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Research Article

Integration of Servqual, Kano Model, Kansei Engineering, and TRIZ for Service Quality Improvement in Courier Logistics

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ABSTRACT

The rapid expansion of e-commerce has intensified competition in the logistics sector, compelling companies to enhance service quality to retain customer loyalty. Despite various efforts, many logistics service providers, including PT. Pos Indonesia KPC Sidoarjo, continue to face persistent service quality issues such as delayed deliveries and unresolved complaints. While previous studies have focused on either functional or emotional service attributes separately, there remains a lack of integrative approaches that translate these attributes into actionable innovations. This study aims to fill that gap by integrating SERVQUAL, the Kano Model, and Kansei Engineering to identify priority service attributes based on satisfaction gaps, customer importance, and emotional resonance. The Theory of Inventive Problem Solving (TRIZ) is then employed to systematically generate innovative and contradiction-resolving improvement proposals. The analysis identifies six critical service attributes covering 80% of cumulative importance that require immediate attention: responsiveness in providing delivery updates, prompt complaint handling, parking availability, on-time delivery, compensation for damaged goods, and staff courtesy. Recommended improvements include activating online service platforms, enhancing the tracking system, and implementing automated responses and online claims. This study contributes a novel, comprehensive framework for improving service quality by bridging diagnostic analysis with creative problem-solving, strengthening the strategic capabilities of courier service providers.

1. INTRODUCTION

The consumption behavior of society through e-commerce has been rapidly increasing (Orinaldi, 2020). This trend has driven a surge in demand for delivery services, which play a critical role in supporting the success of e-commerce activities (Asari et al., 2023). Delivery services act as a bridge, connecting the processes of pickup and final delivery to consumers (Japarianto, 2018). Along with this growth, numerous new delivery service providers have emerged, creating intense competition in the industry. As a result, delivery service companies must continuously innovate to maintain their presence while attracting more customers (Garside, 2023; Winarti & Primadiana, 2016). In this context, improving service quality has become a key strategy for gaining a competitive advantage, with customer satisfaction serving as a critical indicator of success (Wardhani, Sugianto, & Hermana, 2020). However, persistent service-related complaints such as delays, damaged goods, or poor responsiveness continue to undermine customer trust, especially in state-owned courier services (Aula, Ula, & Rosnita, 2023). Therefore, addressing service quality gaps through innovative and customer-centered approaches is urgently required.

To address these quality challenges, researchers have developed various measurement and improvement approaches that capture both functional and emotional aspects of service. Research on service quality has been widely conducted, employing various approaches to understand customer needs and propose improvements. The Servqual model is a commonly used method for measuring the gap between customer expectations and perceptions of service quality (Ekasari et al., 2017). Meanwhile, the Kano model identifies service attributes

based on the level of satisfaction they provide and their importance to customers (Kasmawati & Sofiyanurriyanti, 2023). Kansei Engineering adds an emotional dimension by examining how customers' perceptions of a service are influenced by their emotional responses (Sudaryo & Hadiana, 2019). Furthermore, Theory of Inventive Problem Solving (TRIZ) offers a systematic framework for generating innovative solutions to resolve contradictions in service attributes (Purnamawati & Suryadi, 2020). Recent studies have shown that integrating these methods provides a comprehensive framework SERVQUAL and Kano identify functional service gaps, Kansei captures emotional expectations, and TRIZ translates both into creative (M. Hartono, Santoso, Prayogo, & Ivon, 2017). Thus, the integration addresses service problems holistically, from diagnosis to innovation.

Numerous studies have integrated various methods to enhance service quality and better understand customer needs. One frequently utilized integration involves Servqual, the Kano model, and Kansei Engineering. For instance, Simanjuntak, Khasanah, and Ada (2021) employed this combination to evaluate service quality in cafés, while Jutriano and Abidin (2023) applied it to the distribution of medical devices. Additionally, the integration of Servqual, the Kano model, and Quality Function Deployment (QFD) has proven effective in various contexts. Markus Hartono (2017) leveraged this combination for logistics services, S. K. Dewi, Lestari, and Nugraha (2023) applied it to delivery and logistics companies, Aji and Lukmandono (2021) used it to improve service quality in a university faculty, and Ardilla and Hartono (2023) implemented it in the tobacco industry. However, most of these integrations focus only on identifying service gaps without proposing structured innovation solutions. The inclusion of TRIZ as an inventive problem-solving tool complements the diagnostic strengths of SERVQUAL, Kano, and Kansei, offering a comprehensive end-to-end framework for quality improvement (Markus Hartono, 2017).

