

Proceedings of International Conference on Education, Technology, and Innovation

Homepage: <http://proceedings.upi.edu/index.php/ICETI/index>



How to Improve the Quality of TransJakarta's Customer Relations: Kaizen, Voice of Customer, and Statistics Approach

Rahmat Saputra^{1,*}, Anni Rohimah², Adelia Dwi Valentin³, Siti Fadila⁴

¹ Faculty of Engineering, Muhammadiyah A.R. Fachruddin University, Banten, Indonesia

*Correspondence author email: rahmatsaputra@unimar.ac.id

ABSTRACT

Improving customer relationships is an ongoing effort by TransJakarta to ensure long-term customer satisfaction, loyalty and engagement. This study examines the strategies used to improve the relationship between TransJakarta and its customers to ensure long-term satisfaction, loyalty and engagement. TransJakarta focuses on various actions to maintain good relationships with customers, such as providing quality service, personalised communication, quick response to complaints, and loyalty programs. The approach used in this study involves Kaizen, Voice of Customer (VoC), and statistical analysis to understand and improve customer relationships. Data from VoC is used to identify factors that influence customer relationships with TransJakarta. Statistical analysis was applied to test the influence of these factors, which were then processed using the PDCA (Plan, Do, Check, Act) approach within the Kaizen methodology. This study concludes that the main key in improving the quality of TransJakarta services and maintaining good relations with customers is the ability of employees to provide accurate and complete information. Employees need to have in-depth knowledge of TransJakarta services as well as good communication skills to meet customer expectations and build strong relationships. In addition, providing individualised attention to each customer is also very important to increase customer loyalty.

Keywords: *Quality, Customer Relationship, Improvement, Kaizen, Public Transportation*

1. Introduction

Public transport is important in supporting community mobility to carry out daily activities. To support the mobility of community activities optimally, it is necessary to have adequate public transport and in accordance with the needs of users [1].

To determine the needs of public transport users, it is necessary to pay attention to the perceptions of users of all elements of transport, including public transport services [2]. In addition, in order to provide innovative public transport services, it is necessary to conduct a thorough review of ways to improve the quality of services [3].

As one of the main public transport in Jakarta, TransJakarta plays an important role in urban mobility. However, like other major public transport services, Transjakarta faces challenges in maintaining customer satisfaction. Despite TransJakarta's efforts to provide reliable and efficient services, uncomfortable and overcrowded conditions, limited seating capacity, overcrowding at peak hours, lack of air conditioning in some buses, and so on. These issues collectively contribute to a negative customer experience, potentially leading to a decline in passenger numbers and a decline in TransJakarta's reputation,

Although several studies have discussed how to improve public transport services and used several methods or media to improve public transport services, such as studies that take into account user heterogeneity among users' assessments of various aspects of the service in order to achieve quality service [4], measured passenger satisfaction using Principal Component Analysis (PCA) and four main factors were extracted that influence passenger satisfaction with public bus transport services in the city. [5], using Automatic Face Mask Detection System media to improve the quality of public transport services [6], and Transjakarta buses are less efficient in terms of departures or stops that cause travel delays so that it needs to be improved to improve the quality of service in Transjakarta [7].

This research aims to design quality services in TransJakarta as a public transport by using a special approach that combines Kaizen, Voice of Customer, and statistical analysis to address specific problems faced by TransJakarta customers so that these problems need to be fixed so that the quality of TransJakarta services increases.

2. Methods

The method in this study relates to the approach of data collection techniques and data processing using kaizen methodology, statistical analysis, and Voice of Customer. The combination of several approaches is used to facilitate data collection and data processing to draw conclusions.

2.1. Data collection method

Data collection methods contain various methods used to obtain data related to TransJakarta services. The following data collection methods were used:

2.1.1. Questioner

A questionnaire is a research instrument consisting of written questions with the aim of obtaining data from certain groups of people who are used as research targets [8]. In this study, questionnaires were used to collect data related to TransJakarta users' perceptions of its services. Each question asked uses the Servqual dimension which consists of tangible, reliability, responsiveness, assurance, and empathy [9]. The following are the questionnaire questions asked to users:

