Civil and Environmental Science Journal (CIVENSE)

journal homepage: https://civense.ub.ac.id/index.php/civense

Original research article

Improving the quality of toll road services to increase the satisfaction level of Pekanbaru – Dumai Toll Road

Syah Gemma Putra[a,*] Agus Dwi Wicaksono [a], Gunawan Prayitno [a], Nguyen Trong Hiep [b]

[a] *Department of Urban and Regional Planning, Brawijaya University, Malang, 65145, Indonesia*
[b] *Faculty of Civil Engineering, University of Transport and Communications, Hanoi, Vietnam*

ARTICLEINFO

Keywords:
Toll Road
Service Quality
Satisfaction Level

ABSTRACT

Pekanbaru - Dumai toll road is one of the segments of the Trans Sumatra toll roads built by PT Hutama Karya. The Pekanbaru - Dumai toll road connects economic centers in Riau Province, including Dumai-Duri-Kandis-Petapahan-Minas-Pekanbaru. Despite offering stronger connectivities, problems regarding the toll road service quality were found. In relation to this, research has been conducted by carrying out two objectives. The first is to analyze the quality of service and level of satisfaction of the toll road users assessed from the toll road users. The second is to formulate referral recommendations to fix and improve the quality of the Pekanbaru-Dumai toll road services to meet the needs and expectations of users. This study employs the Importance-Performance Analysis (IPA) to identify the degree of performance and the level of importance of service qualities, the Customer Satisfaction Index (CSI) analysis to determine the level of satisfaction of toll road users, and the Quality Function Deployment (QFD) analysis to define the development priorities for the Pekanbaru-Dumai toll road. The results revealed that the satisfaction level of the Pekanbaru-Dumai toll road was 0.63, which refers to the "quite satisfied" category. Meanwhile, there are sets of priorities to improve the service quality - The priority is toll road surface maintenance regularly, the second priority is toll road lighting facility maintenance regularly, and the third priority is toll road safety facility maintenance regularly.

1. Introduction

As the rapidly growing population because of the development also raises demands regarding procurement, repair, and service of transportation infrastructure in terms of quantity and quality, such as road infrastructures which are increasing [1]. Infrastructures that can support the population's needs for accessibility and mobility, which is one of it, are toll roads [2]. The toll road that will be built aims to achieve equitable development and improve distribution services more efficiently to support the increasing economic growth, especially in high-development areas [3].

According to Law Number 38 of 2004 (UU No 38 of 2004) concerning roads, it is explained that toll roads are freeways included in the road network system and as national roads whose users are required to pay toll fees [4]. In contrast to public roads, where the user is free of charge, toll roads, in practice, require users to pay toll fees [4]. In practice, toll roads have minimum service standards (SPM) for toll roads under the regulation of Minister of Public Works Regulation Number 16/PRT/M/2014 concerning minimum service standards, as the government's effort to protect toll road users. The minimum service standards for toll roads consist of 8 service substances, there are [5] :

* Corresponding author.
E-mail address: syahgemmaputra@gmail.com (S. G. Putra)
Doi: 10.21776/ub.civense.2023.00601.4
Received 13 December 2022; Accepted 07 March 2023
E-ISSN: 2620-6218/

1. Toll Road Conditions
2. Average Speed
3. Accessibility
4. Mobility
5. Safety
6. Rescue Units and Services Assistance
7. Environment
8. Rest Area

Based on the research conducted by Zuna (2015), the current toll road SPM still needs to meet user expectations fully. This, of course, has its expectations for toll road services users receive that differ from the expected service [6]. For example, on the Pekanbaru - Dumai toll road, problems were found that can reduce the feeling of satisfaction, comfort, and safety of users. The problem is the condition of the toll road surface, which is bumpy and even has holes. This condition can endanger users who drive on the Pekanbaru - Dumai toll road. Another problem is the facilities in rest areas that are not varied, such as the unavailability of ATMs and insufficient parking facilities to accommodate parked trucks to rest. The impact of insufficient parking facilities is that trucks will park on the shoulder of the road around the toll road, which can endanger other users and the truck. These problems reflect services that must meet the minimum service standards for toll roads. Paputungan's research (2021) explained that service quality affects customer satisfaction [7]. With the influence between service quality and user satisfaction and the identification of service quality issues on the toll road between Pekanbaru and Dumai. This study has two primary purposes, first this study will analyze the level of user satisfaction with service quality based on the views of Pekanbaru – Dumai toll road users in the form of toll road conditions and rest areas that do not comply with the minimum toll road service standards. Secondly This study also will arrange recommendations for improvement based on service quality of the Pekanbaru – Dumai toll road in terms of the needs and expectations of toll road users to increase the level of satisfaction of Pekanbaru – Dumai toll road users.

