



For a better management of bus service quality in the city of Constantine

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Abstract

Our study desires to address the criticized issue by bus users in Constantine and suggest improvement in terms of service quality, attractiveness, and competition. We adopt an innovative approach that considers the characteristics of the buses and customer satisfaction for continuous improvement by associating the evaluation of the current situation through an in situ survey using well-chosen performance indicators concerning the culture of the Constantinian citizen with measuring satisfaction criteria using the KANO model. The indicators chosen are representative and measurable and allow precise mapping of the situation, the main of our research. The main result highlights the importance of rolling stock as one of the most important segments of the urban transport system, which justifies the amount of criticism it received. In the end, this study's results can help achieve several societal objectives, including safety, comfort, and efficiency of transport, for a better quality of urban life.

Keywords: urban transport; rolling stock; KPI; quality of service; customer satisfaction.

1. Introduction

Following a severe criticism of bus users in the city of Constantine, we propose through this study to highlight this problem in order to suggest improvements in the quality of service, attractiveness, and competition for this mode of transport.

For information, this city is known by the appearance and character of its lines, it marked a management proclaimed by the network, and buses are permanently assigned for a constant route as well as drivers. Thus, special attention is directed towards rolling stock quality in order to bring out the most effective policy that meets the needs of citizens in their mobility in terms of quality of service, well-being, and a better quality of social life. Quality of rolling stock is now one of the most important segments and, together with infrastructure and operating procedures, a fundamental component of the urban transport system (Kanthavel and al, 2021), (Jacyna and al, 2017). Therefore, to ensure its operation, being attractive and competitive, these assets must be properly maintained at optimal levels of safety, comfort, and cleanliness (Rohani and al, 2013). However, it should also be noted that several studies on the quality of urban transport in Constantine

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have addressed accessibility, quality through travel time, politics of exploitation, and a limited number of studies on the quality of rolling stock in Algeria. Thus, a previous study on the major problems affecting the quality of urban transport in Constantine by bus, simulates the problems of this category as a priority and the actions on rolling stock as essential thus 75% of bus users denounce the state of these latter and describe it as bad (Mounira and Rachid, 2021).

As a result, sustainable management is necessary and the question arises: how to assess the situation of rolling stock that will guide us towards the best reflections to improve the quality of service offered to the customer and satisfy users?

This work aims to ensure a good quality of urban transport network service, which is more than essential to the proper functioning of a self-respecting city. Ensuring this quality by this study basing on the choice of efficiency and effectiveness indicators which influence the quality of service on the one hand and the criteria of the users satisfaction on the other hand while taking into account the specific culture of the Constantinian inhabitant, to carry out the necessary actions to better improve the quality offered, made the originality of the contribution of this work.

2. Literature review

In terms of the quality of transport service, the perception of user behaviour is critical in the examination of all modes of transport (Sama and al, 2023), this was the objective of many recent studies on the quality of service that leads to the well-being of the quality of life of citizens. This quality of service is defined as the efforts made by organizations to meet the needs of clients (Anggraeni, 2021), and will be achieved by bridging the gap between client expectations and the service provided (Le and al, 2020). This has been the subject of many studies, and many approaches have been developed for such a measure of quality and satisfaction. Thus, P-TRANSQUAL offers four measurement dimensions, namely: Comfort, Tangible, Personnel, and Reliability (Vujičić and Prester, 2019)(Bakti, and Sumaedi, 2015). However, SERVQUAL proposes the dimensions of the offers concerning Access, Reliability, Responsiveness, Tangible, Security, Communication, Understanding, Competence, Credibility, and Courtesy (Suria and al, 2019), (Talapatra and al, 2022). For its part, SERVPERF is presumed to give more reliable results than the SERVQUAL scale in measuring quality of service and better diagnostic information (Dam, S. M and Dam, T. C, 2021). The common output of all these models is that their measurement principle is based on the use of performance indicators. In the same context, several studies on the quality of service offered by urban transport operators in Algeria, more particularly in Constantine, were examined in terms of measuring the quality of service appreciated by the following indicators: accessibility, geographic coverage, operational policy, and road safety (Bakiri and Guenadez, 2022) (Ghenouchi and Debache, 2018) (Benmechiche and Cherrad, 2018). In these studies, a very limited number are interested in the problem of quality of service on the safety, comfort, and operation of rolling stock, however, these problems are prioritized according to a study already conducted on urban transport problems in Constantine (Mounira and Rachid, 2021). This mission attention leads us to apply the concept of measuring the quality of rolling stock based on the principle of the models already mentioned, using performance indicators that reflect the reality of service provision to users while taking into account the measurement of customer satisfaction. This is based on judging criteria, which we can tell whether the customer is satisfied or not. The Kano model is among the models, which allow us to highlight customer preference criteria to attend to the satisfaction objective (Kohli and Singh, 2021). The method proposed by Kano allows us to determine for its

functions: proportionate, mandatory, and attractive, the criteria to be improved from a specific questionnaire (Dianoux, 2010). It has been applied in many research areas, including the transportation quality researches (Chen and al, 2021) (Asian and al, 2019).

Filling the gaps between the main common use of quality measurement researches using performance indicators and the mission research parts of rolling stock quality measurements in terms of Comfort, property and security while taking into consideration the priority of users satisfaction criteria, was the main objective of our work. It guides us to choose indicators that have an influence on the quality of service and the satisfaction of users while taking into account the culture of the Constantinian inhabitant, this common vision will be the benchmark for decision-making. This management strategy is based on the values, morals, and principles that make up the culture. The latter are known by all employees and users and are placed at the heart of management to be transformed into actions. As a result, we were inspired by existing methods and created our own approach and our own questionnaire. That makes the originality of this paper.