Table 1: Questioner

Item	Question	Score				
		Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Item_1	Every Transjakarta bus stop is in a strategic location					
Item_2	Transjakarta facilities are good					
Item_3	The condition of Transjakarta facilities is clean and comfortable					
Item_4	Transjakarta employees look neat and professional					
Item_5	Employees provide services on time					
Item_6	The type of service provided is in accordance with what is offered					
Item_7	Complaint services are fast and reliable					
Item_8	Employees can be relied upon in handling service problems of Transjakarta users					
Item_9	Employees always show patience and attention to Transjakarta					
Item_10	Employees provide information needed by users appropriately					
Item_11	Employees always respond quickly to user complaints					
Item_12	Employees are ready to help users when experiencing difficulties					
Item_13	Employees respond to user requests quickly, precisely and efficiently					
Item_14	Employees can always resolve user complaints					
Item_15	Employee ability can be trusted					
Item_16	Employees are competent and professional in serving users					
Item_17	Employees are skilled in serving users					
Item_18	Employees are able to answer every user question					
Item_19	Employees foster a sense of trust to users					
Item_20	Users feel safe in making transactions					
Item_21	Employees apologise immediately when something goes wrong					

Item_22	Employees give individualised attention to users					
Item_23	Employees understand users' specific needs					
Item_24	Employees put users' interests first					
Item_25	Employees are easily contactable by users					
Item_26	Service to users does not distinguish social status					

2.1.2. Sample Selection Method

The sample selection was carried out using probability sampling technique, which is a sampling technique carried out by providing opportunities or opportunities for all members of the population to be selected as samples [10]. Then because the population is large and unlimited, in this study will be limited to 30 samples for pre-survey and determination of Voice of Customer weights, then 30 samples to set new targets for improving TransJakarta services. This is based on the fact that all samples are homogeneous [11], That is, it can represent the entire population of TransJakarta service users.

2.2. Analytic Method

The analysis method used in this research is as follows:

2.2.1. Kaizen Methodology

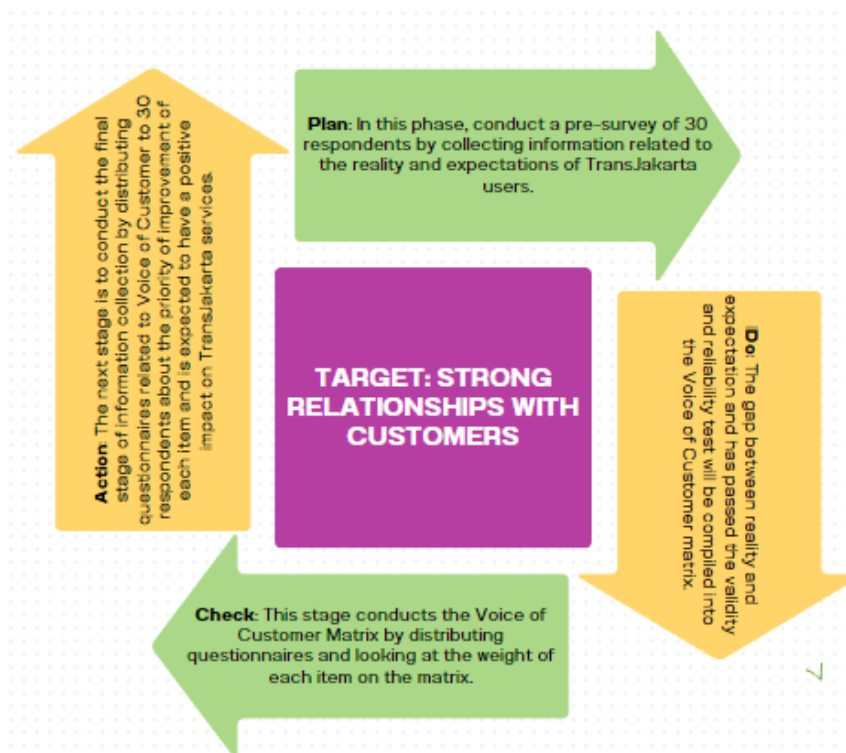


Figure 1: Kaizen Methodology.