The Servqual model has also been widely combined with other methods, such as the Kano model and Kansei Engineering. Pramana and Suparto (2024) integrated Servqual with the Kano model to assess service quality in a courier service company, while Kusumaningtyas and Sediyono (2017) combined Servqual with Kansei Engineering to enhance services at the Badan Pertahanan Nasional. Additionally, Lee, Zhao, and Lee (2019) utilized a combination of Servqual and TRIZ for retail businesses, whereas Neyland, Mende, and Rembet (2022) applied this approach to automotive repair workshops. However, most of these studies integrated only two or three methods and did not establish a comprehensive framework that addresses both functional and emotional service attributes, nor did they explore inventive problem-solving in depth. Integrating SERVQUAL, Kano, Kansei, and TRIZ offers a synergistic approach that not only diagnoses service quality gaps but also enables emotionally-attuned and innovation-driven solutions (Markus Hartono, Setijadi, & Norwandi, 2019).

Several studies have also employed a combination of the Kano model and Kansei Engineering, such as Prabowo (2019), who applied this integration to a courier service company. Meanwhile, TRIZ and Logistics Service Quality (LSQ) were combined by Qisthani, Yamani, Nurisusilawati, and Nugroho (2022) to improve services in the delivery and logistics sector. Kansei Engineering and Quality Function Deployment (QFD) were also implemented by Yulian and Taufik (2021) in a company specializing in industrial gas turbine repair and motor and generator overhauls. Although these studies contribute valuable insights, they remain limited in scope and lack a unified framework that connects diagnostic, emotional, and inventive perspectives. Therefore, a full integration of SERVQUAL, Kano, Kansei Engineering, and TRIZ is needed to generate comprehensive, emotionally resonant, and innovation-driven service improvements.

M. Hartono et al. (2017) integrated Kansei Engineering, the Kano model, and QFD to improve service quality in third-party logistics. Additionally, a combination of the Kano model, QFD for Environment (QFDE), and TRIZ was utilized by (Tandiono & Rau, 2023) for sustainable product design. Broader studies were conducted by Markus Hartono (2020), which combined the Kano model, Kansei Engineering, and TRIZ to identify critical service attributes in the service industry, IT-based logistics services, and courier services. This integration was also applied by (R. S. Dewi & Ferlania, 2021) to online learning systems implemented by university departments. Despite these advancements, no prior studies have fully integrated all four methods SERVQUAL, Kano, Kansei Engineering, and TRIZ within a unified framework to address service quality problems in courier logistics. This gap is particularly evident in state-owned logistics services in Indonesia, which face persistent service quality issues and demand structured, emotionally resonant, and innovative solutions (Suzana, Irwansyah, Suparni, & Darmawan, 2024).

PT Pos Indonesia (Persero) is one of the largest logistics companies in Indonesia facing similar challenges. PT Pos Indonesia KPC Sidoarjo, as one of the largest post office networks in Sidoarjo Regency, has made efforts to improve its services by expanding its transportation fleet. However, customer complaints regarding delays, incorrect addresses,

damaged goods, and lost items remain frequent. These issues highlight a service quality gap that requires comprehensive solutions. While previous studies have addressed service quality improvements in logistics, most have focused on one or two dimensions, such as functional or emotional attributes. Research that integrates these dimensions with innovative methods like TRIZ to produce comprehensive solutions remains scarce, particularly in Indonesia. Moreover, the specific context of PT Pos Indonesia as a national logistics company has not been extensively explored in the literature, offering opportunities for novel contributions in this study. Therefore, there is an urgent need for a unified approach that combines diagnostic (SERVQUAL, Kano), emotional (Kansei), and inventive (TRIZ) perspectives to formulate holistic and practical improvements in service quality, tailored to the complex operational realities of PT Pos Indonesia.

