Assessing Customer Satisfaction of Airport Train Service: An Application of the Kano Model

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Abstract. Every service firm must find ways to attract new customers, retain existing customers, and remain competitive and profitable. As competition increases, pursuing customer satisfaction becomes more important in this particular global market competitiveness. Previously, traditional methods believe that customer satisfaction and quality attributes have a linear relationship. In other words, customers might feel satisfied when certain quality attribute can be provided by the service provider; yet they might not feel satisfied when the quality attribute is missing. Nevertheless, this relationship is not that linearly simple. In some quality attributes, indeed an improvement in performance of the service attribute can significantly improve customer satisfaction; while on the other case, the customers might still accept the absence of a quality attribute without being dissatisfied. This phenomenon has been identified by the Kano model which uses a different approach to treat the relationship between customer satisfaction and quality attributes as two-dimensional terms. This research aims to evaluate customer satisfaction of airport train service by utilizing the Kano model. Eighteen attributes were employed in a case study that exhibited the application of the Kano model to assess customer satisfaction. By implementing the Kano model, it is intended to provide a strategy for the service provider to improve customer satisfaction.

1. Introduction
Transportation is regarded to be able to affect the growth of the city and its liveability since it enables trade between people, which is essential for the development of civilizations. More broadly, it has a meaningful impact that makes unity in the life of a country due to the ability to balance the development of economic and social systems of a country [1]. Transportation development is directed at the realization of a reliable, effective and efficient transportation system in supporting the dynamic movement human, goods and services, as well as regional development. In such case, the economic growth needs a reliable and efficient transportation system.

However, this reliability and efficiency could be disturbed by several problems, such as traffic congestion, long commutes, and urban freight distribution. In Indonesia, especially in Jakarta, its capital, the vehicle growth reached 5.35 % per year (2012-2016) [2]. Therefore, public transportation is considered vital, because it has many advantages for the economy, social and environmental sectors. For instance, it could reduce traffic congestion [3], play an essential role in enabling productivity and occasions by driving skills, labour, and knowledge within and between markets [4], reduce car ownership which can reduce parking space [5], advance physical fitness, mental health, and offers access to medical care plus healthy food [6]. From the social benefits point of view, it is the fastest, safest, and cheapest method to connect with work, family, and social activities [4]. Also, it decreases greenhouse gas emission in the environmental side [4].
One mode of public transportations is the airport train which aims to serve people who want to go to the airport or want to go home from the airport more quickly without facing the traffic jam. It is operation, the airport train must pay attention to its physical as well as non-physical conditions in determining the service quality delivered to the consumers. Both of these variables can be used to determine customers satisfaction in assessing the airport train service. The needs of assessing service quality of public transportation have been discovered by several scholars, e.g., [7], [8].

Previously, several quality management systems have been implemented to pursue customer satisfaction. It has been perceived in one-dimensional terms, i.e., the greater the fulfilment of desired quality attributes, the higher the customer satisfaction (or in other words, the relationship between customer satisfaction and quality attributes are treated as linear). However, there are some quality attributes that fulfill customer expectation to some extent without necessarily implying a higher level of customer satisfaction. The Kano model is intended to face this dilemma (see Section 2.2 for more elaboration).

This research tried to assess customer satisfaction of the airport train service by employing the Kano model. The P-TransQual [9] scale is used to derive the quality attribute of the airport train service. It comprises of four dimensions (i.e., comfort, personnel, reliability, and tangibles). Furthermore, eighteen attributes are generated from these four dimensions (see Section 2.1. for this discussion). A case study to exhibit the applicability of this method was conducted to assess customer satisfaction of Soekarno–Hatta Airport Railink (SHAR) located in Indonesia. This research is intended to give the management an insight to improve quality of the service to attain customer satisfaction from customers’ perspective.

2. Research Design

2.1. The dimensions of airport train service quality

There are four dimensions of airport train service quality that were used in this study, i.e., comfort, tangible, personnel, and reliability. These dimensions are adapted from the work of Bakti and Sumaedi [9] which proposed a model of service quality of public land transport services, namely, P-TRANSQUAL. The model does arguably have good validity and reliability and also stable when it was re-examined according to respondent’s characteristics differences. Furthermore, the four-dimension are disentangled into eighteen service quality attributes (see also Table 1) which would be described as following.

The first dimension is comfort. It represents passenger’s assessment of airport train’s safety and comfort. This dimension can be assessed using six attributes, i.e., passengers’ capacity in the airport train (C1), safety while using the airport train service (C2), security from crime while using the airport train service (C3), obedience to traffic (C4), comfortable temperature in the airport train (C5), and safety related to the behavior of other passengers in the airport train (C6).