2. Material and Methods

2.1. Research Location

The object of this research is the Pekanbaru – Dumai Toll Road, located in Riau Province. The Pekanbaru – Dumai Toll Road crosses several cities and regencies: Dumai City, Bengkalis Regency, Kampar Regency, Siak Regency, and Pekanbaru City. The Pekanbaru - Dumai Toll Road is a part of the Trans Sumatra Toll Road built by PT Hutama Karya. The Pekanbaru – Dumai Toll Road connects the main economic corridors in Riau Province, namely Dumai, Duri, Kandis, Petapahan, Minas, and Pekanbaru. The Pekanbaru - Dumai Toll Road functions as an alternative access that can increase accessibility and mobility in tourism activities and the distribution of goods. In contrast, Dumai City, which has a port, is the entry point for goods from Malaysia and other countries. Pekanbaru - Dumai Toll Road has a total length of 131.48 Km, divided into 6 Sections. The following is the division of sections on the Pekanbaru – Dumai Toll Road:

Table 1
Division of Section on the Pekanbaru-Dumal Toll Road.

Section	Length	Facility
Section 1 Pekanbaru - Minas	9,5 Km	-
Section 2 Minas – Kandis Selatan	24,1 Km	-
Section 3 Kandis Selatan – Kandis Utara	16,9 Km	Rest Area Type A Km 45A
Section 4 Kandis Utara – Duri Selatan	26,2 Km	Rest Area Type A Km 65B
Section 5 Duri Selatan – Duri Utara	29,45 Km	Rest Area Type B Km 82A andKm 82B

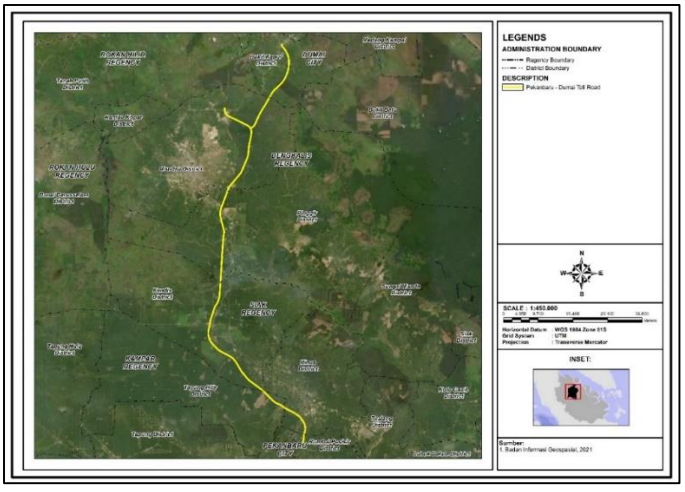

Fig. 1. Pekanbaru - Dumai Toll Road.

2.2. Research Instrument

Data collection was carried out using two methods: primary and secondary surveys. The primary survey is divided into two, questionnaires and interviews. Questionnaires were conducted to obtain the value of the level of performance and the level of importance. Distribution of the questionnaires is conducted online using Google Forms. Respondents to this questionnaire are Pekanbaru - Dumai toll road users who drive on toll roads at least once a month in 2022. The number of respondents to the questionnaire was determined using the Yamane formula. Out of a total LHR of 6,984, 100 were obtained. In addition, interviews were conducted with toll road managers or PT Hutama Karya to obtain technical responses regarding problems on the Pekanbaru – Dumai toll road. The

secondary survey was conducted to get an overview of the Pekanbaru – Dumai Toll Road and used as a reference in conducting research.

2.3. Analytical Methods

2.3.1. Variables and Service Attributes

Service qualities will be evaluated in Importance Performance Analysis, Customer Satisfaction Index, and Quality Function Deployment. The service characteristic consists of five variable components. The service characteristics were derived from prior studies and minimal many as 37 individuals with a percentage of 37%; aged 36-40 years, as many as four individuals with a percentage of 4%; aged 41-45 years, as many as three individuals. This toll road service criteria. The following are the service attributes that will be used in this study.

Table 2
Services Attributes [8] [9] [10] [11].

Variable	Services Attributes	Sources
Reliability	Traffic Flow Smoothness around toll booths/gates	• Ardhika, 2007 • Pancawati, 2013 • Yana, 2018 • Satriotomo, 2011 • the regulation of Minister of Public Works Regulation Number 16/PRT/M/2014
	The convenience of toll roads when crossed	
	Safety while driving at night	
Responsiveness	Speed of response to emergency calls (Operator/police/ambulance/crane)	
	Operation and handling of all toll booths during heavy traffic volumes (National and Religious Anniversary/National Holidays/Weekends)	
Assurance	The Presence and Readiness of Patrol Officers in Securing the Pekanbaru - Dumai toll road	
Empathy	Toll managers provide a place for tool users to provide input on toll roads.	
	Toll Road Driver's Speed	
Tangible	Condition of Street Lighting at Night	
	Completeness and clarity of Signs and Information Boards to read	
	Completeness and clarity of kilometer markers to read	
	Existence of Reflectors on the Guardrail and Median Concrete Barrier	
	Toll Road Surface Quality Conditions	
	Availability and condition of guard rails	
	Availability and condition of median concrete barrier	
	Availability of Parking in the Rest Area	
	Availability and cleanliness of toilets in the rest area	
	Availability of refueling stations in the rest area	
	Availability of ATMs in rest areas	
	Availability of Minimarkets in Rest Areas	
	Availability of Restaurants and Eating Places in Rest Areas	

2.3.2. Importance Performance Analysis

This analysis measures the level of importance and performance assessed based on the perceptions of toll road users [12]. IPA analysis will produce any service attributes that should be improved based on performance and importance. To determine which service attributes will be repaired, IPA analysis generates diagrams with four quadrants, namely:

Fig. 2. Diagram IPA.

