmu Pengetahuan Sosial*, vol. 12, no. 3, pp. 1120–1128, 2025, doi: 10.31604/jips.v12i3.2025.1120-1128.

[19] M. Titisari, S. Hadi, Y. Utomo, D. Karya, and G. Aliansa, "Modeling e-commerce website using QFD," *Business and Finance Journal*, vol. 8, no. 1, 2023, doi: 10.33086/bfj.v8i1.3947.

[20] H. N. K. Giao, "Customer satisfaction at Tiki.vn e-commerce platform," *Journal of Asian Finance, Economics and Business*, vol. 7, no. 4, pp. 173–183, 2020, doi: 10.13106/JAFEB.2020.VOL7.NO4.173.

[21] F. Pasaribu, W. P. Sari, T. R. N. Bulan, and W. Astuty, "The effect of e-commerce service quality on customer satisfaction, trust and loyalty," *International Journal of Data and Network Science*, vol. 6, no. 4, pp. 1077–1084, 2022, doi: 10.5267/j.ijdns.2022.8.001.

[22] S. S. Alam, M. H. Ali, N. A. Omar, and W. M. H. W. Hussain, "Customer satisfaction in online shopping in growing markets: An empirical study," *International Journal of Asian Business and Information Management*, vol. 11, no. 1, pp. 78–91, 2020, doi: 10.4018/IJABIM.2020010105.

[23] X. Wang *et al.*, "The application value of Kano model in quality of healthcare: A scoping review," 2024, doi: 10.1101/2024.03.30.24305047.

[24] H. C. Wang and Y. T. Chen, "Integrating Kano model and QFD for service quality improvement in digital services," *Sustainability*, vol. 15, no. 8, pp. 1–17, 2023, doi: 10.3390/su15086421.

[25] M. A. Fauzi and A. Haris, "Analisis kepuasan pelanggan marketplace menggunakan metode Kano dan SERVQUAL," *Jurnal Teknologi Informasi dan Ilmu Komputer*, vol. 10, no. 2, pp. 255–264, 2023, doi: 10.25126/jtiik.2023102584.

[26] P. J. Lin, C. H. Tsai, and Y. S. Chang, "Applying the Kano model to explore customer satisfaction in e-commerce service attributes," *Journal of Retailing and Consumer Services*, vol. 68, 2022, doi: 10.1016/j.jretconser.2022.103070.

[27] G. Balbin-Romero, E. Carrera-Mija, A. Serrato-Cherres, and F. Cordova-Buiza, "Relationship between e-banking service quality based on the e-SERVQUAL model and customer satisfaction: A study in a Peruvian bank," *Banks and Bank Systems*, vol. 17, no. 4, 2022, doi: 10.21511/bbs.17(4).2022.15.

[28] W. Dong, R. Qi, D. Wang, W. Zhang, and X. Liu, "Service quality assessment and optimization of high-speed railway waiting halls using a Kano model and multidimensional questionnaire analysis," *Buildings*, vol. 15, no. 8, 2025, doi: 10.3390/buildings15081212.

[29] H. Li, H. Gu, W. Chen, and Q. Zhu, "Improving massive open online course quality in higher education by addressing student needs using quality function deployment," *Sustainability*, vol. 15, no. 22, 2023, doi: 10.3390/su152215678.

[30] G. Mekuria, "Assessment of service quality using synergies of fuzzy SERVQUAL, fuzzy Kano's model, and fuzzy analytic network process into QFD," *Journal of Innovations in Business and Industry*, 2023, doi: 10.61552/jibi.2023.04.002.

[31] B. Suryawardani, D. Gusnadi, A. Wulandari, and D. Marcelino, "Integration Kano model and E-SERVQUAL to evaluate online travel agent services in Bandung 2022," *Jurnal Kawistara*, 2022, doi: 10.22146/kawistara.73937.

[32] L. Ding, Y. Ding, Y. Wang, X. Li, and Y. Liu, "Analyzing maternal needs for 'Internet+ Nursing Service' after hospital discharge: A SERVQUAL-KANO model approach," *J. Multidiscip. Healthc.*, vol. 18, pp. 721–734, 2025, doi: 10.2147/JMDH.S505926.

[33] Y. Chen, C. Ho, and S. Kuo, "Service quality of and user satisfaction with non-state-owned academic libraries in China: Integrating the fuzzy Delphi method with the Kano approach," *Sustainability*, vol. 14, no. 14, 2022, doi: 10.3390/su14148506.

[34] H. Shan, X. Fan, S. Long, X. Yang, and S. Yang, "An optimization design method of express delivery service based on quantitative Kano model and fuzzy QFD model," *Discrete Dyn. Nat. Soc.*, 2022, doi: 10.1155/2022/5945908.

[35] D. Andriani, "Service quality improvement strategy in the auto insurance industry: Customer perspective study," *International Journal of Integrated Engineering*, vol. 15, no. 1, 2023, doi: 10.30880/ijie.2023.15.01.006.