The second dimension is personnel, which refers to passenger’s assessment of the services provided by employees of the service provider. It includes the courtesy, willingness to help, and understanding of passengers’ needs. The inclusion of this dimension is due to the fact that human as a customer is a vital aspect for improving the quality of the service. When customer consumes a service, this mechanism cannot be separated from the interaction between (among) humans. In the airport train service context, the passengers also need to communicate with the employees. This dimension consists of four attributes, namely, helpfulness of the personnel (P1), responsiveness of the personnel (P2), understanding of passengers’ needs (P3), and courtesy of the personnel (P4).

The third dimension is reliability, which represents passenger’s assessment of the reliability of the transportation in delivering passengers from the point of origin to the final destination. Several aspects have to be considered, such as the amount of the vehicle, the waiting time, the travel time, and the consistency of the airport train service in delivering passengers to the destination. This dimension is assessed by using four attributes, i.e., waiting time (R1), travel time (R2), adequacy of the airport train (R3), and delivery to the destination (R4).
The last dimension is tangibles, which represents the passenger’s assessment of the physical facilities provided by the transportation service provider. These physical facilities include the condition of the interior and exterior of the train as well as its engine. This dimension has a vital role for supporting other dimensions; for instance, on the comfort dimension, passengers would feel comfort when the condition of the airport train is clean for both the interior and the exterior. In addition, the condition of the engine can lead to a comfortable feeling of the passengers because a good engine condition can reduce the loudness of the airport train and could prevent road accident. Furthermore, the quality of the engine can support the performance of the reliability dimension of the airport train service. This dimension can be measured using four attributes, namely, cleanliness of interior, seating, and windows (T1), cleanliness of the airport train exterior (T2), the condition of airport train’s machine (T3), and the condition of airport train’s seats (T4).

**Table 1.** The service quality attributes used in this research

| Dimensions | Attributes | References |
|------------|------------|------------|
| Comfort    | C1 Passengers’ capacity in the airport train | [9], [10] |
|            | C2 Safety while using the airport train service | [9], [10] [11] |
|            | C3 Security from crime while using the airport train | [9], [10] [11], [12] |
|            | C4 Obedience to traffic | [9], [13] |
|            | C5 Comfortable temperature in the airport train | [9] [10], [14] |
|            | C6 Safety related to the behavior of other passengers in the airport train | [9], [10] |
| Personnel  | P1 Helpfulness of the personnel | [9], [11], [13] |
|            | P2 Responsiveness of the personnel | [9], [11], [13] |
|            | P3 Understanding of passengers’ needs | [9], [11], [13] |
|            | P4 Courtesy of the personnel | [9], [10], [13], [14] [15] |
| Reliability| R1 Waiting time | [9], [10], [13], [14] |
|            | R2 Travel time | [9], [10], [13], [14], [15] |
|            | R3 Adequacy of the airport train | [9], [10], [12] |
|            | R4 Delivery to the destination | [9], [13] |
| Tangibles  | T1 Cleanliness of interior, seating, and windows | [9], [10], [11], [12], [14], [15] |
|            | T2 Cleanliness of the airport train exterior | [9], [12], [15] |
|            | T3 The condition of airport train’s machine | [9] |
|            | T4 The condition of airport train’s seats | [9], [10], [14], [15] |

2.2. The Kano Model

The Kano model which was proposed by Kano [16] is a set of ideas and techniques that help to determine customers’ satisfaction with product features. Although it is initially proposed for physical products or goods, however, it has been further developed in the service area, see for example [17]–[21]. In this research, the Kano model was also applied in the service area, i.e., to assess customer satisfaction of airport train service.

The model is a two-dimensional state space that maps customer satisfaction and functionality (or service dimension’s performance). The vertical axis shows customer satisfaction (also called delight or excitement). It goes from total satisfaction (or delighted) to total dissatisfaction (or frustrated). The horizontal axis, on the other hand, displays the service performance (also called sophistication and implementation). It represents how much of a given feature the customer gets, or how well the implementation of the service being offered. It goes from no functionality at all (or insufficient amount of the quality) on the left-hand side to best possible implementation (or sufficient amount) on the right-hand side.
The qualities are then classified into five categories. The first is attractive (A) quality (also called exciters or delighters). It means when it presents, the customers will be satisfied; while it does not present, they would still accept without being dissatisfied. The second category is one-dimensional (O) quality. It means when it does present, the customers will be satisfied anyway, yet it depends on the level of the quality: the higher the quality, the higher the level of satisfaction; vice versa. Because of this proportional relation, this attribute is usually called linear. The third category is must-be (M) quality. It means when it does not present, the customers will be dissatisfied since the quality of the attribute is a necessity. In other words, the service providers need to have this attribute, but that will not make the customers more satisfied: they just will not be dissatisfied. The fourth category is indifferent (I) quality. It means that the customers will be indifferent, apathetic when it presents. They do not really care much about this attribute: which the presence (or absence) does not make a real difference in customer’s reaction to the service being offered. The last category is reverse (R) quality. It means when it does present, the customer will be dissatisfied; vice versa.