2.3.3. Customer Satisfaction Index

This analysis is used in measuring user satisfaction related to service quality based on user perceptions [13]. The level of user satisfaction can be interpreted by comparing the level of perception with expectations. The CSI assessment consists of 5 criteria, namely.

Table 3
Kriteria CSI [13].

No	CSI Score	Criteria
1	0,81 - 1,00	Very Satisfied
2	066 – 0,80	Satisfied
3	0,51 – 0,65	Quite Satisfied
4	0,35 – 0,50	Less Satisfied
5	0,00 – 0,34	Not Satisfied

2.3.4. Quality Function Deployment

Structured analysis determines consumer needs and translates what things are needed into relevant technical requirements specifications [14]. There are six steps in conducting this analysis: Voice of the Customer, Planning Matrix, Technical Response, Relationship Matrix, Correlation Matrix, and Technical Matrix. These six stages will produce a House of Quality Matrix [15].

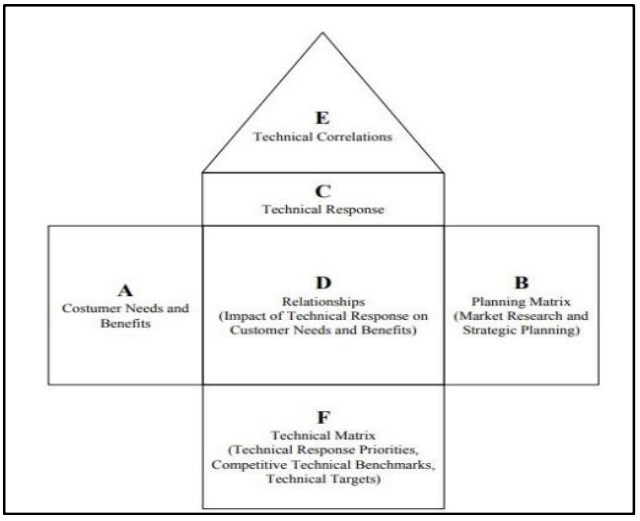

Fig. 3. House of Quality [15].

3. Result and Discussion

3.1. Characteristics of Pekanbaru – Dumai Toll Road Users

The characteristics of respondents who use the Pekanbaru - Dumai toll road in this study are divided into gender, age, type of work, and reasons for use. The characteristics of user responders are classified into two categories based on their gender: male, 72 people with a percentage of 72%, and female, 28 people with a percentage of 28%. This shows that most users who use toll roads are primarily male. This is because the Pekanbaru - Dumai toll road is the third longest Trans Sumatra toll road with a length of 131.48 Km, so male users more often drive vehicles on the Pekanbaru - Dumai toll road.

The characteristics of respondents using the Pekanbaru - Dumai toll road based on age are divided into seven categories: age 21-25 years, as many as seven individuals with a percentage of 7%; ages 26-30 years, as many as 43 individuals with a percentage of 43%; ages 31-35 years, as shows that most Pekanbaru - Dumai toll road users are 26 - 30 years and 31 - 35 years, which is the productive age for work.

The characteristics of respondents using the Pekanbaru - Dumai toll road are divided into four categories based on the reasons for use: because it saves time for as many as 83 people (83%), because it saves gasoline for as many as two people (2%), because it is safer for as many as four people (4%), and because it is more comfortable for as many as 11 people (11%). This shows that users choose to use the toll road because they want efficient travel time but also remember the sense of comfort and safety when using the Pekanbaru - Dumai Toll Road.

The characteristics of respondents using the Pekanbaru - Dumai toll road based on occupations are divided into 6; namely, three teacher jobs with a percentage of 3%, 19 private employee jobs with a 19% percentage, eight students work with a percentage of 8%, civil servant jobs 18 people with a percentage of 18%, 30 people working as drivers with a percentage of 30% and 22 people working as self-employed people with a percentage of 22%. This shows that most Pekanbaru - Dumai toll road users are drivers of goods and people transport. This is because the City of Dumai, as the entry point for goods from the seaside to Pekanbaru City as an industrial center and the provincial capital, moves to the distribution of goods and services between Pekanbaru and Dumai into a relationship of mutualism in terms of economy. Apart from drivers, the jobs with the second highest number are entrepreneurs looking for production goods in the city of Dumai and processed in the city of Pekanbaru.