Kaizen methodology is a useful tool to improve efficiency and quality [12]. Kaizen methodology can be used regarding continuous improvement in personal life, home life social life and work life [13]. In the Kaizen methodology there are several tools that can be used as a medium for continuous improvement, one of which is Plan-Do-Check-Act (PDCA), which is a continuous improvement cycle to make small incremental changes [14]. To achieve the desired results outlined in the research objectives, PDCA is used as a medium for continuous improvement. The steps are as follows [15]:

1. Planning Phase (Plan): In this phase, conduct a pre-survey of 30 respondents by collecting information related to the reality and expectations of TransJakarta users.
2. Implementation Phase (Do): The gap between reality and expectation and has passed the validity and reliability test will be compiled into the Voice of Customer matrix.
3. Check Stage: This stage performs the Voice of Customer Matrix by distributing questionnaires and looking at the weight of each item on the matrix.
4. Corrective Action Phase (Action): The next stage is to conduct the final stage of information collection by distributing questionnaires related to Voice of Customer to 30 respondents about the priority of improvement of each item and is expected to have a positive impact on TransJakarta services.

2.2.2. Statistical Analysis

The statistical analysis approach used in this study is to conduct Validity and Reliability testing. The validity test is to ensure that the questionnaire used has the accuracy to make measurements [16]. Meanwhile, the reliability test function is a measurement activity of how consistent the questionnaire is used within a certain period of time[17]. The interpretation of the validity test results is if the r value $<$ r table, then the value is declared invalid. Then on the contrary, the validity test results are if r value $>$ r table, then the value is declared valid[18]. Then the item is declared reliable if the Cronbach's Alpha value $>$ r table and if the Cronbach's Alpha value $<$ r table, it is declared unreliable[19].

2.2.3. Voice of Customer Matrix

The Voice of Customer matrix is a report of customer wants and needs organised in a hierarchical structure[20]. In the Voice of Customer matrix, weighting will be carried out regarding the priority needs of TransJakarta users.

3. Results and Discussion

3.1. Results

The results of data collection related to the reality that occurs against Transjakarta services and the expectations of users of Transjakarta services state that item_1, item_4, item_6, item_13, item_14, and item_25 have no gap between reality and expectations and are positive. Because of this condition, the item will be crossed out of the target items that will be improved. The following is a recap of data between reality and expectations of Transjakarta services:

Table 2: Gap Score

Item	Question	Total Reality Score	Total Expectations Score	Gap Score
Item_1	Every Transjakarta bus stop is in a strategic location	120	119	1
Item_2	Transjakarta facilities are good	104	117	-13
Item_3	The condition of Transjakarta facilities is clean and comfortable	107	111	-4
Item_4	Transjakarta employees look neat and professional	119	117	2
Item_5	Employees provide services on time	110	111	-1
Item_6	The type of service provided is in accordance with what is offered	125	112	13
Item_7	Complaint services are fast and reliable	116	119	-3
Item_8	Employees can be relied upon in handling service problems of Transjakarta users	107	114	-7
Item_9	Employees always show patience and attention to Transjakarta	102	118	-16
Item_10	Employees provide information needed by users appropriately	113	122	-9
Item_11	Employees always respond quickly to user complaints	110	126	-16
Item_12	Employees are ready to help users when experiencing difficulties	107	111	-4
Item_13	Employees respond to user requests quickly, precisely and efficiently	106	104	2
Item_14	Employees can always resolve user complaints	110	110	0
Item_15	Employee ability can be trusted	106	115	-9
Item_16	Employees are competent and professional in serving users	102	115	-13
Item_17	Employees are skilled in serving users	104	111	-7
Item_18	Employees are able to answer every user question	106	115	-9
Item_19	Employees foster a sense of trust to users	107	111	-4
Item_20	Users feel safe in making transactions	109	112	-3
Item_21	Employees apologise immediately when something goes wrong	105	119	-14
Item_22	Employees give individualised attention to users	104	114	-10

Item_23	Employees understand users' specific needs	106	118	-12
Item_24	Employees put users' interests first	104	122	-18
Item_25	Employees are easily contactable by users	118	114	4
Item_26	Service to users does not distinguish social status	106	111	-5

The validity test results state that item_4, item_6, item_9, item_10, and item_12 are invalid because r value $<$ r table, so the item will be crossed out and not included in the Voice of Customer matrix. The following are the results of data validity testing:

Table 3: Validity test.

