

What's the cause of the decrease in the number of angkot's passengers for LDG route in the city of Malang

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Abstract. Increasing the number of population every year in the city of Malang makes the increase also the number of private vehicle users who trigger the occurrence of congestion and lack of public interest to ride public transport, especially in terms of operation and service of public transportation. The main purpose of the research is to explore factors causing the decrease of public transport passengers for LDG route. The research used Importance Performance Analysis. The results showed that the main factors causing the decrease of the number of passengers on the LDG route in Malang City based on the public perception such as driver behavior, the condition of the transport (inside and outside), transportation hygiene, the availability of place to put luggage, the availability of seating, the availability of route / route information LDG transport, duration of stop transportation time at the terminal, and length of travel time.

1 Introduction

Transportation is one of activities that has an important role in daily life. That is because transportation is closely related to the location and extent of human activities, goods and services. Transport also has an important role for the Indonesian people caused by several factors such as the geographical situation of Indonesia which consists of thousands of small islands and large, the waters of which comprise the bulk of the sea, rivers and lakes are in desperate need of their freight carried by land, water and air to reach all areas of Indonesia. However, behind the important role that transportation there are also some very crucial problems caused by lack of transportation planning precisely. One of the problems is congestion. One of the causes of congestion in urban areas is the increasing tendency of transportation service users to use private vehicles compared to public transport [1]. In addition to the improving economic conditions leading to higher levels of private vehicle ownership, the declining role of public transport is also due to the low level of public transport service itself. The low level of service usually involves inadequate facilities and infrastructure, long travel time, number of passengers exceeding transport capacity, low level of comfort, and difficult accessibility to certain areas.

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Mass transit commonly used by people in Indonesia is urban transportation (“Angkot”). City transport is a transport from one place to another within a city by public bus or public passenger car bound in the route (Ministerial Decree No. 35 in 2003). The public transportation that people want is orderly, smooth, safe, convenient and fast transportation. This is one of the options in developing urban transport system, especially mass transportation to remain in demand by the community. Development of urban transport also has a mission that must be able to reduce congestion, able to maintain the quality of the environment and affordable by all levels of society [2]. Malang City is one of the cities that has many centers of activity. It has a high rate of economic growth and it is a city that has a high number and density of the population. This is because Malang City is a city of Education filled with many students who come from various regions. These things certainly have a major influence on the transportation system in the City of Malang. The increasing number of population growth based on statistical data of Malang City in 2014 is 0.8 per cent per year. In addition, the growth of private vehicles in Malang last five years is an average of 8.5 per cent per year [3].

According to the Head of Department of Transportation of Malang City, the number of transportation that operates in Malang City has decreased. The total number of public transportation, which initially amounted to 2,500 units, now still operates only 1,500 units. Even from 1,500 units is only 70 per cent were frequent and feasible to operate. This is due to the lack of passengers. Based on the previous research, it is known that there is a decrease in the number of passengers in LDG route in Malang City by 73 per cent, from 612 passengers to 167 passengers [4].



Fig. 1 Condition of angkot (LDG route) in the city of Malang
Sources: Field Survey, 2017

Some urban transport carrying or transporting passengers exceeds a predetermined capacity in the standard of a maximum of 12 persons. The condition of the urban transport itself (LDG route) that is still less well maintained affects the comfort of the passengers while it is in the transport and also can reduce the passengers' interest to choose LDG route transport (Figure 1).

Figure 2 shows passengers rarely cause drivers have to wait long for passengers are transported not a bit. It is precisely to influence the waiting time of passengers who indirectly passengers who had boarded the transport had to wait for other passengers, even the waiting time can be up to 20 minutes. Thus, the waiting time of LDG passengers is quite long compared to the standard according to the World Bank that is more than 20 minutes.



Fig. 2 Angkot were parked and waiting for passengers at Pasar Besar Road
Sources: Field Survey, 2017

2 Methods

This type of research is reviewed based methods [5], the study was classified into quantitative and qualitative research. It is classified as quantitative because the data is in the form of numbers which is intended to interpret directly and analyzed through the number, level and scale as in the calculation of operational performance, financial performance and calculation of IPA. This research is also qualitative because in this research also uses data related to public perception, as well as graphs and diagrams to describe the characteristics of passengers.

2.1 Location

The location of the study is the road or corridor passed by the LDG route of public transport (“Angkot”) round-trip (Table 1 and Figure 3).