3. Working method

This article is part of a sustainable improvement process of urban transport management practices in the city of Constantine. In this approach, we address the problems related to rolling stock, which is the most criticized factor according to the users concerned (Mounira and Rachid, 2021).

The approach envisaged is a field survey (Samlak, 2020). This method of data production is associated with so-called qualitative methods as opposed sometimes to the so-called quantitative questionnaire survey (Blanchard, 2017). This was the main common methodology of all the quality measurements models such as TRANSQUAL and SERVQUAL, which prove its validity and efficiency (Niu and al, 2019) (Baharum and al, 2019).

To make our research more realistic and precise, we therefore opted for a method based on the collection of qualitative data (Intissar and Rabeb,2015), for a better understanding of the situation while using well-chosen performance indicators to better meet objectives by providing rich and insightful information. In this type of study, the choice of performance indicators guides the success or failure to achieve strategic objectives. However, they do not provide information on the achievement of strategic objectives. The study will therefore present the results of the evaluation with recommendations for improvement actions by implementing operational changes in the short term (Achhal, 2013).

The main challenge of this work is to know how to prioritize the actions to do in order to improve the quality offered based on this evaluation and including the preferences of the clients to expect their satisfaction. For attending this objective, this paper contribution is divided into two principals sections:

- The evaluation of the service quality,
- The identification of user criteria satisfaction.

The first section was organized in four steps:

- The first step, was to have well-chosen the indicators to carry out the direction of the study. Barabino in his work titled " An Integrated Approach to Select Key Quality Indicators in Transit Services " (Barabino and al,2020), covers the gap of the well chose of indicators by proposing an approach setting different steps starting by identifies a long list of indicators, defines their properties such as The relevance of the indicator to the concept of service quality, the Measurability, the Ease of availability, Speed of availability, the Interpretability,... etc, then involving experts

to elicit judgments for each indicator, evaluates the long list, and finally points out the most promising set. Following this approach steps, the selection of our indicators from the among list was based on the most important properties according to the specific properties of the study area and the culture of the citizens, for that the working group agreed that the evaluation of indicators should be pragmatic, so we have points out indicators we can measure visually and rapidly, we can interpret, and at a lower cost. We have eliminated indicators that some could not have produced.

- The second step was the collection of quality data about the service offered. In order to obtain the most realistic results possible, we conducted a field survey (Samlak, 2020). Through this method, we have clearly defined the direction and scope of our research area. We were a team of four people to carry out the survey, where we targeted bus drivers and station managers, as well as our visual observations. The investigation lasted 21 days to observe as many buses as possible.
- The third step was the processing of the data collected using a developed dynamic algorithm.
- The finale step in this section was to highlight each bus data sheet.

In the second section of this work, we target the user satisfaction criteria as follow:

- First step: We have prepared a questionnaire using the KANO method, which is used to measure client satisfaction criteria, in order to better understand their preferences. This questionnaire has targeted bus users already evaluated, for this, we have installed near the stations of the lines of these buses, and get approached the users during their descending from buses.
- Second step: the processing of the users answers using KANO matrix and diagram.
- Third step: resorting and highlight users preferences criteria.

For a better understanding of this work methodology, the following (figure 1) illustrate the work process:

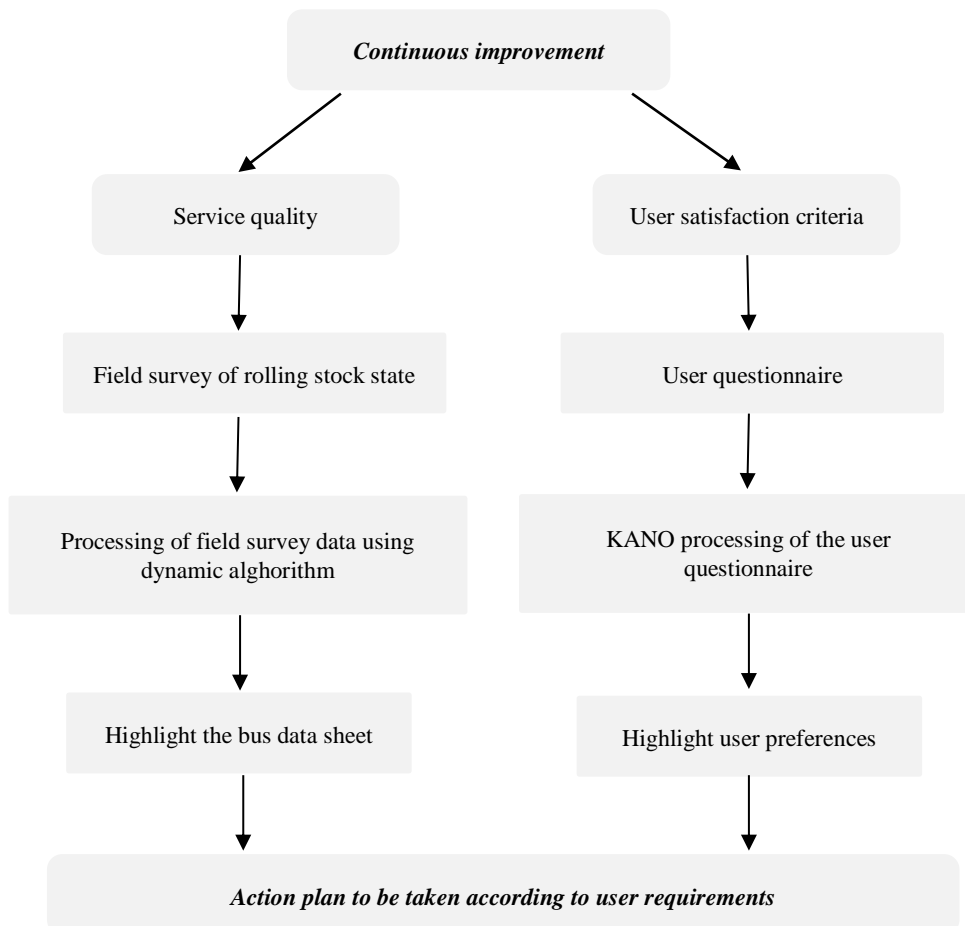


Figure 1: Work methodology process

4. Data collection and processing

3.1. Bus quality data collection.

The work was carried out at the level of the city of Constantine. The latter is the capital of the Wilaya of Constantine in Algeria. A metropolis in north-eastern Algeria, because of its central geographical position in the region, it is a junction point between the main North-South (Skikda-Biskra) and West-East (Sétif-Annaba) axes (Bouhadjar and Chabi, 2021). It has more than 740,000 inhabitants (1,000,000 in the agglomeration). It is considered the third most important city in Algeria in terms of population. We took as a case study 80 buses spread over the four main lines that connect the new city of Ali Mendjli to the four major urban poles of Constantine to get an overview of the quality of urban buses in this city. The relevant lines are shown in Figure 2.

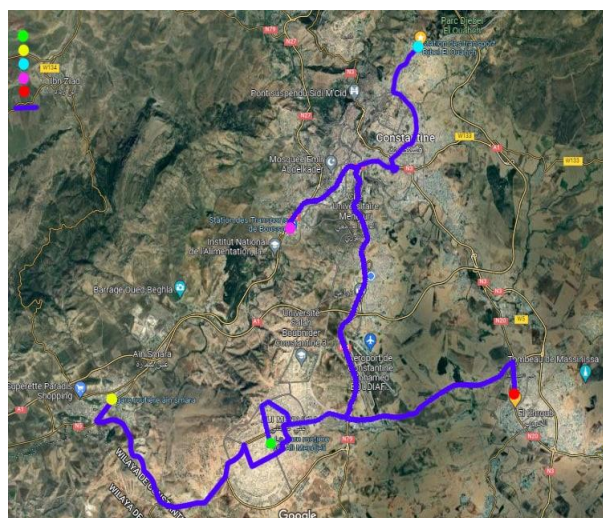


Figure 2: Study area.

As noted in the literature (De Oña, J., and De Oña, R., 2015), (Hawas, 2016), the evaluation of quality of service using performance indicators is the most appropriate technique to measure such a qualitative study. This reflection must be as close as possible to the reality of the operator's service.

For our study, two types of surveys were conducted. The first, concern bus quality was carried out at bus stations to evaluate buses. This assessment is based on bus situation. To reach our goal, a technical sheet has been prepared containing general information about the bus: type, number of seats, registration number, line, and measurement indicators. These indicators make it possible to monitor the performance assessment and analyze the current situation of bus states according to a scale of four parameters: good/ medium/ not good/ null. The choice of the main indicators among the categories defined by standard NF EN 13816 (Gilles and Cécile, 2015), many of this indicators are widely used in this research area (Myint, 2022) (Rodriguez-Valencia and al, 2022) (Irvansyah and al, 2020)

(Dilip and al, 2020) (Barabino and al, 2019). This guides us to choose three major kinds of indicators:

Elements characterizing comfort which physical aspect is felt in the vehicles along the journey. The aspects of driving flexibility and the transport service quality on the ride comfort as how a vehicle responds to road conditions also come under this theme

Elements characterizing vehicle safety deal with safety in the regulatory sense, which means vehicle compliance.

Elements characterizing the cleanliness of the vehicle, as well as their good general condition, are evaluated.

The indicators are then broken down into sub-levels so that they can be measured, as shown in Table 1:

Table 1: Measurement indicators.

	<i>measurement indicators</i>
comfort	The presence of a headrest; The presence of a children's chair in case there are children under the age of five; Air conditioning; Bus corridor length and width; Large side windows; Passenger volumes; Interior lighting The open air central vault; Seating arrangement; Noise (music, motor noise, etc.)
vehicle safety	Receptions and technical visits; The spare wheels; Emergency exit; Pick hammer or equivalent; Interior door opening controls; Transport approved extinguished, location of extinguished, and date of validity; First aid box; Markings and signage (no talking to the driver without duty, the maximum number of passengers, seated, standing, lying down, or in wheelchairs); Anti-skid device (any vehicle traveling on icy or snowy roads); Catalytic converter and filters; Oil filter change and change; Fire-resistant brushes; The car is equipped with an airbag that works in case of an emergency
Vehicle cleanliness	Clean seating; Clean windows (interior and exterior); Clean walls; Clean holding bars; Clean floors; Bodywork is clean and in good condition; Clean driving position ; No unpleasant odours

However, the second survey focuses on client satisfaction, next section.

3.2.Measurement of customer satisfaction.

