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Increasing Customer Satisfaction with Quality Function Deployment Methodology Based on Service Quality Analysis

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ABSTRACT

One way to be superior to competing companies in the service field, especially customer satisfaction, is by analyzing service quality. Satisfied customers can increase their loyalty and have more trust in a company, so they can continue using its services. PT. XYZ is a company that offers logistics accommodation services; this research took the period from January 2023 to February 2024. It is known that the number of fluctuating customers tends to decrease. Apart from that, there were also several complaints submitted by customers, including products arriving late, inability to fulfill customer requests, delays in the delivery process, and top payments not being evenly distributed. This research used the Servqual and Quality Function Deployment (QFD) methodology. The Servqual method was carried out by distributing questionnaires to 95 respondents to identify the biggest gaps based on the dimensions of tangibles, reliability, assurance, empathy, and responsiveness, which was then carried out with a QFD analysis to determine the priority of corrective action. based on technical response. The research results show that the reliability dimension has the largest gap value, 0.21. A QFD analysis is carried out objectively to determine quality improvement based on technical responses obtained from customers' voices. In the QFD analysis, it is known that the priority corrective actions that must be taken are carrying out correct transaction recording, faster employee processes, increasing employee skills, increasing security, optimizing the system, and increasing availability.

Keywords: *Customer Expectations, Customers Satisfaction, House of Risk, Service Quality, Quality Function Deployment*

Introduction

Service quality is an important requirement in all industries. In the world of business competition, every service provider must provide maximum service quality in order to meet client needs effectively. This is important so that business entities can become winners in facing competition with other similar business entities [1]. Today, it is widely believed that the main determinant of success in corporate competition lies in providing superior services that can result in client satisfaction [2]. Customer service is considered satisfactory when consumers achieve profitable results in fulfilling their wishes or desires. Content consumers are expected to show loyalty to the company and advocate the product or service to others [3].

Customer happiness is crucial in determining a company's success in the service industry. Customers will feel satisfaction when the results achieved or perceived match or exceed their expectations [4]. Satisfied customers will improve good relations between consumers and the company, foster loyalty, and shape the company's reputation through positive promotion [5]. To ensure customer satisfaction, service organisations must prioritise the quality of their services. The main prerequisite for achieving success in the service sector is a strong emphasis on providing quality, customer-oriented services [6].

Client satisfaction is important for service companies because it reflects their capacity to meet client expectations [7]. Likewise, PT. XYZ is a company that offers logistics accommodation services. This company has never conducted a customer satisfaction evaluation. According to company data, the number of clients varies and generally decreases monthly. Table 1 displays the quantity of PT patrons in XYZ from January 2023 to February 2024.

Table 1. Number of Customers for the Period January 2023 – February 2024

Year	Period	Customers Quantity
2023	Jan	1190
	Feb	1341
	Mar	1040
	Apr	998
	Mei	1492
	Jun	1021
	July	1164
	August	1117
	Sept	1278
	Oct	1031
	Nov	1090
	Dec	926
2024	January	942
	February	959
Total		**15589**

According to the information that is provided in table 1, the total number of customers who were served over the time period of January 2023 to February 2024 was 15,589 customers. A total of 1,492 customers reached their highest point in May 2023, when the number of consumers reached its highest point. The number of customers reached its lowest point in December 2023, when there were only 926 users. This is the monthly customer graph, which is shown in Figure 1.

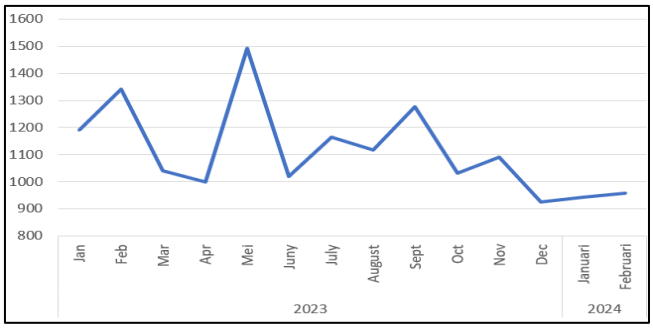


Figure 1. Customer Graph PT. XYZ

Based on Figure 1, it can be seen that there is a pattern of fluctuation and a tendency to decrease the number of clients in this period. Based on company interview findings, it is known that customers submit many complaints. Table 2 provides a complete list of these customer concerns.