In order to determine the classification of each category of quality attribute, the Kano model employs a structured questionnaire consisting of pairs of functional and dysfunctional questions regarding each quality attribute. Functional questions denote situations in which the questioned attribute is provided sufficiently. Conversely, dysfunctional questions propose conditions that the determined attribute is insufficient. In a traditional Kano questionnaire, respondents have to choose only one of the following options: (1) I dislike it; (2) I accept it; (3) I am neutral; (4) I expect it; and (5) I like it. Those answers are then combined to get one of the previously described categories. Given fact that the respondents are asked from both sides of the same thing, the researcher would be able to tell if someone has not fully understood the questions. This condition might happen when there are “conflicting” responses, such as “I like it” and “I like it” on both sides: it is called questionable (Q), see Table 2.

| Table 2. The Kano evaluation table |
|-----------------------------------|
| Dysfunctional                     |
| Dislike                          |
| Like with                        |
| Do not care                      |
| Expect it                        |
| Like it                          |
| Q                                |
| A                                |
| A                                |
| A                                |
| O                                |
| R                                |
| I                                |
| I                                |
| I                                |
| M                                |
| R                                |
| I                                |
| I                                |
| I                                |
| M                                |
| R                                |
| R                                |
| R                                |
| R                                |
| Q                                |

2.3. Customer satisfaction index

At the next stage, the customer satisfaction index is examined. It is a customer-based evaluation system used to evaluate the service provider’s service. It is used to indicate whether satisfaction can be improved by providing new quality attributes, or by fulfilling existing quality attributes, which can only prevent customer dissatisfaction. The satisfaction increment index (SII) identifies whether improving one of attributes could enhance customer satisfaction [22]. When the SII value is close to 0, it indicates that the quality attribute does not have a very positive effect on the customer satisfaction (low value of SII is not an indication of customer dissatisfaction). On the other hand, when the SII value is close to 1, it indicates that quality attribute has a great influence on customer satisfaction. For the degree of customer dissatisfaction, the dissatisfaction decrement index (DDI) is examined. It identifies if one of the quality attributes is not met, whether it should be attributed to customer satisfaction. If the value of DDI is close to 0, it indicates that the quality attribute has no significant effect on the level of customer satisfaction. However, if the DDI value is close to 1, the provision of the quality attribute can decrease customer dissatisfaction. SII and DDI can be calculated using the following formula:

\[ SII = \frac{(A+O)}{(A+O+M+I)} \]
\[ DDI = \frac{-(O+M)}{(A+O+M+I)}. \]

3. Result

The purpose of this research is to implement the Kano model to evaluate customer satisfaction of the airport train service. The object of this study is SHAR, which is an airport rail link service in Indonesia. This airport rail link was built to cut travel time from the Jakarta city centre to the airport, as roads connecting the Soekarno–Hatta International Airport (SHIA) and Jakarta city centre are frequently affected by traffic congestion. At present, passengers can board the train from Manggarai, BNI City, Duri, Batuceper, and SHIA stations. There were 24 kilometres of existing train line from Manggarai to Batuceper and 12 kilometres of new track were built from Batuceper to SHIA station. At Duri, the trains reverse direction.

A questionnaire-based survey was conducted to collect the data. It consists of three parts. The first part aims to collect demographic data of the respondents. The second part is the functional part, and the third part is the dysfunctional part. Those parts utilize four dimensions (eighteen attributes) that has been already mentioned previously (see Section 2.1). The respondents of this survey have to have been experienced in using the service of SHAR. The potential respondents were first approached and asked if they agreed and wanted to participate in the survey. As mentioned earlier, the respondents can only answer the question through the following choices: (1) I dislike it that way, (2) I can live with it that way, (3) I am neutral, (4), it must be that way, and (5) I like it that way. Two hundred respondents participated in the survey. They consist of students, employees, civil servants, freelancers, etc., indicating the diversity for the purpose of the study. The profile of the respondents is displayed in Table 3.