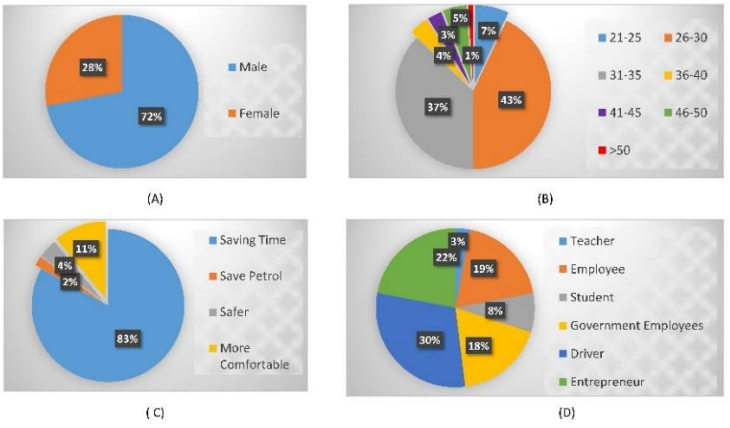

Fig. 4. (A) Gender, (B) Age, (C) Reasons for Use, (D) Occupation.

3.2. Pekanbaru – Dumai Toll Road Service Quality

The quality of service on the Pekanbaru - Dumai Toll Road is generated from the Importance Performance Analysis. This analysis will compare the level of performance and importance of 21 service attributes. The questionnaire results are used to figure out how important each attribute is and how important each level of performance is. So that the average value of the performance level and the average level of importance of each attribute can be calculated as follows.

Table 4
IPA Analysis Results.

Service Attributes	Average Performance (X)	Average Importance (Y)	GAP (X-Y)	Conformity Level
1	3.41	3.74	-0.33	91.18
2	3.56	4.17	-0.61	85.37
3	3.60	4.15	-0.55	86.75
4	3.56	3.94	-0.38	90.36
5	3.60	4.00	-0.40	90.00
6	3.24	3.75	-0.51	86.40
7	3.60	4.00	-0.40	90.00
8	3.85	4.20	-0.35	91.67
9	3.79	4.21	-0.42	90.02
10	4.08	4.35	-0.27	93.79
11	4.15	4.30	-0.15	96.51
12	3.94	4.26	-0.32	92.49
13	3.60	4.20	-0.60	85.71
14	3.88	4.21	-0.33	92.16
15	3.91	4.18	-0.27	93.54
16	3.50	4.20	-0.70	83.33
17	3.73	4.16	-0.43	89.66
18	3.31	4.00	-0.69	82.75
19	3.70	4.20	-0.50	88.10
20	3.72	4.00	-0.28	93.00
21	3.71	4.04	-0.33	91.83
Average	**3.69**	**4.11**		

Table 4 shows the average value of performance, the average value of interest, the gap, and the level of conformity can be seen. The average value of performance is a value that describes the quality-of-service performance on a service attribute based on user perceptions. Whereas this evaluation used a Likert scale from 1 to 5. The service attribute with the highest average performance value is service attribute 11, with a value of 4.15, which indicates that this service attribute is based on user perceptions of this service attribute having the best service performance compared to other attributes. Conversely, while the service attribute with the lowest performance value is service attribute 6, with a value of 3.24, which indicates this service attribute is based on user perception, this service attribute has the worst service performance.

The average importance value is a value that describes how important the service attribute is in influencing user satisfaction. Whereas this evaluation used a Likert scale from 1 to 5. The service attribute with the highest average importance value is service attribute 10, with a value of 4.35, which indicates that this attribute is based on user perceptions. This service attribute is most important compared to other attributes and has the most influence on users' satisfaction compared to other attributes. While the service attribute with the lowest importance value is service attribute 1, with a value of 3.74, which indicates this service attribute is based on user perception, this service attribute is the least important. It does not affect Pekanbaru - Dumai toll road user satisfaction.The gap value is the difference between the average value of performance with the average value of importance. Where if the gap value is positive, then the performance is following the performance expected by the user and vice versa. The level of conformity is a comparison between the level of performance and the level of importance. If the level of conformity is more than 100%, then the service attribute has exceeded user expectations, or the user has been satisfied with the service attribute and vice versa. Based on Table 4, no service attributes have a concordance level value above 100%, indicating that no service attributes have service performance met user expectations.

After knowing the average value of performance and importance of each service attribute, the next step is to obtain the distribution of service attributes into the IPA diagram, which has been divided into 4 using the SPSS statistical application. Quadrant 1 contains service attributes with low-performance and high-importance values, quadrant II contains service attributes with high-performance and highly important values, and quadrant III contains service attributes with low-performance and low-importance values. Finally, quadrant IV contains attributes that have high-performance values and low-importance values [12]. Based on Figure 5, 4 service attributes are included in quadrant I, nine service attributes are included in quadrant II, six service attributes are included in quadrant III, and two service attributes are included in quadrant IV.