Table 2. Customer complains

No	Customer complain
1.	Goods or products arrive late
2.	Ready-stock products cannot meet customer needs
3.	*Delay in the delivery process*
4.	Top payments cannot be distributed evenly to customers

Based on Table 2, there are several problems that may be of concern to the company. As a result, PT. XYZ must assess the level of client satisfaction. Long (2020) identified five dimensions of service quality: reliability, tangibles, responsiveness, assurance, and empathy [8]. In order to enhance the evaluation process for measuring service quality, it is crucial to enhance the indicators utilised in the evaluation. These indicators need to be synchronised with the five characteristics of quality. Therefore, the evaluation findings can accurately detect any deficiencies or contradictions in any aspect of service quality. Consequently, this enables certain enhancements to be implemented [9].

Servqual is a methodology employed to evaluate the quality of services. Servqual refers to the disparity between the tangible service delivered and the customer's anticipated level of service [10]. The advantage of utilising this method is its ability to encompass the subjective nature of gathering data through questionnaires and highlight aspects that must be considered for ongoing enhancement based on the potential significance of customer happiness. By following this approach, the corporation can ascertain which facilities are deemed significant and impact client satisfaction with its services [11].

Based on previous research conducted by [12], [13], [14], [15], [16] The Servqual method has been proven to be used to identify gaps between customer satisfaction and expectations.

To mitigate the influence of the business owner's subjective opinion, the most effective approach is to use the Quality Function Deployment (QFD) method to determine necessary improvements. Quality Function Deployment (QFD) is a systematic approach used in the product planning and development process. The goal is to precisely identify and define customer needs and preferences and effectively communicate how a product or service can meet those requirements and preferences. The servqual dimensions are used as a means to prioritise customer requests in a customer needs matrix based on the sum of customer interests, perceptions and expectations. Therefore, this research was conducted with the title [17], [18], [19]. Oleh karena itu penelitian ini dilakukan dengan judul "Increasing Customer Satisfaction with Quality Function Deployment Methodology Based on Service Quality Analysis at PT. XYZ"

Research Methods

Therefore, this research began by using service quality techniques to show the gap between customer satisfaction and expectations in the PT logistics sector. By utilising the Quality Function Implementation technique, XYZ then implements appropriate steps in response to customer desires and preferences, focusing on the matrix with the least satisfactory level of satisfaction. The main method of collecting data is by distributing surveys directly to PT customers. XYZ conducted interviews with company management to collect information about technical response preparation, technical response development direction, correlation between technical responses, data on organisational difficulties in process characteristics, targets, and correlation between service attributes and technical responses for House of Quality preparation. In addition, secondary data collection was carried out by reviewing records of the number of monthly clients and previous consumer complaints. The following are the stages of data processing carried out in this research. This research was carried out with the title.

Service Quality

Respondents in this research were PT clients. XYZ has used logistics services, especially for accommodation rentals, with customers spread throughout Indonesia with a sample of 95 customers. Purposive sampling is used in a research sampling strategy, which refers to a sampling approach that has been designed for a specific purpose. According to [20] there is a minimum respondent limit that can be used for research, namely 30 samples with different respondents. The larger the sample taken from the total population, the better. According to established guidelines, it is recommended that a minimum sample size of 30 be used for research involving statistical data processing [21], [22]. To fill out the questionnaire, respondents were asked to provide a scale of values for the service attributes according to what the respondents felt. The scale used is 1 to 5, table 2 is the scale level for filling out the questionnaire [23].