Customer satisfaction is one basis on which the system is based. To measure it and highlight the criteria of satisfaction of a targeted population, we choose to use the KANO method (Jin and al,2022). The approach has the advantage of provoking a meeting with its customers and thus improving the understanding of the expectations of its market. This

helps to understand the needs of users. The model is built on the basis of a questionnaire Kano collects, for each function, the level of satisfaction of the interviewee. The originality of the approach lies in the dissociation of satisfaction and dissatisfaction with the presence or absence of the function expected by the client. It is essential to identify the features that offer the maximum benefits with the minimum investment, (Kermanshachi and al, 2022).

The results of this method are interpreted according to the crossing of the answer to the question on the lack of function and with that on the presence of the function on the standard KANO matrix presented in Table 2:

Table 2: KANO Matrix.

<i>customer requirement</i>		Lack of function				
		I am happy	It's normal	I am neutral	I do with	I am unhappy
Presence of function	I am happy	Q	A	A	A	O
	It's normal	R	I	I	I	M
	I am neutral	R	I	I	I	M
	I do with	R	I	I	I	M
	I am unhappy	R	R	R	R	Q

The specific meaning of each attribute is explained as follows (Zhang and al, 2018):

- Must be (M): If there is such a property, customer satisfaction will not be improved, and if it does not exist, the customer will be dissatisfied, and the user satisfaction will drop significantly.
- One-dimensional (O): The user will be satisfied, if not, the user will not be disappointed
- Attractive (A): The user will be very satisfied, and the user satisfaction will have a greatly improved emotional attitude. If not, the user will not be disappointed.
- Indifferent (I): It means that there is no need for this attribute, whether or not it exists, there will be no impact on the user experience; in other words, if it does not exist, it will not cause the customer to be dissatisfied.
- Reverse (R): If there is such a property, user satisfaction will decline.

The clients targeted by our study are bus users in the city of Constantine. As a result, we displaced near the stations of the buses concerned and get closer to their users while they exited buses to question them. The construction of the questionnaire is based on the linkage of the above quality indicators to establish the link between the quality of service and client satisfaction, as shown in Table 3.

Table 3: KANO survey.

<i>Quality indicator</i>	<i>KANO survey</i>
Comfort	Q1: option 1: what do you think about the comfort on the buses?
	Option 2: what do you think about the discomfort on the buses?
	Q2: option 1: what do you think about the noise on the buses?
	Option 2: what do you think about the quite on the buses?

Vehicle safety	Q3: option 1: What do you think about security in buses? Option 2: What do you think about insecurity in buses?
Vehicle cleanliness	Q4: option 1: What do you think about the inside cleanness of the buses? Option 2: What do you think about the inside dirt of the buses? Q5: option 1: What do you think about the outside cleanness of the buses? Option 2: What do you think about the outside dirt of the buses?

3.3.Data processing.

Our approach purpose is the continuous improvement of the urban transport system, so we opt the use of a dynamic approach in the data processing phase by applying a continuous improvement algorithm to the data obtained (figure 4). Therefore, for greater credibility and credible information, the user questionnaire is available on Google Forms and accessible to users at any time so that we can arrive at a continuous satisfaction measure based on the planned improvements, and regular investigations envisage the state of the buses programmed to continue the evolution of the situation of the buses. However, we mark here that our case study refer only a part of the Park, and this approach should be applied to all existing buses and to those whose operation project for a better quality offered to the customer.

The considered algorithm implies the existence of the three principal agents of the system: the client, the BUS operator, the agent and the admin.

Here, the client takes part with the notion of satisfaction, the BUS operator with the rolling stock, the agent who counts the controllers, and the admin that is the responsible for the decision, as shown in figure 3.



Figure 3 : Continuous quality improvement circle.

The data processing is deviated into two sections: the first is processing the data collected from the survey on the quality of rolling stock, and the second is processing the data collected from the users survey.

3.3.1. Rolling stock quality data processing

We tried to process the data by applying an algorithm that complements the exploitation of the simplest and most efficient solutions; this is shown in Figure 4.

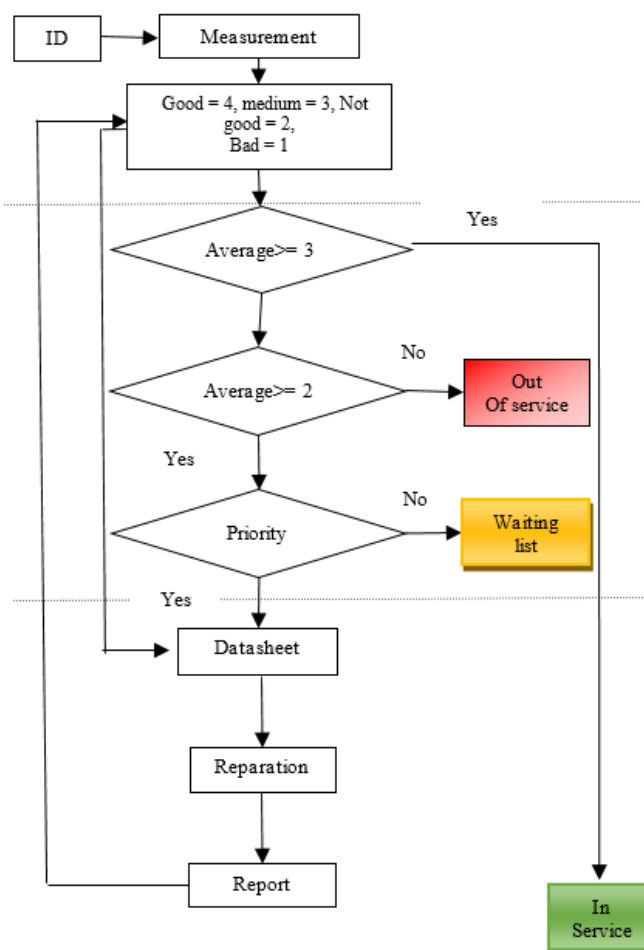


Figure 4: Processing data algorithm.