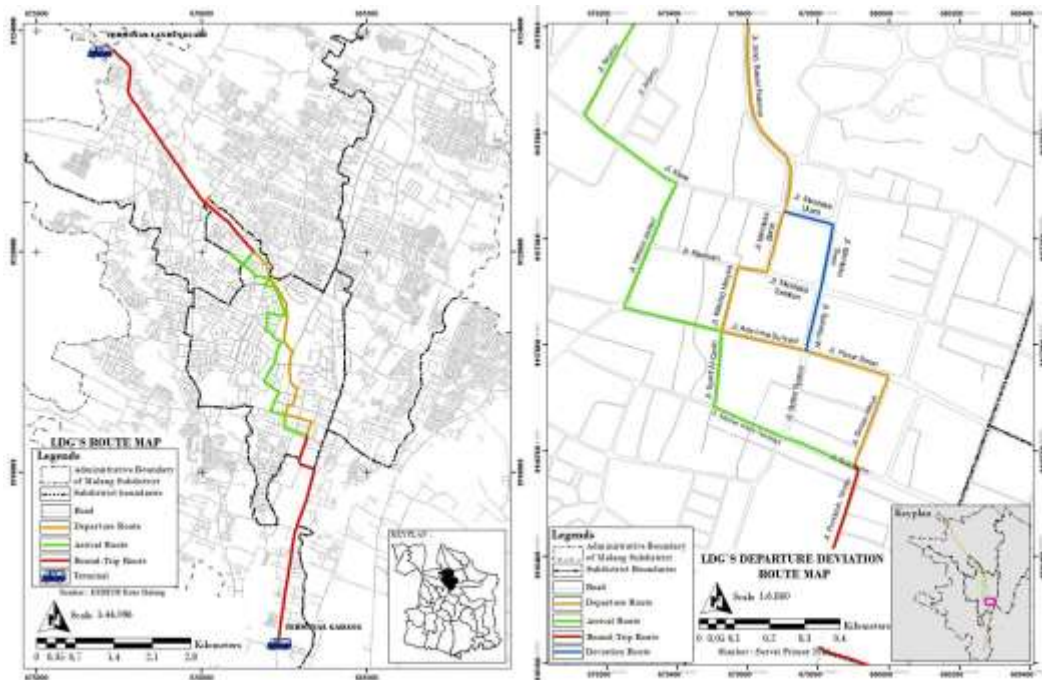


Fig. 3. LDG route of angkot round-trip in the city of Malang and deviation route

Table. 1 LDG route of angkot round-trip in the city of Malang

Route	Departure	Arrival
LDG	Landung Sari Terminal – Raya Tlogomas - Mayjen MT. Haryono – Mayjen Panjahitan – Brigjen S. Riyadi – Jend Basuki Rahmat – Merdeka Barat – Kauman – KH. Wachid Hasyim – Ade Irma Suryani – Pasar Besar – Sersan Harun – Kyai Tamin - Prof. Moh. Yamin – Sartono SH – Kol. Sugiono –Gadang Terminal	Gadang Terminal – Kol. Sugiono – Sartono SH – Prof. Moh. Yamin – Kyai Tamin – Kapten Piere Tendean - Syarif Al Qodri – Ade Irma Suryani – KH. Hasyim Ashari – Kawi – Bromo – Buring – Cerme – Guntur – Anjasmoro – Raung - Ijen – Bandung – Veteran – Terusan Bogor – Mayjen Panjahitan – Mayjen Haryono – Raya Tlogomas - Landung Sari Terminal

2.2 Sample

The population is the whole of the research subject. The sample is partially or representative of the population studied. Sampling of urban transport (Angkot) passengers can be done by interviewing urban transport (Angkot) passengers using accidental sampling method, ie taking samples with certain considerations that are not designed meeting first and easiness to get the necessary data, for example, easy to find, easy to reach or coincidence [5]. In this study the population taken is the entire population in Malang City. The calculation of the sample of city transport is calculated using the Bernoulli formula as follows:

$$n = \frac{\left[\frac{Z_{\alpha}}{2} \right]^2 \cdot p(1-q)}{e^2} \quad (1)$$

Information:

n = total of minimum sample

Z = the level of significance ($\alpha = 0.05$) so obtained ($Z = 1.96$)

e = level of error (10%)

p = the proportion of the number of questionnaires considered correct (50%)

q = the proportion of the number of questionnaires considered to be false (50%)

Determination of samples of urban transport drivers can be conducted by interviewing directly to the driver of urban transportation for LDG route in Malang City. Determination of sample from the owner of urban transportation can be conducted by interviewing directly to the owner of urban transport LDG route in Malang.

Thus obtained results of the calculation as follows:

$$n = \frac{\left[\frac{Z_{\alpha}}{2} \right]^2 \cdot p(1-q)}{e^2}$$

$$n = \frac{[1,96]^2 \cdot (0,5) (0,5)}{(0,1)^2}$$

$$n = \frac{3,8416 \times (0,25)}{0,01} = 96.04 \sim 96$$

Based on the sample calculations using the Bernoulli formula, the minimum sample obtained for this study is as much as 96 respondents.