Table 3. Likert scale

Answer Choices	Skor
Very Important/Satisfied (SP)	5
Important/Satisfied (P)	4
Enough (C)	3
Not Important/Satisfied (TP)	2
Very Unimportant/Satisfied (STP)	1

Source : [24]

After distributing the questionnaire, data is collected for processing and begins with a validity and reliability test. This test needs to be carried out to determine that the quality of the data obtained meets the standards [25]. The validity test refers to the degree of conformity between the data collected and the data contained in the source. If the data collection instrument is valid, the data obtained is suitable for continuing the data processing process [26]. According to the information provided in Table 1, the total number of customers who were served over the time period of January 2023 to February 2024 was 15,589 customers. A total of 1,492 customers reached their highest point in May 2023, when the number of consumers reached its highest point. The number of customers reached its lowest point in December 2023, with only 926 users. This is the monthly customer graph, which is shown in Figure 1.

Reliability testing is carried out after validity testing. Reliability testing is a measuring instrument that refers to the degree of consistency and stability of data obtained from data collection [27]. The usage of reliability testing is often used for the purpose of evaluating the consistency and stability of

instruments. The approach used in the reliability test conducted for this study was Cronbach's Alpha. If the data that was gathered is in the form of a range or scale that has been standardised using a Likert scale, then the Cronbach's Alpha technique is appropriate for assessing the amount of reliability that the data has. It is possible to say that the variable is dependable if the Cronbach Alpha value is more than 0.60; the higher the Cronbach Alpha number, the more reliable the data is [28]. In this research, reliability testing was assisted by the SPSS program.

Service quality is prepared using a service quality approach based on customer needs and desires. In this Servqual, there are five measurement dimensions, namely tangible, responsiveness, assurance, empathy, and assurance, and each dimension has different question indicators according to the scope of the dimension [29]. The tangibles dimension refers to the physical evidence that customers can perceive, such as the facilities' quality and company personnel's appearance. The Reliability dimension relates to the company's ability to deliver reliable performance consistently. The Responsiveness dimension refers to the company's willingness to assist customers and give them appropriate attention. The Assurance dimension relates to the company's ability to create a sense of customer security and trust. Lastly, the Empathy dimension refers to the company's ability to show care and attentiveness to each individual customer [30].

Quality Function Deployment

The tool used in this QFD method is the House of Quality (HOQ). Following is a stage in the HOQ matrix [18], [19], [31]:

a. Technical Specifications

Components such as characteristics, matrices, technical specifications, units, and criteria are included in the process of developing technical specifications.

b. ***Relationship***

Relationship refers to evaluating the degree of connection between qualities and technical requirements. Rate the relationship on a scale from 0 (No connection) to 9 (Extremely strong).

c. Planning Matrix

In determining the planning matrix, several processes are carried out, including:

- *Importance to customers*

  The significance of services/products is evaluated by assessing the servqual component with the lowest value.
- *Current Satisfaction Performance*

  Customer satisfaction is assessed by assessing the Servqual dimensions and identifying the one with the lowest value.
- *Goal*

  The goal refers to the desired level of pleasure that is aimed to be obtained for the product under development. Goals may be assessed using a rating system ranging from 1 to 4, where 1 represents a very poor outcome, 2 indicates a result that is not acceptable, 3 signifies a more satisfactory outcome, and 4 represents a very satisfactory result.
- *Improvement Ratio*

  The improvement ratio number quantifies the extent of enhancement or refinement required in product development. The outcome may be categorised as follows: if the result is less than 1, there is no change; if it falls between 1 and 1.5, there is considerable improvement; if it exceeds 1.5, there is total improvement. One must compare the existing satisfaction performance with the objective to get the improvement ratio value.
- *Sales Point*

  Sales points are highly valued characteristics, particularly for their ability to drive sales. The sales point value is determined as follows: 1 represents no sales point, 1.2 represents a medium sales point, and 1.5 represents a strong one.
- Raw Weight and Normalized Raw Weight