This algorithm process is divided into three steps; the first one is the phase of entering the vehicle to the evaluation:

- It will establish all vehicle information in the ID (registration, serial number, vehicle type, operator, etc.),
- The vehicle will be evaluated according to the indicators shown if the assessment is done on a sheet to be completed with the scale of (Al-Amin and al, 2021):
 - Well if the observer notices the function
 - Medium if the observer notices a lack of function
 - Not well if the observer notices an insufficient of function
 - Null if the observer notices the absence of the function

- The reading of the data will be translated into the program by the following notation grid:

- Well = 4
- Medium= 3
- Not well= 2
- Null = 1

The second step is the input port to the function; it will be assigned as follows:

- Averaged the input data
 - If the average \geq to 3, then the bus will be commissioned
 - If the average \leq to 2, then the bus will go out of service
 - If $3 \geq$ the average \leq 2, then we will check if the bus is a priority for the repair, otherwise, it will be transmitted to the waiting list, the prioritization will be classified buses in the range (3-2), the more the average is close to 3 the more the bus is priority repair.

Third step. The third step is the repair of the buses concerned.

- A technical sheet will be drawn up from the data entered by the observer, and the technical sheet will provide the repairer with all the information to define the characteristics to be repaired or improved according to the satisfaction criteria mentioned by the customers.
 - The repair will then be assigned by the experts in the field, and a report will be drawn up at the end for it to be entered a second time on the evaluation curve.

3.3.2. Processing of customer satisfaction data

The processing of the distributed questionnaire returns is based on the Kano matrix. We collected 201 responses, but as we mentioned above, this questionnaire is still available to customers, so the results are always up to date.

The results obtained allow us to calculate the satisfaction indicator and the dissatisfaction indicator for each criterion (as shown in Table 4). These two indicators make it possible to understand to what extent the presence or absence of a particular factor influences the level of customer satisfaction. We calculate them from the data of the formulas (Walas and Nemethy, 2017):

- the satisfaction indicator: $A+O / A+O+M+I$
- the dissatisfaction indicator: $O+M / (A+O+M+I) \times (-1)$

Table 4: calculate of satisfaction and the dissatisfaction indicators.

<i>users requirements</i>	<i>A</i>	<i>O</i>	<i>M</i>	<i>I</i>	<i>R</i>	<i>Q</i>	<i>Ranking</i>	<i>Degree of satisfaction</i>	<i>Degree of dissatisfaction</i>
Comfort criteria (Q1)	18	29	23	40	23	68	Q	0,42727273	-0,47272727
Noise pollution criteria (noise) (Q2)	43	86	13	34	15	10	O	0,73295455	-0,5625
Safety criteria (Q3)	11	50	59	35	19	27	M	0,393548387	-0,70322581

Internal property criteria (Q4)	30	77	30	29	14	21	O	0,64457831	-0,64457831
External property criteria (Q5)	45	32	16	78	12	18	I	0,4502924	-0,28070175

These results allow us to draw the following diagram (Qianli, Xu., & al, 2009) :

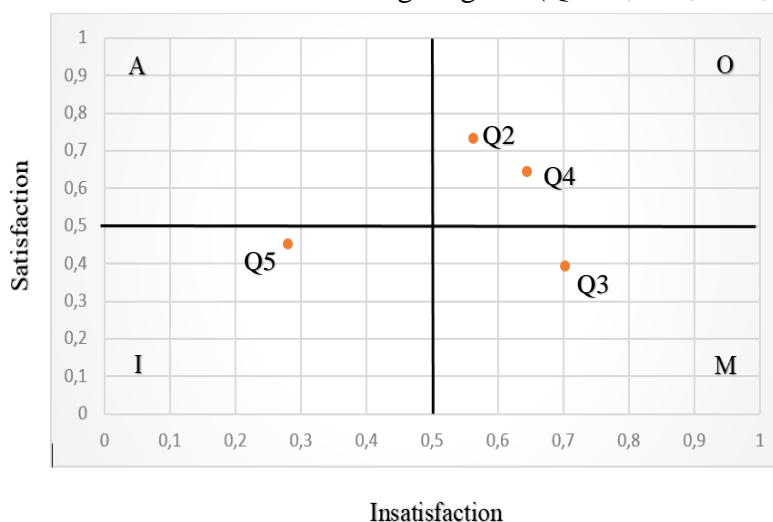


Figure 5: KANO diagram.

Figure 5 shows the classification of criteria on the Kano diagram according to the results of customer requirements, and following the evaluation rule "M>O>A>I" the priority characteristics to be repaired are those classified in category «M»: the safety criteria, then in category "O": the interior property criteria and the noise nuisance criteria. and which concerned The "I" category, it corresponds to the criteria of external property, its requirements don't matter much to increase customer satisfaction, and the lack of that function will not decrease it. And the "Q" category, where there are no solid messages about when they will become a priority for the customer and when their presence can compromise customer satisfaction, so it is generally overlooked. (Walas, B., & Nemethy, S., 2017).