| Variables | Percentage | Variables | Percentage | Variables | Percentage |
|-----------|------------|-----------|------------|-----------|------------|
| Gender    |            | Education |            | Employment|            |
| Male      | 57         | Elementary school | 1.5       | Employee  | 9          |
|           | 43         | Junior high school | 2         | Housewife | 2          |
| Female    |            | Senior high school | 71.5      | Pilot     | 1          |
|           |            | Bachelor’s degree | 24.5      | Student   | 77         |
| Age       |            | Graduate  | 3          |            |            |
| < 20      | 8          | Post-graduate | 0.5       | Freelance | 1.5        |
| 21-30     | 79         |            |            | Civil     | 5.5        |
| 31-40     | 3          |            |            | Servant   |            |
| 41-50     | 6.5        |            |            | Others    | 4          |
| > 50      | 3.5        |            |            |           |            |

A reliability test with Cronbach’s alpha [23] was carry out to verify whether the respondents’ answers to any question tended to be correlated to each other. The results are shown in Table 4. As one can see, the values of the Cronbach’s alpha for all dimensions are greater than 0.7, indicating that the questionnaire used in this research is reliable [24].

Table 5 shows the result of the classifying quality attributes (third column). Among the eighteen service quality attributes, only one of them is must-be quality attributes (M), while the rests are indifferent quality attributes (I). The “indifferent” quality means that the presence or the absence of these attributes will not provide much to the satisfaction of the customers [25]; hence, these attributes are unnecessary and discard these attributes will reduce costs [26]. The “must-be” quality means that if the attributes are not fulfilled, customers will not be satisfied and not interested in the service. Hereinafter, even if these attributes are completely fulfilled, it does not lead to customer satisfaction.
Table 4. The values of Cronbach’s alpha

| Dimensions  | Cronbach’s alpha | Functional | Dysfunctional |
|-------------|------------------|-----------|---------------|
| Comfort     | 0.796            | 0.896     |               |
| Personnel   | 0.883            | 0.914     |               |
| Reliability | 0.852            | 0.898     |               |
| Tangibles   | 0.868            | 0.915     |               |

Table 5. The results of the research

| Dimensions | Attributes | Quality attribute’s category | SII  | DDI  |
|------------|------------|------------------------------|------|------|
| Comfort    | C1         | I                            | 0.347| -0.291|
|            | C2         | I                            | 0.378*| -0.482|
|            | C3         | M                            | 0.343| -0.597*|
|            | C4         | I                            | 0.352| -0.383|
|            | C5         | I                            | 0.349| -0.513*|
|            | C6         | I                            | 0.325| -0.428|
| Personnel  | P1         | I                            | 0.371*| -0.437|
|            | P2         | I                            | 0.330| -0.467|
|            | P3         | i                            | 0.347| -0.393|
|            | P4         | I                            | 0.321| -0.485*|
| Reliability| R1         | I                            | 0.347| -0.474|
|            | R2         | I                            | 0.428*| -0.485|
|            | R3         | I                            | 0.367| -0.352|
|            | R4         | I                            | 0.392*| -0.495*|
| Tangibles  | T1         | I                            | 0.321| -0.508*|
|            | T2         | I                            | 0.376*| -0.361|
|            | T3         | I                            | 0.372*| -0.556*|
|            | T4         | I                            | 0.362| -0.459|

Finally, the result of customer satisfaction index as well as customer dissatisfaction index are also shown in Table 5 (fourth and fifth columns). Top six (highest for SII and lowest for DII) quality attributes of each index are identified by an asterisk. As one can see in Table 5, quality attribute of travel time (R2) has the highest value for customer satisfaction index, i.e., 0.428; meaning that if this attribute is increased, it will give the greatest impact in customer satisfaction. The quality attribute of delivery to the destination (R4) has the second highest value, i.e., 0.392; while the quality attribute of safety while using the airport train service (C2) has the third highest value, i.e., 0.378. The lowest value from the quality attribute of customer satisfaction index is cleanliness of the interior, seats, and windows (T1) and courtesy of the personnel (P4), i.e., 0.321. On the other hand, in customer dissatisfaction index, security from crime while using the airport train (C3) has the lowest value, i.e., -0.597. The second lowest value is T3, which is the condition of airport train’s machine with -0.556. Lastly, the third least value in customer dissatisfaction index is comfortable temperature in the airport train (C5), with the value score of -0.513. If these quality attributes are well improved, it will minimize customer dissatisfaction.

4. Conclusion
This work implemented the Kano model to examine customer satisfaction of the airport train service. A case study has been conducted at SHAR, Located in Jakarta, Indonesia. This work aims to be able to identify the quality attributes that can be improved to increase customer satisfaction. The result shows that there are seventeen “indifferent” (I) quality attributes and only one belongs to “must-be” (M) quality attributes. This work also reveals which quality attributes should be prioritized to maximize customer satisfaction index, and which quality attributes should be prioritized to minimize customer
dissatisfaction index. This work might be useful for the management of SHAR in order to analyse the quality of its service. Moreover, this work can provide such a reference for improving the quality of the service to increase customer satisfaction in the future.

5. References

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