This study aims to integrate the Servqual method, the Kano model, Kansei Engineering, and TRIZ to improve priority service attributes in the courier services of PT Pos Indonesia KPC Sidoarjo. The Servqual method and the Kano model will be employed to identify attributes with the largest negative gaps and their impact on customer satisfaction (S. K. Dewi, 2019). Kansei Engineering will be utilized to explore customers' emotional responses to service attributes (Wiryawan, 2015). The integration of these three methods will result in a prioritized list of attributes requiring improvement (Mansur, Farah, & Cahyo, 2019). Subsequently, TRIZ will be applied to generate innovative solutions that minimize contradictions in service enhancement. This integrative approach enables a seamless transition from diagnosis (gap analysis and prioritization) to emotionally-informed and innovation-driven improvements. The contribution of the research is twofold: it develops an integrative approach that bridges theoretical gaps and provides practical solutions to improve the competitiveness of PT Pos Indonesia in the logistics sector. Given the persistent challenges in logistics service quality, particularly within state-owned enterprises in Indonesia, this research offers both contextual relevance and methodological advancement.

2. METHOD

To clarify the sequence and integration of the methods used in this study, a research flowchart is presented in Figure 1. This flowchart illustrates the step-by-step process starting from the identification of service attributes to the formulation of innovative solutions using TRIZ. The integration of SERVQUAL, the Kano Model, Kansei Engineering, and TRIZ is clearly depicted to highlight how each method contributes to the prioritization and improvement of service quality.

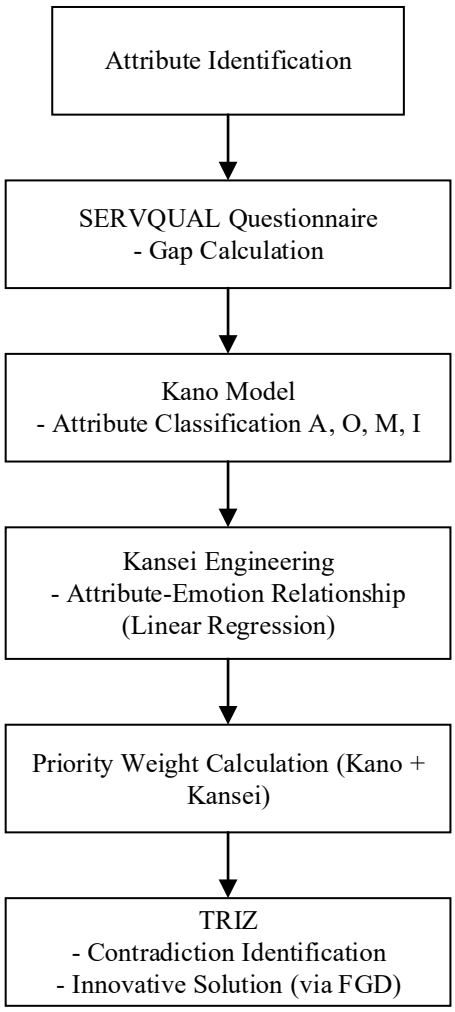

Fig. 1. Flowchart of Integrated SERVQUAL, Kano Model, Kansei Engineering, and TRIZ Approach

2.1 Stages of Servqual and Kano Model

2.1.1 Identification of Service Attributes Based on Servqual Dimensions

The identification of service attributes was conducted through interviews with employees in service management and process management, who are directly involved in service delivery and package shipment processes. The identified attributes were then categorized into the five SERVQUAL dimensions: empathy, reliability, tangibility, responsiveness, and assurance. These attributes were subsequently included in a questionnaire designed to capture customers' expectation, perception, and importance ratings for each service attribute. The complete list of attributes classified under each SERVQUAL dimension is presented in Table 1.

2.1.2 Development of the Initial Questionnaire

The initial questionnaire consisted of three sections of closed-ended questions. The first section measured customer expectations and perceptions, which were later used to calculate gap values for each attribute. The second

section recorded the perceived importance level of each attribute, forming the basis for satisfaction calculations. The third section collected responses to functional and dysfunctional scenarios for each attribute, which were then used to classify the attributes using the Kano model's if–then categorization logic. This structure allowed the study to capture both quantitative service gaps and the psychological impact of service quality attributes.