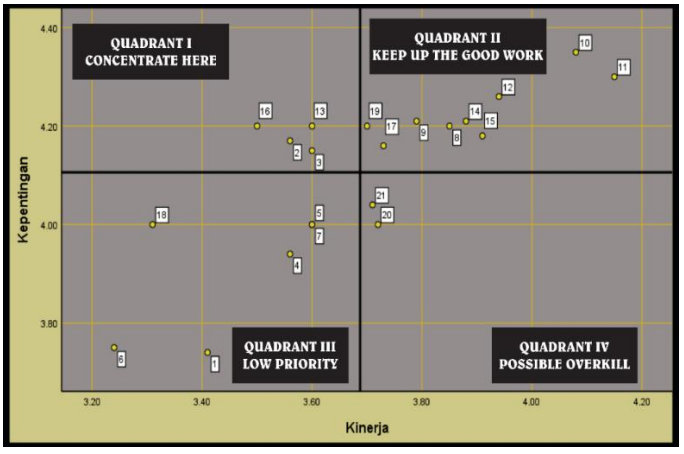

Fig. 5. IPA Diagram.

3.3. Pekanbaru – Dumai Toll Road User Satisfaction

The value of the level of user satisfaction is obtained from the results of the analysis of the customer satisfaction index; where based on the calculation of the analysis, the user satisfaction value for the Pekanbaru - Dumai toll road is 0.63 or 63%, where this value is included in the criteria of being quite satisfied. Based on user characteristics, the dominant reason for toll road users using the Pekanbaru - Dumai toll road is to save travel time with a percentage of 83%. Toll roads, alternative roads, can provide shorter travel times than public roads. Therefore, in calculating the customer satisfaction index, users are quite satisfied with the services provided by toll roads. 17% of users use the toll road for more comfortable and safe reasons. The difference between the level of performance and the level of importance is found that three service attributes have a greater difference than the others, which are the comfort of the toll road when crossed, the quality condition of the toll road surface, and the availability of parking in rest. The problem with service quality is attributed to the level of user satisfaction on the Pekanbaru - Dumai toll road is at a lower level. With this result, PT Hutama Karya, as the manager, can continue to be committed to increasing user satisfaction in the following years to reach the very satisfying category or close to 100% and maintain it so that user satisfaction can be achieved.

3.4. Directions for Priority Development of Pekanbaru - Dumai Toll Road

The Directions for the priority development of the Pekanbaru – Dumai toll road are obtained from the quality function deployment analysis results. In contrast to the IPA and CSI analysis, the QFD analyst does not use all service attributes but only uses 13 service attributes obtained from the service attributes in quadrants I and II in the IPA analysis results. The service attribute in this QFD analysis will be called Voice of Customer or user needs. The Voice of Customer, as it follows, is.

Table 5
Voice of Customer.

No	Voice of Customer
1	Convenience of the highway when crossed
2	Safety while driving at night
3	Toll Road Surface Quality Conditions
4	Availability of Parking in the Rest Area
5	Toll Road Driver's Speed
6	Condition of Street Lighting (PJU) at Night
7	Completeness and clarity of Signs and Information Boards to read
8	Completeness and clarity of kilometer markers to read
9	Existence of Reflectors on the Guardrail and Median Concrete Barrier
10	Availability and condition of guard rails
11	Availability and cleanliness of toilets in the rest area
12	Availability of ATMs in rest areas
13	Availability and condition of Median Concrete Barrier (median road/road barrier)

After getting the voice of the customer or what needs are the user's problems. The next step is to make a planning matrix, which in making this planning matrix consists of 6 parts, consist of goal, importance of customer, current satisfaction performance, improvement ratio, raw weight and normalized raw weight. Goal is the value of user expectations regarding service on the Pekanbaru Dumai road. Current satisfaction performance is the value of the user's perception of how good the Pekanbaru - Dumai toll road service is. The improvement Ratio is a measure of the effort required to increase the level of user satisfaction. Raw weight is a value that describes the level of importance of all consumer needs. The following is the value of the planning matrix.

Table 6
Matriks Perencanaan.

VoC	CSP	Goal	Importance of Customer	Improvement Ratio	Raw Weight	Normalized Raw Weight
1	3.56	4.17	0.076	1.171	0.089	8.0%
2	3.60	4.15	0.076	1.153	0.087	7.8%
3	3.60	4.20	0.077	1.167	0.089	8.0%
4	3.50	4.20	0.077	1.200	0.092	8.3%
5	3.85	4.20	0.077	1.091	0.084	7.5%
6	3.79	4.21	0.077	1.111	0.085	7.7%
7	4.08	4.35	0.079	1.066	0.085	7.6%
8	4.15	4.30	0.078	1.036	0.081	7.3%
9	3.94	4.26	0.078	1.081	0.084	7.5%
10	3.88	4.21	0.077	1.085	0.083	7.5%
11	3.73	4.16	0.076	1.115	0.085	7.6%
12	3.70	4.20	0.077	1.135	0.087	7.8%
13	3.91	4.18	0.076	1.069	0.082	7.3%

After obtaining the planning matrix and voice of customer, the third step is determining the technical response. The determination of the technical response is the answer from the voice of the customer, which was made and formulated by the researchers and the management, PT Hutama Karya, with due regard to the minimum service standards of toll roads and regulations that apply to realize user needs. The creation of technical response begins with grouping service attributes/voice of customer. Grouping based on the similarity of handling. After grouping the service attributes/voice of customer, the researchers teamed up with representatives of PT Hutama Karya, Mr. Ruli, to formulate a technical response for the Pekanbaru - Dumai Toll Road. The following is the technical response from the Pekanbaru – Dumai toll road:

Table 7
Technical Responses.