Item	r Value	r Table	Status
Item_1	0,478	0,361	Valid
Item_2	0,367	0,361	Valid
Item_3	0,374	0,361	Valid
Item_4	0,271	0,361	Invalid
Item_5	0,943	0,361	Valid
Item_6	0,132	0,361	Invalid
Item_7	0,670	0,361	Valid
Item_8	0,434	0,361	Valid
Item_9	0,033	0,361	Invalid
Item_10	0,248	0,361	Invalid
Item_11	0,370	0,361	Valid
Item_12	0,045	0,361	Invalid
Item_13	0,719	0,361	Valid
Item_14	0,446	0,361	Valid
Item_15	0,820	0,361	Valid
Item_16	0,820	0,361	Valid
Item_17	0,548	0,361	Valid
Item_18	0,737	0,361	Valid
Item_19	0,871	0,361	Valid
Item_20	0,931	0,361	Valid
Item_21	0,534	0,361	Valid
Item_22	0,367	0,361	Valid
Item_23	0,948	0,361	Valid
Item_24	0,717	0,361	Valid
Item_25	1,000	0,361	Valid
Item_26	0,588	0,361	Valid

Then the reliability test results state that all items are reliable because Cronbach's Alpha Value $>$ r Table. The following are the results of the reliability test:

Table 4: Uji Reliabilitas

Reliability Statistics	
Cronbach's Alpha	N of Items
0,540	31

The next result is that all items that are valid and have a negative gap value will be input into the Voice of Customer matrix. Then the results will be made weighting related to the priority level of improvement. The priority weight will be made into 3 levels with the provisions that:

1. Less Priority
2. Priority
3. High Priority

Here are the results of the weighting:

Table 5: Priority Level of Improvement

Customer Relationship Scores	Customer Requirements																		
	1	2	3	3	3	3	3	3	3	3	3	3	3	1	3	3	3	3	3
1	3	3	3	3	3	3	3	3	3	3	3	3	1	3	3	3	3	3	3
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1
5	2	2	2	2	2	2	2	2	2	3	2	3	1	3	2	2	2	2	2
6	3	1	3	3	3	3	2	2	1	1	2	2	2	2	3	3	3	3	1
7	2	2	2	2	2	2	1	1	1	2	3	2	1	1	2	2	2	2	2
8	2	1	3	2	2	2	2	2	2	2	3	1	1	1	1	1	1	1	1
9	2	2	2	3	3	3	2	2	1	2	2	2	2	2	2	2	2	2	2
10	2	2	2	2	1	2	2	2	2	2	2	3	3	3	2	1	3	1	1
11	3	1	1	1	3	3	3	3	3	3	3	1	2	2	2	2	1	2	2
12	2	2	2	2	2	2	3	1	3	1	3	2	1	1	2	2	1	1	2
13	2	2	2	2	2	2	3	3	3	1	3	1	2	2	2	3	2	1	1
14	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	1
15	3	1	3	3	3	3	2	2	2	2	1	3	2	3	3	3	1	3	3
16	3	3	2	3	1	2	2	2	2	2	2	1	2	1	3	3	3	3	1

17	3	1	3	2	3	3	3	3	1	3	1	2	3	3	3	3	1
18	2	2	2	2	2	2	2	2	1	2	2	2	2	3	2	1	2
19	2	1	1	2	2	2	2	2	2	2	1	3	3	2	2	1	2
20	2	2	1	3	3	2	2	2	3	2	2	2	2	2	2	1	3
21	2	1	1	2	1	1	1	2	2	3	2	2	2	2	2	2	1
22	1	1	2	2	3	1	2	1	1	1	3	1	2	1	1	1	1
23	1	2	2	2	2	2	2	2	1	3	1	1	2	2	1	1	1
24	2	1	1	2	2	3	3	3	1	1	3	1	2	2	2	2	2
25	1	1	1	3	3	2	2	2	1	3	1	1	1	1	1	1	1
26	3	3	3	3	3	2	2	2	2	3	3	3	2	3	3	1	3
27	2	3	3	3	3	2	2	2	2	1	3	3	2	3	2	1	2
28	3	3	3	2	2	2	2	2	2	3	3	3	1	3	3	1	3
29	2	2	2	2	2	3	3	3	3	2	2	2	1	1	2	2	2
30	1	1	2	2	1	3	3	1	2	2	2	3	3	1	1	2	1
Scores	62	52	60	66	65	64	63	61	55	67	59	54	58	62	60	50	51
Priority Level	6	13	8	2	3	4	5	7	11	1	9	12	10	6	8	15	14

The results of table 5 state that the highest priority level weight is related to 'Employees are able to answer every user question' and the lowest is related to 'Employees put users' interests first'. From these results it can be explained that employees must have the ability to answer all questions related to TransJakarta services.