2.1.3 Distribution of the Initial Questionnaire

The initial questionnaire was distributed to 30 purposively selected respondents who had used courier services from PT. Pos Indonesia KPC Sidoarjo at least once. The minimum sample size of 30 was chosen based on the statistical standard that the t-distribution begins to approximate normality and stabilize at n ≥ 30. The distribution was conducted online via Google Forms, and responses were monitored to ensure completeness. No incentives were provided, and incomplete responses were excluded from analysis to minimize non-response bias. The results from this stage served as a basis for validating the instrument prior to wider deployment.

2.1.4 Validity and Reliability Testing

Validity and reliability testing were performed using SPSS software. An item was considered valid if the Pearson correlation coefficient (r_{hitung}) exceeded the critical value (r_{tabel}= 0.361 at n = 30, α = 0.05). All items met this criterion. Reliability was assessed using Cronbach's Alpha, with a threshold of α > 0.6. The questionnaire achieved an overall reliability coefficient of α = 0.83, indicating high internal consistency and suitability for further data collection.

2.1.5 Final Questionnaire Distribution

The final questionnaire was distributed after the initial instrument was confirmed to be valid and reliable. Using purposive sampling, 100 respondents who had previously used PT. Pos Indonesia KPC Sidoarjo's courier services were selected. The sample size of 100 was determined based on the 10:1 subject-to-variable ratio commonly used in quantitative research, ensuring statistical stability for further analysis. The questionnaire was distributed online using Google Forms, and respondents were reminded via email follow-ups to reduce non-response bias. Incomplete submissions were excluded from the dataset to maintain data quality for subsequent processing.

Table 1. Service Attributes Based on Servqual Dimensions

No.	Code	Service Attribute
Tangible		
1	X1	Service room is clean, comfortable, and meets health protocol standards
2	X2	Service staff wears neat clothing and complete attributes
3	X3	Complete office supporting equipment (computers, scales, stationery, etc.)
4	X4	Complete room facilities (availability of restrooms, seating, etc.)
5	X5	Adequate parking area
Realibility		
6	X6	Timely pick-up of goods
7	X7	Timely delivery of goods
8	X8	Fast and easy administrative service
9	X9	Delivery of goods according to the destination address written
10	X10	Shipping cost calculation based on distance and good dimensions
11	X11	Product description matches the customer's specifications
12	X12	Tracking status on the website is accurate according to the actual delivery status
Responsiveness		
13	X13	Staff respond quickly to serve customers
14	X14	Staff are responsive in handling customer complaints
15	X15	Staff quickly provide the latest delivery information to customers
Assurance		
16	X16	Goods received are in the same condition as when they were sent
17	X17	Compensation provided if goods are damaged during delivery
Emphaty		
18	X18	Staff are polite in serving customers
19	X19	Staff are friendly when serving customers

2.1.6 Calculation of Gap Value and Satisfaction Value

Perception and expectation data obtained from the final questionnaire were used to calculate the gap value for each service attribute. This study focuses only on attributes with negative gap values, as they indicate areas needing service improvement at PT. Pos Indonesia KPC Sidoarjo. The gap was calculated by subtracting the expectation score from the perception score. Subsequently, satisfaction values were determined by multiplying the importance rating with the corresponding gap value. These results served as inputs

for prioritizing service improvements in the subsequent analysis stages.

2.1.7 Classification of Attributes Using Kano Model

Service attributes with negative gap values were further analyzed using the Kano Model to identify how each attribute affects customer satisfaction. Classification was based on customer responses to functional and dysfunctional questions and applied using if–then logic derived from Blauth's evaluation scheme. Each attribute was categorized into one of six Kano categories Attractive (A), One-dimensional (O), Must-be (M), Indifferent (I), Reverse (R), or Questionable (Q) as summarized in Table 2. This classification provided strategic direction for prioritizing service improvements.

Table 2. Kano Evaluation

Customer Need		Dysfunctional				
		Like	**Must**	**Neutral**	**Tolerable**	**Dislike**
Functional	**Like**	Q	A	A	A	O
	Must	R	I	I	I	M
	Neutral	R	I	I	I	M
	Tolerable	R	I	I	I	M
	Dislike	R	R	R	R	Q

Where:

Q = Questionable A = Attractive
I = Indifferent R = Reverse
M = Must-be O = One-dimensional

2.2 Kansei Engineering Stages

Kansei Engineering was applied to capture users' emotional expectations toward courier services. An open-ended questionnaire was distributed to 30 purposively selected customers to elicit initial Kansei words. After filtering for clarity and redundancy, the refined words were rated for importance on a five-point Likert scale in a structured questionnaire distributed to 100 respondents, consistent with the purposive sampling criteria.