Voice of Customer	Repairment Type	Technical Responses
Convenience of toll roads when crossed	Moderate Repair	Toll Road Surface Maintenance on Regular Basis (TR-1)
The condition of the quality of the toll road surface on a regular basis		
Safety while driving at night	Moderate Repair	Maintenance of Toll Road Lighting Facilities on Regular Basis (TR-2)
Condition of Street Lighting (PJU) at Night		
The presence of reflectors on the *guardrail* and MCB		
Availability of Parking in the Rest Area	Moderate Repair	Parking Expansion in Rest Area (TR-3)
Toll Road Driver's Speed	Moderate Repair	Enforcement of E-Traffic Tickets (E-Tilang) for Offenders (TR-4)
Completeness and clarity of Signs and Information Boards to read	Moderate Repair	Maintenance of Toll Road Safety Facilities on Regular Basis (TR-5)
Completeness and clarity of kilometer markers to read		
Availability and condition of guard rails		
Availability and condition of median concrete barrier		
Availability and cleanliness of toilets in the rest area	Moderate Repair	Adding Rest Area Facilities (TR-6)
Availability of ATMs in rest areas		

Based on Table 7, there are 6 technical responses that will answer and resolve problems in 13 voices of customers. After determining the technical response, the next step is to make the house of quality matrix. House of quality Matrix is the result from the QFD analysis. The House of quality Matrix aims to see the effect of technical response in responding to user needs. The following is the house of quality matrix. The house of quality matrix consists of a relationship matrix, technical correlation, and technical matrix. The relationship matrix aims to assess the influence of the technical response in handling and controlling the user's needs with the performance of user satisfaction. A matrix symbol is used to describe the level of relationship between technical response and the customer's voice. Symbols in the matrix will determine the priority of the action to be performed. Here is the symbol of the relationship matrix

Table 8
Relationship Matrix Symbols [15].

Symbols	Score	Annotation
(Empty)	0	Have no relationship
Δ	1	Weak relationship
○	3	Moderate relationship
●	9	Strong relationship

Technical correlation is an assessment to determine whether there is a relationship between technical responses and how far the relationship is. The relationship between technical responses can be a positive relationship, a negative relationship, or not even related at all. It is hoped that this technical correlation will make it easier to determine the policy to be taken regarding determining the technical response to be implemented. Below are the technical response symbols.

Table 9
Technical Correlation Symbols [15].

Symbols	Annotation
√	The positive influence is very strong
+	The positive influence is quite strong
(Empty)	No influence
-	The negative influence is quite strong
X	The negative influence is very strong

The technical matrix consists of 3 parts, namely contribution, which is a value that shows the contribution of the technical response to fulfilling user requests. Normalized contribution is the contribution value expressed on a scale of 0 – 1 or in percentage. Absolute importance is the value of the importance of the technical response obtained from the importance level of each voice of customer multiplied by a numerical value. Then the house of quality matrix is produced as follows.

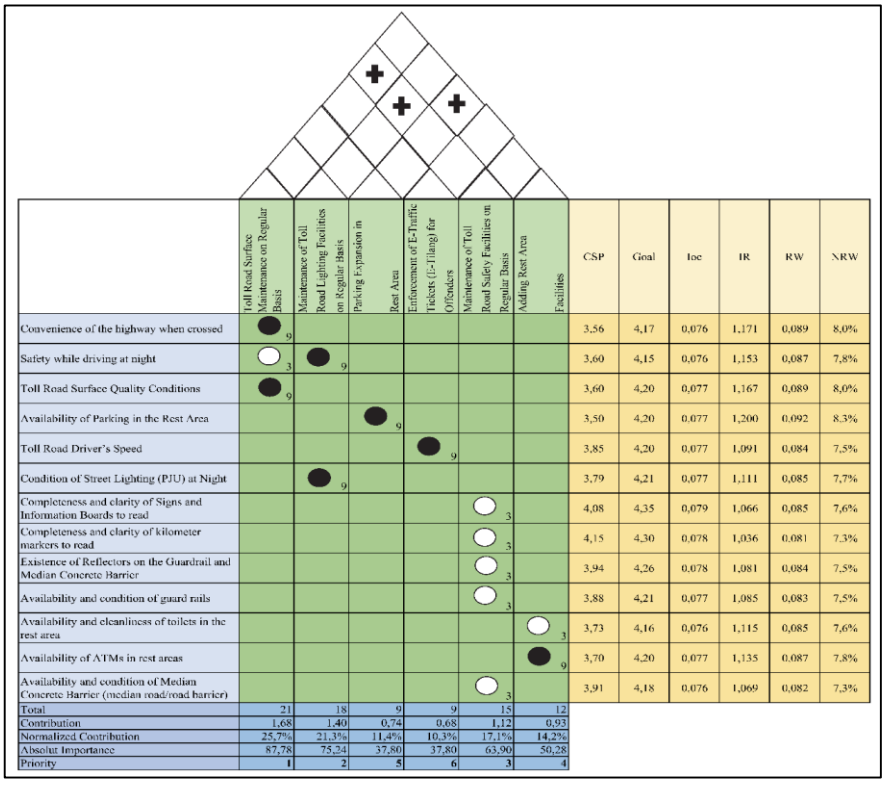

Fig. 6. House of Quality Matrix.