The relationship between items related to TransJakarta services and Customer Relationship is something that is interrelated. The stronger an item has a relationship, the more it becomes the main focus in a service. In this study, the relationship between these items and customer relationships was obtained through a questionnaire by weighting as follows:

1. ● : Strong Relationship Level
2. ▽ : Medium Relationship Level
3. ○ : Weak Relationship Level

Table 6: Customer Relationship Scores

Customer Requirements	Customer Relationship Scores																	
	Transjakarta facilities are good	The condition of Transjakarta facilities is clean and comfortable	Employees provide services on time	Complaint services are fast and reliable	Employees can be relied upon in handling service problems of Transjakarta users	Employees always respond quickly to user complaints	Employee ability can be trusted	Employees are competent and professional in serving users	Employees are skilled in serving users	Employees are able to answer every user question	Employees foster a sense of trust to users	Users feel safe in making transactions	Employees apologise immediately when something goes wrong	Employees give individualised attention to users	Employees understand users' specific needs	Employees put users' interests first	Service to users does not distinguish social status	
1	●	▽	○	▽	▽	○	○	○	▽	▽	●	▽	○	▽	▽	○	○	
2	●	▽	○	▽	▽	○	○	○	▽	▽	●	▽	○	▽	▽	○	○	
3	●	▽	○	▽	▽	○	○	○	●	▽	●	▽	○	●	▽	○	○	
4	●	▽	○	○	▽	○	▽	○	▽	▽	●	▽	○	▽	▽	○	▽	
5	▽	▽	○	●	○	○	○	○	●	●	▽	▽	○	●	▽	○	▽	
6	▽	▽	○	▽	▽	○	○	○	●	▽	○	▽	○	●	▽	○	○	
7	○	▽	●	●	▽	●	●	○	▽	●	○	●	▽	▽	●	▽	○	
8	○	▽	●	●	▽	●	▽	○	○	●	○	●	○	○	▽	▽	○	
9	▽	○	▽	▽	▽	○	●	▽	●	▽	▽	▽	●	●	●	▽	○	
10	▽	●	▽	○	▽	▽	●	▽	○	○	▽	▽	○	○	●	▽	○	
11	▽	○	▽	●	▽	○	▽	▽	○	●	▽	▽	●	▽	▽	○	●	
12	▽	●	▽	○	●	▽	○	▽	▽	○	○	▽	▽	●	▽	○	●	
13	○	▽	▽	▽	▽	▽	●	▽	▽	▽	●	▽	▽	▽	▽	○	○	
14	○	▽	▽	▽	●	▽	○	○	○	●	●	○	○	●	▽	●	●	
15	○	●	●	○	●	▽	●	○	▽	●	○	○	▽	●	○	▽	▽	
16	○	▽	▽	○	●	○	●	○	▽	▽	▽	●	●	▽	●	●	●	
17	▽	●	●	▽	▽	▽	▽	●	○	○	▽	○	▽	○	○	●	●	
18	○	▽	●	▽	○	▽	▽	○	○	●	▽	●	●	●	●	▽	▽	
19	○	●	●	●	▽	●	▽	●	○	○	▽	▽	●	○	▽	○	○	
20	●	●	▽	▽	▽	▽	▽	▽	▽	●	▽	▽	▽	▽	▽	●	●	
21	●	▽	●	●	▽	●	○	●	○	●	○	○	○	○	○	○	○	
22	○	○	●	●	▽	●	●	●	●	○	▽	▽	●	▽	▽	●	○	
23	●	●	▽	▽	▽	▽	▽	▽	○	●	○	●	○	▽	▽	○	○	
24	○	○	○	○	▽	○	▽	○	▽	○	▽	▽	○	▽	●	▽	○	
25	▽	▽	●	●	▽	●	▽	●	▽	●	▽	▽	●	●	▽	▽	●	
26	○	▽	○	○	▽	○	●	○	○	●	▽	○	●	●	●	▽	▽	
27	○	▽	▽	●	▽	▽	▽	▽	○	▽	▽	▽	○	▽	●	▽	●	
28	●	▽	○	▽	▽	▽	●	▽	○	○	○	○	○	●	▽	○	●	
29	●	▽	○	▽	▽	▽	●	▽	○	▽	▽	○	○	●	▽	○	▽	
30	●	▽	○	▽	▽	○	○	○	▽	▽	●	▽	○	▽	▽	○	○	
Scores	58	61	58	62	62	54	61	50	52	65	59	58	52	67	65	50	54	

Table 6 shows that 'Employees give individualised attention to users' has the highest weight on Customer Relationship. So that when employees can provide attention in the individual realm, it will further strengthen the customer relationship with Transjakarta.