Validity ($r > 0.361$) and reliability (Cronbach's $\alpha = 0.84$) tests confirmed the instrument's quality. The average score for each Kansei word was calculated and used as an emotional weight in the integrated analysis, ensuring that service improvements addressed both functional performance and emotional resonance.

2.3 Integration of Selected Service Attributes with Kansei Engineering

Service attributes with negative satisfaction scores and categorized as Attractive or One-dimensional in the Kano model were integrated with Kansei words through stepwise linear regression. An affinity diagram was used to align each service attribute (independent variable) with relevant Kansei words (dependent variables).

The regression was conducted using SPSS with a significance threshold of $p < 0.05$. The resulting coefficients quantified each attribute's emotional influence, enabling prioritization of improvements that balance service quality gaps with emotional impact.

2.4 Calculation of Importance Weight of Significant Kansei Words

To prioritize service attributes for improvement, the importance weight of each significant Kansei word was calculated by combining its emotional influence score (from regression) with its Kano classification weight. Kano categories were assigned weights, with Attractive (A) valued at 4 and One-dimensional (O) at 1. Total scores were then ranked, and attributes contributing to the top 80% cumulative weight (Pareto principle) were selected for enhancement.

2.5 Determination of Improvement Proposals Using the TRIZ Method

The selected priority attributes were analyzed using the TRIZ method to develop innovative improvement proposals. Each attribute was mapped to standard engineering contradictions using the 39 TRIZ parameters. Relevant inventive principles were then identified from the 40 TRIZ principles. Proposed solutions were refined through focus group discussions (FGD) involving PT. Pos Indonesia KPC Sidoarjo staff, ensuring feasibility and alignment with operational realities.

3. RESULT AND DISCUSSION

The demographic characteristics of the respondents include gender, age, and number of visits (Table 3). The majority of respondents were male (63%), while female respondents accounted for 37%, suggesting a higher tendency among men to use the courier service. In terms of

age, most respondents were in the 25–30 age group (37%), followed by 31–35 years (28%), 18–24 years (25%), and above 36 years (10%). Overall, respondents predominantly fell within the productive age range of 25–35 years. Regarding service usage frequency, 57% had used the service more than five times, 32% had used it 2–4 times, and 11% had used it only once. More frequent users are likely to have a deeper perception of service quality. These demographic details ensure the validity of perceptions captured in subsequent analysis, as frequent and experienced users are more likely to provide informed assessments of service quality.

Tabel 3. Demographic Characteristics of Respondents

Variable	Item	Respondents	Percentage
Gender	Wanita	37	37%
	Pria	63	63%
Age	18-24	25	25%
	25-30	37	37%
	31-35	28	28%
	>36	10	9%
Number of Visits	1 kali	11	11%
	2-4 kali	32	32%
	>5 kali	57	57%

3.1 Results of Identifying Kansei Words

Based on the results of the open-ended initial questionnaire regarding customer emotional expectations towards the services at PT. Pos Indonesia KPC Sidoarjo, it was found that 11 Kansei words were selected. The mean Kansei scores were obtained from the results of the final questionnaire concerning the importance level of the selected Kansei words, as shown in Table 4. The determination of Kansei word weights, based on the FGD, was derived from the AHP assessment and weight calculations using Expert Choice software. The AHP evaluation results and weight calculations using Expert Choice software are shown in Fig. 2. The detailed results are summarized in Table 4. These results are visually shown in Figure 2.

Fig. 2. Results of Kansei Weight Calculation using Expert Choice Software

In Table 4, it can be seen that the highest score was for the Kansei word "fast" with a value of 4.33. This means that the word "fast" is considered important and highly expected to be delivered in accordance with or exceeding customer expectations. On the other hand, the lowest score was for the Kansei word "polite" with a value of 3.19.