The House of Quality matrix is used to determine which technical response mapping is most influential in overcoming the problems contained in the voice of customer. Based on Figure 6 it can be seen whether the technical response can solve problems in service attributes and how much resolution can be done, which is marked with black and white circles. The black circle that shows the technical response strongly affects service attributes, while the white circle shows the technical response has a moderate effect on service attributes. Another thing that can be seen from the matrix above is that there is a relationship between technical responses, which are marked with the plus symbol (+) in Figure 6 above. The next thing that can be known from the house of quality matrix is the determination of the priority order of which technical response is most influential in overcoming problems with the voice of customer, which is marked in the blue part of the matrix above. The technical response with the greatest. Absolute Importance value is the technical response with the most influence in overcoming the problem. The following is a sequence of technical responses based on the priority of development directives.

Table 10
Priority directives for the development of service quality on the Pekanbaru - Dumai toll road.

Priority	Technical Responses	TR	AI
1	Toll Road Surface Maintenance on Regular Basis	TR-1	87,78
2	Maintenance of Toll Road Lighting Facilities on Regular Basis	TR-2	75,24
3	Maintenance of Toll Road Safety Facilities on Regular Basis	TR-5	63,90
4	Addition to Rest Area Facilities	TR-6	50,28
5	Parking Expansion in Rest Area	TR-3	37,80
6	Enforcement of E-Traffic Tickets (E-Tilang) for Offenders	TR-4	37,80

Based on Table 10, the technical response that has the highest priority is toll road surface maintenance regularly (TR-1), with an AI value of 87.78. The technical response that has priority number two is the maintenance of toll road lighting facilities on a regular basis (TR-2) with an AI value of 75.24. The technical response with priority number three is the maintenance of toll road safety facilities (TR-5) with an AI score of 63.90. The technical response with priority number four is the addition of rest area facilities (TR-6) with an AI value of 50.28. The technical response that has priority number five is the expansion of the parking in the rest area

(TR-3) with an AI value of 37.80. The last priority of the technical response based on the quality function deployment analysis is the Enforcement of E-Traffic Tickets (E-Tilang) for Offenders (TR-4) with an AI value of 37.80.

4. Conclusions and Recommendations

The results of this study show that the level of user satisfaction on the Pekanbaru - Dumai toll road has a value of 0.63 or 63%. This value indicates user satisfaction with the quality of service provided by PT Hutama Karya on the Pekanbaru - Dumai toll road, which is included in the quite satisfied category. With this level of satisfaction quite satisfied in the assessment of the quality of service from the results of the IPA analysis, it was found that service quality has a lower value than other service qualities.

The convenience of the toll road when crossed (gap value -0.61), the condition of the toll road surface quality (gap value - 0.60) and the availability of parking in the rest area (gap value -0.70). Based on the characteristics of the users, it was found that the reasons for using toll roads were mostly due to saving time, with a total percentage of 83%, while the reasons for the convenience of toll roads were 17%. The reason for using it because it saves time, and users feel quite satisfied even though there are problems with service quality.

Based on the Quality Function Deployment analysis, there are some recommendations to improve service quality Pekanbaru– Dumai toll road, these recommendations are arranged into seven priorities. The First priority is toll road surface maintenance regularly, the second priority is toll road lighting facility maintenance regularly, the third priority is toll road safety facility maintenance regularly, the fourth priority is to improve rest area facilities, the fifth priority is to expand parking in the rest area, and the absolute priority is to enforce electronic fines or (e-ticket) for traffic violations. Those recommendations can be input for PT Hutama Karya to improve the quality of service so that it can increase the value of user satisfaction and maintain that value.

References

[1] M. Harum and Sutriani. (2017). *Pengaruh Pembangunan Jalan Tol Sutami Terhadap Nilai Lahan Disekitarnya* (The Influence of the Development of the Sutami Toll Road on the Value of the Surrounding Land). Nature: National Academic Journal of Architecture, vol. 4, no. 1, pp. 66-73, 15 June.

[2] M. M. Sembirng. (2022). *Analisis Dampak Pembangunan Infrastruktur Terhadap Pendapatan Masyarakat : Studi Kasus Pembangunan Jalan Tol Pekanbaru-Minas* (Analysis of the Impact of Infrastructure Development on Community Income: A Case Study of the Pekanbaru-Minas Toll Road Development). *Repository Universitas Islam Riau, Pekanbaru* (Riau Islamic University Repository, Pekanbaru).