4. Results

The first phase of the evaluation revealed the following results:

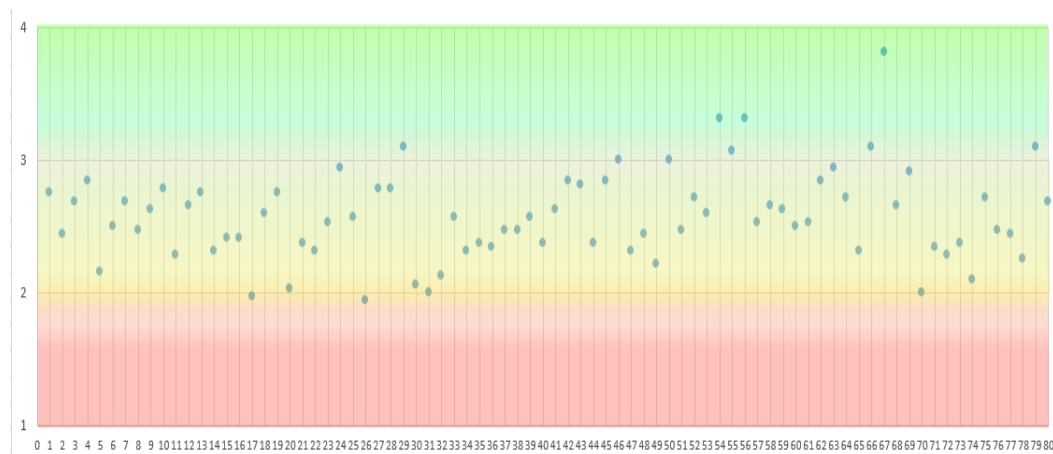


Figure 6: Evaluation result

Figure 6 shows three classification zones according to the previous evaluation grid, the green zone contains ID's of buses with an evaluation average of more than 3 and are evaluated positively, buses with ID 67, 54, 56, 66, 29, 46, 55, 50, and 79 are the buses concerned which are authorized to operate.

The red zone refers to ID's of buses with an evaluation average of 2 that will be decommissioned. It contains buses that have identifiers 20, 70, 31, 17, and 26.

The yellow zone corresponds to ID's buses classified with an evaluation average between 2 and 3, which must be revised. This requires special attention. Therefore, we will classify this category based on the condition of the buses; the closer the condition of the bus is to three on average, the more priority the bus has.

According to the results obtained, the most priority bus to be repaired is the one bearing the ID number 24. The corresponding data sheet accompany this bus shown in the table3.

Table 3: Bus technical data sheet.

<i>Pick hammer or equivalent device</i>	Null
<i>Registration and Signage</i>	Null
<i>anti-slip device</i>	Null
<i>Catalytic converter and filters</i>	Null
<i>Fire resistant brushes</i>	Null
<i>The car is equipped with an airbag that works in case of emergency</i>	Null
<i>Clean holding bars</i>	Null
<i>clean floors</i>	Not well
<i>Cleanliness of the driving position</i>	Not well
<i>The presence of a chair for children in case there are under five years.</i>	Null

Action to do	<ul style="list-style-type: none"> - bring a pick hammer - put instructions for prohibitions and displays in the vision of customers - equip the bus with a non-slip device - equip the bus with a catalytic converter and filters - provide a fire-resistant brush
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The bus in this case will be directed to repair, and the agent in charge of this task will apply the instructions mentioned in the data sheet in the order mentioned by the results of the customer satisfaction criteria measurement.

This bus had a positive review after the assignment of the first two tasks (put a hammer-pic and the Inscriptions) with an average of more than 3, in this case, the bus does not require the assignment of any other operation; it will go directly to the service.

To better see the influence of this approach to the service, we continue to apply it for the first 10 iterations on the buses concerned. It emerges from the result that the buses with IDs 24, 63, 69, 4, 62, 42, 45, 43, 28 and 10 were priority buses to repair according to our algorithm. Results of the update situation after repairs are shown in figure 7.

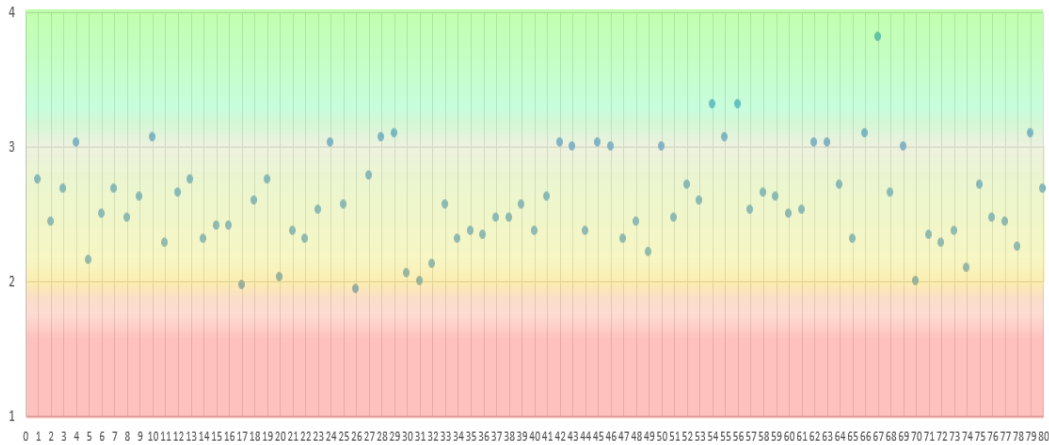


Figure 7: Result after first 10 iterations.

The figure above illustrates the improvement of the situation, it is considered a positive return on the application of the approach, and this only encourages the generalization of the application of this approach for the rest of the park in order to reach the continuous improvement goal and the desired customer satisfaction for a better quality of urban life.