3.2 Calculation of Service Attribute Gap Value

The gap value for each service attribute was calculated by subtracting the expectation score from the perception score. This value serves as an indicator of customer satisfaction: a positive gap indicates that the service meets or exceeds expectations, while a negative gap indicates dissatisfaction.

As shown in Table 5, there are 18 service attributes with negative gap values and one attribute with a positive gap. The only positive gap was found in the attribute "calculation of shipping costs based on travel distance and item dimensions" (X10), with a value of 0.17. The most critical negative gap was in "staff responsiveness in providing the latest shipment information to customers" (X15), with a value of -1.88. The smallest negative gap occurred in "product description matching the customer's specifications" (X11), at -0.06. Only service attributes with negative gaps were selected for further analysis.

Table 4. Results of Questionnaire Distribution on the Importance Level of Kansei Words

No.	Code	Kansei *Words*	Mean	Weight
1	Y1	Fast	3.19	0.197
2	Y2	Safe	4.19	0.079
3	Y3	Affordable	4.11	0.116
4	Y4	Responsible	3.95	0.065
5	Y5	Responsive	3.92	0.035
6	Y6	Punctual	4.11	0.190
7	Y7	Polite	4.33	0.038
8	Y8	Trustworthy	4,11	0.135
9	Y9	Innovative	3.93	0.047
10	Y10	Helpful	4.08	0.030
11	Y11	Accurate	4.13	0.067

Table 5. Results of Service Attribute Gap Calculation

No.	Code	Service Attribute	Gap Value
Tangible			
1	X1	Service room is clean, comfortable, and meets health protocol standards	-0.17
2	X2	Service staff wears neat clothing and complete attributes	-0.26
3	X3	Complete office supporting equipment (computers, scales, stationery, etc.)	-0.33
4	X4	Complete room facilities (availability of restrooms, seating, etc.)	-0.5
5	X5	Adequate parking area	-0.55
Reliability			
6	X6	Timely pick-up of goods	-0.79
7	X7	Timely delivery of goods	-0.93
8	X8	Fast and easy administrative service	-0.12
9	X9	Delivery of goods according to the destination address written	-0.81
10	X10	Shipping cost calculation based on distance and good dimensions	0.17
11	X11	Product description matches the customer's specifications	-0.06
12	X12	Tracking status on the website is accurate according to the actual delivery status	-0.18
Responsiveness			
13	X13	Staff respond quickly to serve customers	-0.07
14	X14	Staff are responsive in handling customer complaints	-1.67
15	X15	Staff quickly provide the latest delivery information to customers	-1.88
Assurance			
16	X16	Goods received are in the same condition as when they were sent	-0.29
17	X17	Compensation provided if goods are damaged during delivery	-0.43
Emphaty			
18	X18	Staff are polite in serving customers	-0.27
19	X19	Staff are friendly when serving customers	-0.3

Table 6. Affinity Diagram For Grouping Service Attributes Based on Kansei Words Type

Kansei *Words*	Influential Service Attributes
Fast	X6, X7, X8, X13
Safe	X9, X12, X16, X17
Affordable	-
Responsible	X9, X14, X15, X16, X17
Responsive	X13, X15
Punctual	X6, X7
Polite	X18
Trustworthy	X9, X12, X14, X16, X17
Innovative	X7, X12
Helpful	X13, X14, X18
Accurate	X6, X7, X8, X9, X11, X12

In the next stage, the satisfaction scores of the selected service attributes were calculated and subsequently categorized using the Kano model. Functional and dysfunctional questionnaire responses were processed using the Kano evaluation table. Service attributes (independent variables) were then logically paired with Kansei words (dependent variables) through an affinity

diagram, as shown in Table 6, ensuring alignment between functional and emotional priorities.

Stepwise linear regression was conducted to determine the influence of Kansei words on each service attribute. Table 7 summarizes the satisfaction scores, Kano categorizations, and significant Kansei words. The largest negative satisfaction score was found in the attribute "staff responsiveness in providing the latest delivery information to customers" (X15), with a score of -7.689. This attribute falls under Kano category A but has no significant Kansei word. Conversely, the attribute "product description matching the customer's specifications" (X11) had the smallest negative score of -0.241, also in category A, and was associated with one significant Kansei word. This combined analysis offers a comprehensive view of customer dissatisfaction, functional classifications, and emotional drivers.