  The raw weight number indicates the degree to which there is room for development regarding service quality. The calculation of raw weight may be accomplished by multiplying the Importance to Customers, Improvement Ratio, and Sales Point, respectively. Meanwhile, the Raw and Normalised Raw Weights are compared to arrive at the Normalised Raw Weights.

d. Technical Correlation

An explanation of the connection that exists between one technical standard and another technical specification is provided by the term "technical correlation." It is via symbols that these connections are portrayed.

e. Technical Matrix

The process of identifying the technical priorities is currently taking place at this level. While establishing technical qualities, this approach's priority will be considered for research purposes. A calculation is utilized to determine the contribution and the usualized contribution. It is possible to calculate the contribution by multiplying the sum of the relationship with the normalized raw weight. On the other hand, the normalized contribution is calculated by comparing the contributions to the total contributions.

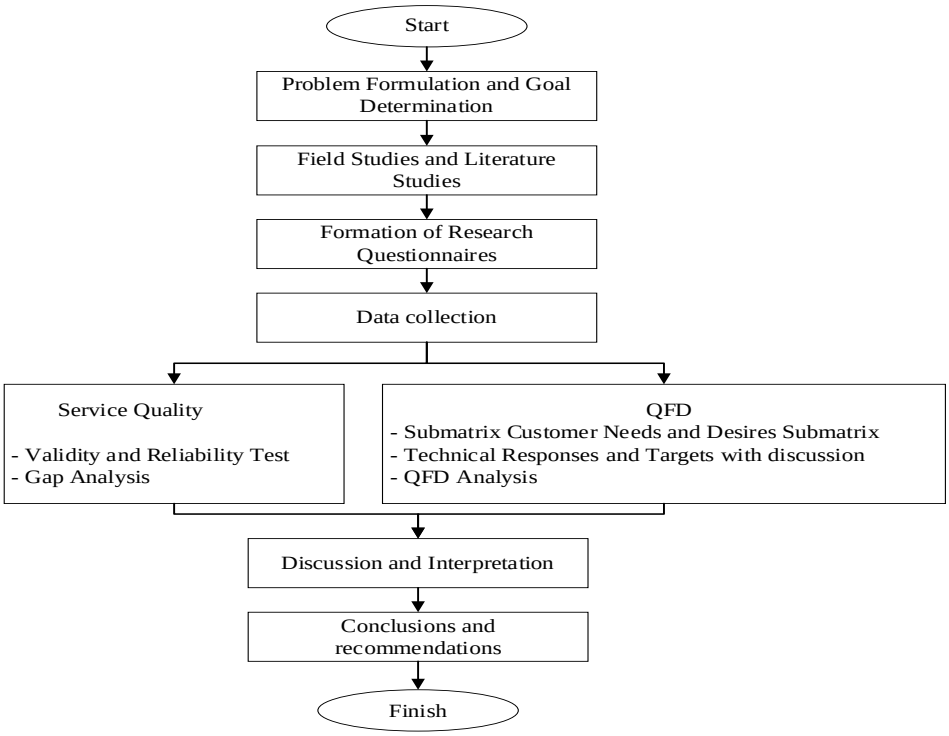


Figure 2. Research Flowchart

Results and Discussion

Data collection

Research attributes used at PT. XYZ was taken from several previous studies compiled by several sources. The research attributes are first consulted with the company to match the real conditions in the field so that they can be used as a reference in creating questionnaires that will be distributed to customers. Research attributes are determined from factors that are considered to influence the quality of PT services. XYZ. In obtaining data, questionnaires were distributed to 95 respondents, and the number of respondents was determined based on the minimum sample requirement used in quantitative research of 30 respondents [22]. After distributing the data, the next stage is to conduct validity and reliability tests.