5. Conclusion

In conclusion, it can be said that rolling stock is one of the most important segments of the urban transport system, which justifies its predominance in terms of criticism received by the users concerned. The results obtained from this study describing the real situation of rolling stock in this city are encouraging. However, the survey needs to be expanded to other lines to better consolidate the results, as our study covered only part of the park, four essential lines. Therefore, as perspectives, this approach should apply to all existing buses and those whose operation projects a better quality offered to the customer in the city.

As our aim is the continuous improvement of the urban transport system, we, therefore, choose to use a dynamic approach in the data processing phase by applying a continuous improvement plan to the data obtained. Noting here that the limitations of this approach take place at the level of the data collection phase, accordingly, and for greater credibility

and credible information, we have proposed to make one of the surveys of the quality of buses periodically at the level of the parking, as well as the satisfaction measurement questionnaire available on Google Forms accessible to users at any time so that we arrive at a continuous satisfaction measure based on the planned improvements, while taking into account the requirements lead to customer satisfaction. In the end, this study can help achieve several societal objectives, including safety, comfort, and efficient transport, for a better quality of urban life and more opportunities for active living.

References

- Achhal, Y. (2013). "Cadre méthodologique pour la conception d'indicateurs de performance de développement durable".
- Al-Amin, M., Islam, M. S., & Ahammed, M. S. (2021). Service Quality Analysis of Intercity Bus Service of Pabna-Dhaka Highway. *American Journal of Traffic and Transportation Engineering*, 6(4), 116-127.
- Anggraeni, F. N. (2021). "Analysis of user satisfaction of public transportation ojek online (gojek) through service instruments". *Jurnal Mahasiswa Ekonomi & Bisnis*, 1(2), 77-86.
- Asian, S., Pool, J. K., Nazarpour, A., & Tabaeian, R. A. (2019). "On the importance of service performance and customer satisfaction in third-party logistics selection: An application of Kano model". *Benchmarking: An International Journal*, 26(5), 1550-1564
- Baharum, S., Haron, S., Ismail, I., & Diah, J. M. (2019). "Urban bus service quality through sustainable assessment model". *Int. J. Supply Chain Manag*, 8(3), 576-585.
- Bakiri, H., Guenadez, Z. (2022). "The liberalisation of public transport in Algeria: between economic realism and social demands. Case of Constantine". *Journal of Human Sciences*, 757.
- Bakti, I. G. M. Y., & Sumaedi, S. (2015). "P-TRANSQUAL: a service quality model of public land transport services". *International Journal of Quality & Reliability Management*, 32(6), 534-558.
- Barabino, B., Cabras, N. A., Conversano, C., & Olivo, A. (2020). "An integrated approach to select key quality indicators in transit services". *Social indicators research*, 149, 1045-1080.
- Barabino, B., Coni, M., Olivo, A., Pungillo, G., & Rassa, N. (2019). "Standing passenger comfort: A new scale for evaluating the real-time driving style of bus transit services". *IEEE Transactions on Intelligent Transportation Systems*, 20(12), 4665-4678.
- Benmechiche, M., cherrad, S. E. (2018). "La circulation routiere à constantine et son effet sur son accessibilité". *Sciences & Technologie. D, Sciences de la terre*, 189-197.
- Blanchard, P. (2017). "Qualitatif et quantitatif : la fin du malentendu". *Science politique. Bruylant*.
- Bouhadjar, K., Chabi, N. (2021). "Espace public à travers l'histoire de la ville Algérienne, cas de Constantine et de sa nouvelle ville Ali Mendjeli". *Romanian Journal of Geography*, 65(1), 61-81.
- Chen, M. C., Hsu, C. L., & Huang, C. H. (2021). "Applying the Kano model to investigate the quality of transportation services at mega events". *Journal of Retailing and Consumer Services*, 60, 102442.
- Dam, S. M., Dam, T. C. (2021). Relationships between service quality, brand image, customer satisfaction, and customer loyalty. *The Journal of Asian Finance, Economics and Business*, 8(3), 585-593.

De Oña, J., De Oña, R. (2015). "Quality of service in public transport based on customer satisfaction surveys: A review and assessment of methodological approaches". *Transportation Science*, 49(3), 605-622.

Dianoux, C. (2010). "L'identification de la contribution des éléments de qualité à la satisfaction: le problème de la formulation des items dans le cadre d'un questionnaire Kano". *La Revue des Sciences de Gestion*, (2), 87-92.

Dilip, A., Devika, C. A., George, J. K., Winto, J. P., & Rahul, R. (2020). "Suitability of Existing Public Bus Routes". *Department of Civil Engineering, ASIET, India*. e-ISSN, 2278-1684.

Eboli, L., Forciniti, C., & Mazzulla, G. (2020). "Capturing the differences in perceiving service quality of metro passengers of Madrid". *European Transport \ Trasporti Europei*, 76(5), 1825-3997.

Ghenouchi, R., Debache, S. (2018). "Evaluation d'un service de transport collectif urbain par bus a travers le temps de parcours comme indicateur de performance : cas du grand constantine". *Sciences & Technologie. D, Sciences de la terre*, 173-187.

Hawas, Y. E., Hassan, M. N., & Abulibdeh, A. (2016). "A multi-criteria approach of assessing public transport accessibility at a strategic level". *Journal of Transport Geography*, 57, 19-34.

Idris, M. F. M., Saad, N. H., Yahaya, M. I., Shuib, A., Mohamed, W. M. W., & Amin, A. N. M. (2022). "Cost of Rolling Stock Maintenance in Urban Railway Operation: Literature Review and Direction". *Pertanika Journal of Science & Technology*, 30(2).