3.2. Discussion

Because employees are able to answer every user question, employees must have extensive knowledge related to Transjakarta service products. So, it is necessary to conduct periodic training by emphasising that employees can master various Transjakarta service products. In addition, in maintaining customer loyalty to always use Transjakarta services, it is necessary to carry out activities to the maximum according to the weight of the relationship between items and customer relationships.

4. Conclusion

In this study, it can be concluded that the key factor in improving the quality of TransJakarta services and maintaining customer relationships is the ability to answer questions. It states that employees must have in-depth knowledge of TransJakarta services so that they are able to provide accurate and comprehensive answers to any user questions. This is very important to fulfil users' expectations and increase their satisfaction. It then highlights the importance of providing individualised attention to each user. By providing personalised attention, employees can build stronger relationships with users, increase loyalty, and ultimately strengthen customer relationships with TransJakarta.

From the results of this analysis, it can be recommended several things to improve the quality of TransJakarta services, namely Increasing Employee Knowledge through continuous training, employees must be equipped with up-to-date knowledge about TransJakarta services, so that they can provide accurate and relevant information to users, communication skills development train good communication skills, both orally and in writing, in order to interact with users effectively and build positive relationships, focus on user experience by paying more attention to user needs and expectations, TransJakarta can increase customer satisfaction and build a good reputation.

Acknowledgement

This journal article was written by Rahmat Saputra from the Industrial Engineering, Faculty of Engineering, Muhammadiyah A.R. Fachruddin University and based on the results of research with the title " How to Improve the Quality of TransJakarta's Customer Relations: Kaizen, Voice of Customer, and Statistics Approach", the author would like to thank Muhammadiyah A.R. Fachruddin University as an institution that has supported this research and the parties who have been willing to provide information and data in order to achieve the objectives of this research.