Validity Test

Due to the fact that the study was carried out by collecting data via the use of a questionnaire predicated on a Likert scale, it was required to conduct out a validity test in order to determine the degree to which the data was accurate. If the r-calculated test result is higher than the regulatory standard value, then the validity test may be considered to be legitimate [32]. A total of 95 surveys were sent out to customers living in different parts of Indonesia. The validity of the questionnaire was evaluated by comparing the rtable with the rcount after it had been distributed to the participants. The value of the rtable is derived from the r product moment table, and the significance level is set at 5%. A total of 95 people participated in the survey, and the r table value that can be calculated using df = 93 (df = n – 2) will be 0.202 [26]. If r_{count} is more than r_{table}, it means that the statement item from the questionnaire is valid. If otherwise, it is necessary to distribute the questionnaire again until valid data is obtained. In this

research, a validity test was carried out with the help of SPSS 26.0 software. Table 4 is the result of the reality and expectation level validity test.

Table 4. Results of Population Validity Testing

Statement	r_{count}	
	Satisfaction Level	Expectation Level
1	0,451	0,407
2	0,325	0,340
3	0,401	0,271
4	0,468	0,401
5	0,454	0,467
6	0,363	0,481
7	0,486	0,432
8	0,486	0,276
9	0,372	0,412
10	0,370	0,446
11	0,354	0,380
12	0,343	0,395
13	0,344	0,415
14	0,316	0,356
15	0,310	0,317
16	0,275	0,342
17	0,311	0,391
18	0,390	0,377
19	0,279	0,329

According to Table 4, it is determined that all of the count values in this investigation have a value that is higher than the table value. As a result, it is possible to assert that all of the data is legitimate, and each statement may be used for more research.

Reliability Test

Reliability testing in this research uses the Cronbach Alpha formula and is calculated with the help of SPSS software; the results of SPSS calculations can be seen in Table 5.

Table 5. Reliability Test Results

Amount of data	*Cronbach alpha*		Information
	Satisfaction Level	Expectation Level	
95	0.653	0.675	Reliable

The reliability test results indicate that the reliability coefficient for customer satisfaction is 0.653 and the reliability coefficient for the level of expectations is 0.675. These coefficients demonstrate that all attributes possess a substantial Cronbach Alpha coefficient, exceeding 0.600. Consequently, it can be inferred that all the measuring concepts for each question in the questionnaire are reliable. This implies that the questionnaire employed in this research can be deemed trustworthy and accurate.

Servqual Data Processing

Long (2020) identified five dimensions of service quality: reliability, tangibles, responsiveness, assurance, and empathy [8]. In order to enhance the evaluation process for measuring service quality, it is crucial to enhance the indicators utilised in the evaluation. These indicators need to be synchronised with the five characteristics of quality. Therefore, the evaluation findings can accurately detect any deficiencies or contradictions in any aspect of service quality. Consequently, this enables certain enhancements to be implemented [9].

Servqual is calculated by assigning weights to each questionnaire feature's value and multiplying those weights by the number of answers that were calculated. This answer provides insight into the respondent's expectations and degree of satisfaction. The first step in calculating servqual is determining the total score on the satisfaction and hope levels questionnaires. The service gap value is then determined by calculating the average for each indicator, which is taken into account. The total score acquired from the questionnaire is shown in Table 6.

Table 6. Recapitulation of Servqual Gap Values

No.	Dimensions	Value	Gap

		Satisfaction	Hope	
1	*Tangible*	3,76	3,34	0,42
2		3,35	3,45	-0,10
3		3,69	3,32	0,37
4		3,67	3,43	0,24
5	*Reliability*	3,35	3,32	0,03
6		3,30	3,23	0,07
7		3,28	3,61	-0,33
8		2,94	3,55	-0,61
9	*Responsiveness*	3,23	3,31	-0,08
10		3,30	3,47	-0,17
11		3,42	3,33	0,09
12		3,40	3,48	-0,08
13	*Assurance*	3,41	3,44	-0,03
14		3,65	3,31	0,34
15		3,40	3,49	-0,09
16		3,61	3,37	0,24
17	*Empathy*	3,40	3,36	0,04
18		3,48	3,62	-0,14
19		3,45	3,36	0,09