Table 7. Recapitulation of Satisfaction Score Calculations, Kano Categorization, and Identification Of Significant Kansei Words

No.	Code	Service Attribute	Satisfaction Value	Kano Category	Significant Kansei Words
1	X1	Service room is clean, comfortable, and meets health protocol standards	-0,721	O	-
2	X2	Service staff wears neat clothing and complete attributes	-1,076	A	-
3	X5	Adequate parking area	-2,255	A	-
4	X6	Timely pick-up of goods	-3,294	O	- Punctual - Accurate
5	X7	Timely delivery of goods	-3,841	O	- Fast - Affordable - Punctual - Innovative - Accurate
6	X8	Fast and easy administrative service	-0,503	A	- Fast
7	X9	Delivery of goods according to the destination address written	-3,402	A	- Accurate
8	X11	Product description matches the customer's specifications	-0,241	A	- Accurate
9	X12	Tracking status on the website is accurate according to the actual delivery status	-0,709	A	- Safe
10	X13	Staff respond quickly to serve customers	-0,279	O	- Fast - Responsive - Innovative
11	X14	Staff are responsive in handling customer complaints	-7,131	A	- Trustworthy - Helpful
12	X15	Staff quickly provide the latest delivery information to customers	-7,689	A	-
13	X16	Goods received are in the same condition as when they were sent	-1,154	A	- Safe
14	X17	Compensation provided if goods are damaged during delivery	-1,806	A	- Responsible - Trustworthy
15	X18	Staff are polite in serving customers	-1,077	A	- Polite - Helpful
16	X19	Staff are friendly when serving customers	-1,182	A	-

3.4 Determining Priority Service Attributes

At this stage, the importance weights of service attributes were calculated by integrating emotional significance (derived from Kansei analysis) and categorical weight from the Kano model, where attributes in the Attractive category were assigned a weight of 4, and those in the One-dimensional category a weight of 1. Based on the Pareto principle, service attributes with cumulative

importance weights within the top 80% were selected as improvement priorities.

The results of this prioritization are presented in Table 8. Among the selected attributes, the highest weight was recorded for "staff's quickness in providing the latest delivery information to customers" (X15), with a contribution of 30.756%. These priority attributes are identified as critical areas for improvement because, despite their strong influence on customer satisfaction and emotional response, they still fall short of meeting customer expectations.

Table 8. The Result of The Calculation for The Importance Weight of Service Attribute

No	Code	Service Attribute	Importance Weight	Percentage of Importance Weight (%)	Cumulative Percentage (%)	Decision
1	X15	Staff quickly provide the latest delivery information to customers	30.756	33.01	33.01	Priority
2	X14	Staff is responsive in handling customer complaints	19.318	20.73	53.75	Priority
3	X5	Adequate parking area	9.020	9.68	63.43	Priority
4	X7	Timely delivery of goods	6.476	6.95	70.38	Priority
5	X17	Compensation provided if goods are damaged during delivery	5.863	6.29	76.67	Priority
6	X19	Staff are friendly when serving customers	4.728	5.07	81.75	Priority
7	X2	Service staff wears neat clothing and complete attributes	4.304	4.62	86.37	Not Priority
8	X9	Delivery of goods according to the destination address written	3.765	4.04	90.41	Not Priority
9	X6	Timely pick-up of goods	3.484	3.74	94.15	Not Priority
10	X16	Goods received are in the same condition as when they were sent	1.528	1.64	95.79	Not Priority
11	X8	Fast and easy administrative service	1.264	1.36	97.14	Not Priority
12	X18	Staff is polite when serving customers	1.236	1.33	98.47	Not Priority
13	X1	Service room is clean, comfortable, and meets health protocol standards	0.721	0.77	99.24	Not Priority
14	X11	Product description matches the customer's specification	0.267	0.29	99.53	Not Priority
15	X12	Tracking status on the website is accurate according to the actual delivery status	0.224	0.24	99.77	Not Priority
16	X13	Staff respond quickly to serve customers	0.214	0.23	100	Not Priority

3.5 Improvement Proposal Using the TRIZ Method

In this stage, the prioritized service attributes were analyzed to identify the core problems. Potential contradictions were mapped using the 39 TRIZ contradiction parameters, and corresponding solutions were formulated based on the 40 inventive principles. These proposed solutions were then assessed for feasibility and alignment with the operational context of PT. Pos Indonesia KPC Sidoarjo.