References

- [1] A. Sulistyowati dan I. Muazansyah, "Optimalisasi Pengelolaan Dan Pelayanan Transportasi Umum (Studi Pada 'Suroboyo Bus' Di Surabaya)," proceedings, hlm. 152, Okt 2019, doi: 10.30589/proceedings.2018.189.
- [2] Y. Huo, J. Zhao, X. Li, dan C. Guo, "Using Fuzzy Clustering of User Perception to Determine the Number of Level-of-Service Categories for Bus Rapid Transit," JPT, vol. 23, no. 2, Okt 2021, doi: 10.5038/2375-0901.23.2.3.
- [3] J. Pucher, H. Park, M. Kim, dan J. Song, "Public Transport Reforms in Seoul: Innovations Motivated by Funding Crisis," JPT, vol. 8, no. 5, hlm. 41–62, Des 2005, doi: 10.5038/2375-0901.8.5.3.
- [4] L. Eboli dan G. Mazzulla, "A New Customer Satisfaction Index for Evaluating Transit Service Quality," JPT, vol. 12, no. 3, hlm. 21–37, Sep 2009, doi: 10.5038/2375-0901.12.3.2.
- [5] A. Nwachukwu, "Assessment of Passenger Satisfaction with Intra-City Public Bus Transport Services in Abuja, Nigeria," JPT, vol. 17, no. 1, hlm. 99–119, Mar 2014, doi: 10.5038/2375-0901.17.1.5.
- [6] T. A. Kumar, R. Rajmohan, M. Pavithra, S. A. Ajagbe, R. Hodhod, dan T. Gaber, "Automatic Face Mask Detection System in Public Transportation in Smart Cities Using IoT and Deep Learning," Electronics, vol. 11, no. 6, hlm. 904, Mar 2022, doi: 10.3390/electronics11060904.
- [7] Meliana Dwi Ayuningtias, Rizky Ramadhani Putri, dan Siti Sahara, "Pengaruh Tingkat Kualitas Pelayanan Oleh Petugas Dalam Transportasi Umum Transjakarta," JUPSIM, vol. 2, no. 2, hlm. 188–197, Mei 2023, doi: 10.55606/jupsim.v2i2.1346.
- [8] E. Rosita, W. Hidayat, dan W. Yuliani, "UJI VALIDITAS DAN RELIABILITAS KUESIONER PERILAKU PROSOSIAL," J.Fokus, vol. 4, no. 4, hlm. 279, Jul 2021, doi: 10.22460/fokus.v4i4.7413.
- [9] D. Rahmawati, H. Aulawi, R. Kurniawati, dan T. F. Sari, "PENGUKURAN KUALITAS LAYANAN BERDASARKAN DIMENSI SERVICE QUALITY (SERVQUAL) DENGAN METODE ZONE OF TOLERANCE (ZOT) DAN KANO PADA PET WORLD," Jurnal Teknik Industri, vol. 18, no. 1, 2023, doi: 10.14710/jati.18.1.21-32.
- [10] A. S. Fadhillah dkk., "SISTEM PENGAMBILAN CONTOH DALAM METODE PENELITIAN," vol. 3, 2024, doi: <https://doi.org/10.30997/karimahtauhid.v3i6.14047>.
- [11] G. Razali dan A. Syamil, METODOLOGI PENELITIAN KUANTITATIF, KUALITATIF, DAN KOMBINASI. CV. MEDIA SAINS INDONESIA, 2023. [Daring]. Tersedia pada: https://www.researchgate.net/profile/Ahmad-Syamil/publication/376832305_Metodologi_Penelitian_Kuantitatif_Kualitatif_dan_Kombinasi/links/658b79e10bb2c7472b131b05/Metodologi-Penelitian-Kuantitatif-Kualitatif-dan-Kombinasi.pdf#page=30
- [12] J. C. Medina, N. A. S. López, M. E. P. Terrón, dan J. V. M. V. Córdoba, "Kaizen: Improving Productivity and Reducing Waste in a Manufacturing Company: a Practical Case Study," J. Professional Business Review, vol. 9, no. 1, hlm. e04241, Jan 2024, doi: 10.26668/businessreview/2024.v9i1.4241.
- [13] Z. Hasan dan M. S. Hossain, "Improvement of Effectiveness by Applying PDCA Cycle or Kaizen: An Experimental Study on Engineering Students," J. Sci. Res., vol. 10, no. 2, hlm. 159–173, Mei 2018, doi: 10.3329/jsr.v10i2.35638.
- [14] J. Singh dan S. K. Gandhi, "Benefits using PDCA cycle of continuous improvement in manufacturing industry - a

- case study," *IJMCP*, vol. 17, no. 1, hlm. 83–97, 2024, doi: 10.1504/IJMCP.2024.135088.
- [15] A. Septiyanto, "Enhancing Productivity in Line X Regulator Assy 2 through the PDCA Method (Plan, Do, Check, Action)," *IJRESM*, 2024, doi: <https://doi.org/10.5281/zenodo.10571050>.
- [16] I. Marthiani, "Uji Validitas dan Reliabilitas Instrumen Penelitian Pemahaman Konsep Biologi," 2024, doi: <https://doi.org/10.61132/yudistira.v2i2.727>.
- [17] A. Syahlani, "Pengujian Secara Empiris (Uji Validitas dan Reliabilitas) Instrumen Minat Belajar Matematika Siswa," 2024, [Daring]. Tersedia pada: <https://j-innovative.org/index.php/Innovative/article/view/5026>
- [18] A. Arsi, "LANGKAH -LANGKAH Uji VALIDITAS REALIBILITAS INSTRUMEN DENGAN MENGGUNAKAN SPSS," 2021, doi: <https://doi.org/10.31219/osf.io/m3qxs>.
- [19] I. P. M. Sari dan F. U. Ermawati, "Instrumen Tes Diagnostik Konsepsi Lima Tingkat pada Materi Gerak Lurus: Pengembangan, Uji Validitas dan Reliabilitas serta Uji Coba Terbatas," *pendipa. jurnal. pendik. sains*, vol. 5, no. 2, hlm. 152–162, Jan 2021, doi: 10.33369/pendipa.5.2.152-162.
- [20] Z. Iqbal dan N. P. Grigg, "Enhancing voice of customer prioritisation in QFD by integrating the competitor matrix," *International Journal of Productivity and Performance Management*, vol. 70, no. 1, hlm. 217–229, Jan 2021, doi: 10.1108/IJPPM-04-2019-0175.