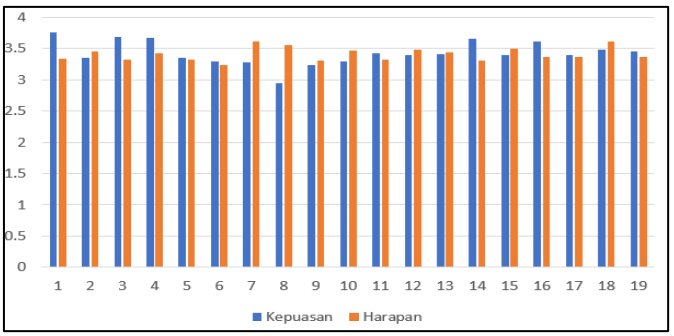


Figure 2. Graphic of Servqual Gap Values

Table 5 and Figure 2 present the servqual gap value for each statement, followed by a summary of the findings obtained by computing the average on each dimension. Table 7 presents the summary of the Servqual gap for each dimension.

Table 7. Recapitulation of gaps in each dimension

Dimension	Gap	Rank
Tangible	0.23	I
Reliability	-0.21	V
Responsiveness	-0.06	IV
Assurance	0.13	II
Empathy	-0.03	III

In Table 6, the positive and negative numbers for data processing in each dimension are shown beside one another. A gap value of 0.23 places tangibles at the top of the list, making them the best. With a gap value of 0.13, assurance is bestowed with the second position in the ranking. With a gap value of -0.03, empathy comes in at the third spot on the list. According to the gap value of -0.06, responsiveness is at the fourth position. This brings us to the fifth position, dependability, with a gap value of -0.21. According to the findings of this study, it is clear that the dependability aspect of service quality has the lowest degree of customer satisfaction. To this end, it is imperative that efforts be made to improve customer satisfaction, especially with regard to this specific aspect, by using the Quality Function Deployment methodology.

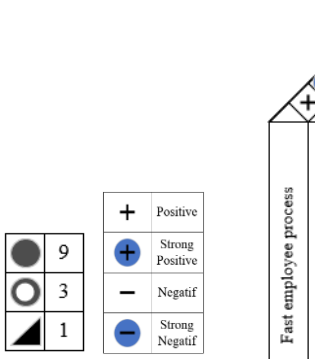
Quality Function Deployment

In improving service quality, the QFD (Quality Function Deployment) method accommodates consumer requests. There are several stages in the process of making QFD. The first stage is finding out what consumers want, so it is necessary to brainstorm with several customers to get a Voice of the Customer (VOC) or technical response to improve service quality. Table 8 summarises the voice of the customer obtained from the brainstorming process.

Table 8. Voice Of Customers Data

No.	*Voice Of Customers*
1	Fast employee process
2	Accurate transaction recording
3	Employee expertise in providing product information
4	System optimisation
5	Security improvements
6	Increased availability

After knowing the voice of the customer, the next stage is preparing the House of Quality (HOQ). At this stage, it is carried out based on the results of the service quality analysis which has the lowest gap value, namely in the reliability dimension. So that the question indicators in these dimensions are used as user requirements. Figure 3 is the House of Quality framework.