Intissar, S., Rabeb, C. (2015). "Étapes à suivre dans une analyse qualitative de données selon trois méthodes d'analyse: la théorisation ancrée de Strauss et Corbin, la méthode d'analyse qualitative de Miles et Huberman et l'analyse thématique de Paillé et Mucchielli". *Revue francophone internationale de recherche infirmière*, 1(3), 161-168.

Irvansyah, R., Sugiarto, S., Achmad, A., & Fahlevi, H. (2020). "Analysis of the Trans Koetaradja bus services considering latent variables of bus line services". In IOP Conference Series: Materials Science and Engineering (Vol. 917, No. 1, p. 012036). IOP Publishing.

Jacyna, M., Wasiak, M., Lewczuk, K., & Karoń, G. (2017). "Noise and environmental pollution from transport: decisive problems in developing ecologically efficient transport systems". *Journal of Vibroengineering*, 19(7), 5639-5655.

Jin, J., Jia, D., & Chen, K. (2022). Mining online reviews with a Kansei-integrated Kano model for innovative product design. *International Journal of Production Research*, 60(22), 6708-6727.

Kanthavel, R., Sangeetha, S. K. B., & Keerthana, K. P. (2021). "Design of smart public transport assist system for metropolitan city Chennai". *International Journal of Intelligent Networks*, 2, 57-63.

Kermanshachi, S., Nipa, T. J., & Nadiri, H. (2022). "Service quality assessment and enhancement using Kano model". *PloS one*, 17(2), e0264423.

Kohli, A., Singh, R. (2021). "An assessment of customers' satisfaction for emerging technologies in passenger cars using Kano model". *Vilakshan-XIMB Journal of Management*, 18(1), 76-88.

Le, D. N., Nguyen, H. T., & Truong, P. H. (2020). "Port logistics service quality and customer satisfaction: Empirical evidence from Vietnam". *The Asian Journal of Shipping and Logistics*, 36(2), 89-103.

Mounira, K., Rachid, C. (2021). "Towards a Better Ecology of Urban Mobility: The Case of the City of Constantine, Algeria". Proceedings from the Urban and Maritime Transport XXVII, 204, 143.

Myint, Z. P. P. (2022). "A Study on Customers Satisfaction of Public Transportation Service (Case Study: No 105 Busline Under Yangon Bus Service)" (Doctoral dissertation, MERAL Portal).

Niu, H., Yao, J., Zhao, J., & Wang, J. (2019). "SERVQUAL model based evaluation analysis of railway passenger transport service quality in China". *Journal on Big Data*, 1(1), 17.

Qianli Xu, Roger J. Jiao, Xi Yang, Martin Helander, Halimahtun M. Khalid, Anders Opperud, (2009). "An analytical Kano model for customer need analysis", *Design Studies*, 30(1), 87-110, ISSN 0142-694X.

Gilles, & Cécile, (2015). Qualité de service dans les transports collectifs urbains : Quelle prise en compte dans les contrats ?". Centre d'études et d'expertise sur les risques l'environnement la mobilité et l'aménagement.

Rodriguez-Valencia, A., Ortiz-Ramirez, H. A., Simancas, W., & Vallejo-Borda, J. A. (2022). « Understanding transit user satisfaction with an integrated bus system". *Journal of Public Transportation*, 24, 100037.

Rohani, M. M., Wijeyesekera, D. C., & Karim, A. T. A. (2013). "Bus operation, quality service and the role of bus provider and driver". *Procedia Engineering*, 53, 167-178.

Rosine, M., Philippe, k. (2015). "Mise en place d'une méthode d'évaluation de l'état corporel du porc métis (large white et race locale) au sénégal". *Épidémiol. et santé anim*, vol.68,p.95-104.

Sama, H. R., Chen, L. S., Nalluri, V., & Chendragiri, M. (2023). "Enhancing service quality of rural public transport during the COVID-19 pandemic: a novel fuzzy approach". *Public Transport*, 1-23.

SAMLAK, N. (2020). "L'approche qualitative et quantitative dans l'enquête du terrain: l'observation, l'entretien et le questionnaire". *Revue Linguistique et Référentiels Interculturels*, 1(1), 32-51.

Sauerwein, E., Bailom, F., Matzler, K., & Hinterhuber, H. H. (1996). "The Kano model: How to delight your customers". In International working seminar on production economics, Vol. 1, No. 4, pp. 313-327.

Suria, H., Ahmad, F. M., & Siti, N. S. (2019). "Bus service indicator: The different sight of performance index development". In *Journal of Physics: Conference Series*, IOP Publishing, 1349(1), p. 012049.

Talapatra, S., Santos, G., & Gaine, A. (2022). "FACTORS AFFECTING CUSTOMER SATISFACTION IN EATERY BUSINESS-AN EMPIRICAL STUDY FROM BANGLADESH". *International Journal for Quality Research*, 16(1).

Vujičić, M., Prester, J. (2019). "Assessing service quality of public tram transport in Zagreb city using P-TRANSQUAL model". *Zbornik Ekonomskog fakulteta u Zagrebu*, 17(1), 19-31.

Walas, B., Nemethy, S. (2017). "Attempt to assess tourist products in rural areas based on the Kano method as basis of customer experience". *Ecocycles*, 3(2), 24-31.

Zhang, J., Chen, D., & Lu, M. (2018). "Combining sentiment analysis with a fuzzy kano model for product aspect preference recommendation". *IEEE Access*, 6, 59163-59172.