[3] F. Fuadi and M. R. Nasrudin. (2022). *Dampak Pembangunan Jalan Tol Trans Sumatera Terhadap Alih Fungsi Lahan Permukiman Dan Persawahan Masyarakat Ditinjau Dalam Perspektif Ekonomi Islam* (The Impact of the Development of the Trans Sumatra Toll Road on the Transfer of Functions to Residential Land and Community Paddy Fields in an Islamic Economic Perspective). *Jurnal Ilmiah Edunomika* (Edunomics Scientific Journal), vol. 6, no. 2, pp. 1-7.

[4] Husin, P. Prananingtyas and S. Mahmudah. (2019). *Analisis Penerapan Pembayaran Tol Menggunakan E-Money* (Analysis of the Implementation of Toll Payments Using E-Money). Diponegoro Law Journal, vol. 8, no. 1, pp. 396-416.

[5] A. Irfan, H. Nenobais and Darmanto. (2021). *Implementasi Standar Pelayanan Minimal Jalan Tol (Sebuah Pendekatan Kebijakan Publik* (Implementation of Toll Road Minimum Service Standards (A Public Policy Approach). vol. I, Banyumas, Jawa Tengah: CV Amerta Media.

[6] H. T. Zuna and A. Retapradana. (2015). *Analisis Perspektif Pengguna Terhadap Peningkatan Kualitas Pelayanan Jalan Tol (Studi Kasus : Jalan Tol Metropolitan Surabaya)* (Analysis of User Perspectives on Improving the Quality of Toll Road Services (Case Study: Metropolitan Surabaya Toll Road). *Jurnal Sosial Ekonomi Pekerjaan Umum* (Social Economic Journal of Public Works), vol. 7, no. 3, pp. 181-191.

[7] T. Paputungan, L. F. Tamengkel and O. F. Walangitan, (2021). *Pengaruh Kualitas Pelayanan Terhadap Kepuasan Pelanggan PT JNE Kotamobagu* (The Influence of Service Quality on PT JNE Kotamobagu Customer Satisfaction). Productivity, vol. 2, no. 5, pp. 397-402.

[8] I. M. Ardhika. (2007). *Analisis Tingkat Kepuasan Pelanggan Terhadap Kualitas Pelayanan Jasa Jalan Tol Jagorawi Pada PT. Jasa Marga (PERSERO)* (Analysis of the Level of Customer Satisfaction on the Quality of Service for the Jagorawi Toll Road at PT. Jasa Marga (PERSERO)), Bogor: Institut Pertanian Bogor.

[9] E. Pancawati and A. A. G. Kartika. (2013). *Analisis Layanan Jalan Tol Berdasarkan Kebutuhan Pengguna (Studi Kasus Ruas Jalan Tol Surabaya – Gresik)* (Analysis of Toll Road Services Based on User Needs (Case Study of Surabaya – Gresik Toll Road)). in Prosiding Seminar Nasional Manajemen Teknologi XIX, Surabaya.

[10] A. A. G. A. Yana, I. N. Y. Astana and B. S. Salasa. (2018). *Efektivitas Layanan Jalan Tol Bali Mandara Dalam Memenuhi Kepuasan Pengguna* (The Effectiveness of Bali Mandara Toll Road Services in Fulfilling User Satisfaction). Jurnal Spektran, vol. 6, no. 2, pp. 224-233.

[11] D. Satriotomo. (2011). *Efektivitas Layanan Jalan Tol Kota Semarang Dalam Memenuhi Kebutuhan Pengguna* (The Effectiveness of Semarang City Toll Road Services in Fulfilling User Needs). Semarang: Diponegoro University.

[12] A. Dharmawan. (2014). *Rancangan Perbaikan Kualitas Pelayanan Jasa Dengan Metode Servqual, Importance Performance Analysis dan Quality Function Deployment Pada Plasa Telkom Cabang Dinoyo Surabaya* (Service Quality Improvement Design Using Servqual Method, Importance Performance Analysis and Quality Function Deployment at Plaza Telkom Dinoyo Surabaya Branch). *Jurnal Manajemen dan Teori dan Terapan* (Journal of Management and Theory and Applied), vol. 7, no. 3, pp. 207-224.

[13] L. Eboli and G. Mazulla. (2009). A New Customer Satisfaction Index for Evaluating Transit Service Quality in Public Transport. Journal of Public Transportation, vol. 12, no. 3, p.

[14] V. Gaspersz. (2006). *Total Quality Management Untuk Praktisi Bisnis dan Industri* (Total Quality Management For Business and Industrial Practitioners), Jakarta: *Gramedia Pustaka Utama* (Main Library Gramedia).

[15] N. Handayani, M. T. Hasan and T. A. Renaldi. (2020). *Analisis Pengembangan Mutu Pelayanan Pasien Instalasi Rawat Inap (IRI) Dengan Metode Quality Function Deployment (QFD)* (Analysis of the Development of Inpatient Installation Service Quality (IRI) with the Quality Function Deployment (QFD) Method). *Jurnal Teknik Industri* (Industrial Engineering Journal), vol. 23, no. 2, pp. 19-30.