	Fast employee process	Accurate transaction recording	Employee expertise in providing product information	System optimization	Security improvements	Increased availability	Expectation Level	Satisfaction Level	Gap Servqual	Goal	Improvement Ratio	Sales Point	Raw Weight	Normal Raw Weight	Prioritas / Ranking
Fast employee service process	●	●	○	○	◢	◢	3.32	3.35	0.03	4	1.19	1.5	5.92	0.2590	1
Accurate recording of payment transactions	○	●			○		3.23	3.30	0.07	4	1.21	1.5	5.86	0.2564	2
Skills of PT employees. XYZ	○		●		◢		3.61	3.28	-0.33	4	1.22	1.2	5.28	0.2310	4
Transactions can be made with a maximum payment of 90 days	●	●			◢	◢	3.55	2.94	-0.61	4	1.36	1.2	5.79	0.2533	3
Total	24	27	12	3	6	2	-	-	-	-	-	-	22.85	1	
Contribution	6.0729	6.9183	2.8560	0.7770	1.5125	0.5123									
Priority / Ranking	2	1	3	5	4	6									

Figure3. House Of Quality Dimension Reliability

Based on Figure 3 above, it can be seen that the priority of corrective action is based on technical response and user requirements in the reliability dimension. Table 9 is a recapitulation of improvement priorities based on QFD analysis.

Table 9. Priority Improvement and Increasing Customer Satisfaction Reliability Dimensions

Prioritise / Ranking	Indicators Based on User Requirements	Indicators Based on Technical Response
1	Fast employee service process	Accurate transaction recording
2	Accurate recording of payment transactions	Fast employee process
3	Transactions can be made with top payments up to a maximum of 90 days	Employee expertise in providing product information
4	Skills of PT employees. XYZ	Security improvements
5		System optimisation
6		Increased availability

Based on the results of the QFD, priorities for improvement and improvement of service user satisfaction indicators can be determined, especially in the reliability dimension, both from the user and technical side. Priorities for each indicator can be seen in Table 9. Table 9 shows that indicators related

to problems with employee service processes and transaction defects are the main priority for improvement from a user and technical perspective. This indicator is closely related to the continuity of customer service operations. This indicator must be immediately evaluated, and improvements must be made.

Based on the evaluation results, it is known that the level of service quality carried out in this research shows a gap between the level of satisfaction and expectations customers feel while using the services provided by PT. XYZ in the field of logistics, for this reason, corrective action efforts were carried out using the Quality Function Deployment methodology; this method is based on the voice of the customer, where the voice of the customer is obtained from a brainstorming process with random customers so that several Voice of Customers are found. will later become the basis for QFD improvement actions. QFD analysis is carried out with the servqual dimension, which has the smallest value; this is the reliability dimension. The results of the QFD analysis carried out by brainstorming show that improvements need to be prioritised, namely in employee service processes. The company needs to review the services implemented so far; it is also necessary to review and normalise service standards so that each worker can provide uniform service and, of course, in accordance with the company's SOP. Apart from that, it is necessary to carry out periodic audits in the transaction process carried out by each customer so that it can be ensured that there are no obstacles in the process of recording the results of the transaction, which could cause the transaction to be inaccurate.

This research is in line with research conducted by Permatasari (2023) that the QFD methodology can be used to determine the corrective actions that the company will carry out, but in this research, it was carried out with the addition of the Servqual methodology to determine service quality based on 5 different dimensions.

Conclusion

Based on the service quality analysis that was carried out using the Servqual method from 95 questionnaire data that PT respondents filled in. XYZ, which consists of customers, obtained the result that the reliability dimension has the largest gap value, namely -0.21, then on this dimension, a Quality Function Deployment analysis is carried out to determine quality improvement objectively based on user requirements obtained from the Servqual indicator of the reliability dimension and technical response based on the voice of customers. During the QFD analysis, it is determined that the company's priority corrective actions should be focused on technical responses. These include ensuring accurate transaction recording, improving employee efficiency, enhancing employee skills, strengthening security measures, optimising the system, and increasing availability.

Suggestions that can be conveyed in this research are that companies should be more aware of the activity processes that occur during the company's continuity, including customer satisfaction. It is necessary to carry out future evaluations to find out the extent of improvements made by the company in an effort to improve service quality, also add methods such as improvement performance analysis, or improvement gap analysis, and performance index to find out in detail each indicator that needs to be improved.

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