As shown in Table 9, a total of 11 improvement proposals were developed for six priority service attributes. These proposals were refined through consideration of practical constraints and company-specific conditions to ensure their applicability.

Table 9. Proposed Improvements Using TRIZ Method

Service Attribute	Contradiction	Principle Description and Proposed Improvements
Staff quickly provide the latest delivery information to customers (X15)	*Speed vs. Adaptability*	• *Preliminary action:* Perform an action before it is necessary or modify a system (partially or entirely). • *Proposed Improvements:* (1) At each distribution center (DC), conduct checks on the condition of incoming goods. If any item is damaged, misdirected, or lost, customer service can immediately inform the customer and take corrective action. This will enhance customer satisfaction and reduce complaint rates.
	Speed vs. Subtance Loss	• *Mechanics subtitution:* Use technology to interact with the system. • *Proposed Improvements:* (2) Reactivate online facilities, such as WhatsApp and email, to speed up and simplify customer service in providing the latest delivery information to customers.
Staff is responsive in handling customer complaints (X14)	*Speed vs. Subtance Loss*	• *Mechanics subtitution*: Use technology to interact with the system. • *Proposed Improvements*: (3) Reactivate online complaint channels, such as widely used social media (Instagram, WhatsApp, Twitter, and email) (4) Optimize the goods tracking system so that the condition of the items can be monitored from anywhere, at any time.
	Level of Automation vs. Adaptability	• *Segmentation:* Increase segmentation to gain efficiency in time and effort. • *Proposed Improvements*: (5) Create an automatic answering system for customer service phone and WhatsApp calls to shorten the time spent handling complaints.
Adequate parking area (X5)	*User Friendliness vs. Subtance Loss*	• *Intermediary:* Use an intermediary object or process • *Proposed Improvements*: (6) Provide an intermediary service (drive-thru) to reduce the number of cars parking due to limited parking space. This service can also speed up the process of item input using adequate facilities (computers, barcode scanners, etc.)
Timely delivery of goods (X7)	*Reliability vs. Subtance Loss*	• *Preliminary action:* Organize the system in advance so it can be easily accessed from anywhere without wasting time. • *Proposed Improvements:* (7) Add identification (colored tape or stickers) to separate packages by their destination areas. This can reduce human error during sorting at the origin DC and transit DC.
Compensation provided if goods are damaged during delivery (X17)	*User Friendliness vs. Level of Automation*	• *Segmentation:* Increase segmentation to gain efficiency in time and effort. • *Proposed Improvements:* (8) Organize the system in advance so it can be easily accessed from anywhere without wasting time
	Speed vs. Level of Automation	• *Preliminary action:* Organize the system in advance so it can be easily accessed from anywhere without wasting time. • *Proposed Improvements:*

		(9) Create an online claim form for compensation through the website, WhatsApp, and email to simplify and speed up the claim process. (10) Implement a claim process tracking system that customers can access directly, allowing them to know the estimated time for receiving compensation.
Staff are friendly when serving customers (X19)	*Reliability vs.* Adaptability	• *Preliminary action:* Change the degree of flexibility. *Proposed Imporvements*: (11) Serve or communicate with customers by adjusting to their characteristics (flexibly), while maintaining politeness, so customers feel comfortable when interacting with the staff.

4. CONCLUSION

This study successfully identified six priority service attributes contributing to 80% of the cumulative importance, leading to the formulation of eleven improvement proposals tailored to the company's context. The integration of SERVQUAL, Kano, Kansei Engineering, and TRIZ played a critical role in this process SERVQUAL and Kano facilitated the diagnosis of service gaps and customer satisfaction drivers, Kansei Engineering enriched the analysis with emotional customer responses, while TRIZ enabled structured, innovative problem-solving. This holistic approach ensures that the proposed improvements are not only data-driven but also emotionally resonant and feasible. While this study focused on courier services, future research may extend the framework to other logistics areas such as warehousing, distribution, and international trade operations.

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