2.3 Data collection

2.3.1 Primary survey

The collection of primary data is the data collected by direct observation to locations that have been previously. The techniques used in this survey include [6]:

1. Observation or Field Survey: Observation is a direct observation to the object of research and the systematic recording of matters relating to research activities carried out. The observations in the form of identification of potential problems that exist in the study area. This observation technique is used to find out the performance of LDG route service including passengers up and down point, number of operating fleet, travel time, load factor, and headway.
2. Interview: Interview is a means of collecting data used to obtain information directly from the source.
3. Questionnaire: The questionnaire is a list of questions given by researchers to others who are willing to provide a response (respondent) in accordance with the request of researchers. The purpose of distributing this questionnaire is to find complete information about a problem from the respondent. Questionnaires are divided into two types: open questionnaires and closed questionnaires.
4. Documentation: The documentation is intended to obtain data directly from the research include relevant books, legislation, activity reports, photos and data relevant to the study. In this study, documentation will be collected in the form of photographs during field observation (photos of LDG transport, terminal, photograph of field survey activities, etc.).

2.3.2 Secondary survey

Table 2 Institutions and data required

No.	Institutions	Data	Function
1	Regional Development Planning Board (BAPPEDA) Malang	<ul style="list-style-type: none"> • SHP Map of Malang City • Spatial Plan of Malang City 	<ul style="list-style-type: none"> • References • Profil • Used in making alternative programs in the form of policies and related issues that will be submitted to the experts / stakeholders.
2	Central Bureau of Statistics (BPS) Malang	<ul style="list-style-type: none"> • Malang City in Figures • Distrcit in Figures 	
3	Department of Transportation (DISHUB) or the Department of Traffic and Road Transport (DLLAJ) Malang	<ul style="list-style-type: none"> • Number of city transportation fleet in Malang city 2017 • Route of urban transport route in Malang • Number of fleet per route of transportation of city of Malang • Mileage distance every urban transport trajectory in Malang City 	

Secondary data collection is conducted by obtaining data from related institutions, studying scientific papers, literatures, reports, as well as other literature related to the issues discussed in order to obtain the theoretical foundation in the discussion. This study will be obtained from the initial hypothesis is based on conditions on the ground and do a comparative study between the field and the theories of the existing literature.

2.4 Importance performance analysis

Importance Performance Analysis (IPA) in this study is used to determine the level of satisfaction and the interests of public transport passengers based on the criteria that have been prioritized by the stakeholders that will be used in determining the variables related strategies any transport service is lacking and needs to be enhanced or prioritized handling.

Table 3 Variable of public transport service assessed by public transport passengers for LDG route

Criteria	No	Variable
Safety	1	Avoidance of accidents
	2	Free from crime or free from crime in Public Transport (Angkot)
Comfort and Load Factor	3	Duration of passengers waiting for LDG transport
	4	Driver behavior (reckless / kebut-kebutan)
	5	Driver service to passengers
	6	Ease of passengers while up and down from transport
	7	Protection from bad weather
	8	Transport conditions (inside or outside)
	9	Cleanliness in transport
	10	Availability of place to put luggage
	11	Seating availability (not crowded)
	12	Condition and quality of seating
	13	Ease of reaching the stop of transportation (bus stop)
	14	Interesting stops
	15	Raise and lower passengers in designated places
Reliability	16	Operational schedule / transport schedule has a fixed schedule
	17	The availability of public transport that serves passengers at all times
	18	There are stops / halte
	19	Availability of route information / LDG transport routes
	20	Transportation operates through route / route that has been determined
Travel Time	21	The number of LDG transport that operates / serves passengers at any time
	22	The length of time stops transport in the terminal
	23	The length of the driver up / down passenger
	24	Transportation time duration (short)
Tariff	25	Tariffs from LDG transport (the amount of expenses that passengers spend on travel destinations)
	26	Costs are relatively cheap / affordable
	27	Tariff suitability of transportation with travel time
	28	Provision of special tariff for children and students

This is the phase of the IPA method in detail from the weighting stage to the stage of determining the variables based on each IPA quadrant.

1. Weighting: The scale used is the Likert scale (5 levels) which is generally used in research is the measurement of attitudes, opinions and perceptions of a person or group of people about social events or symptoms [6].
2. Conformity Level: User satisfaction is illustrated by the degree of conformity between the perceptual assessment of the quality and the importance level assessment of aspects of service performance.
3. Cartesian diagram: X axis filled the score of service / implementation quality level, and Y axis filled by score of importance level.

Cartesian diagram is a structure that is divided into 4 sections bounded by two lines that intersect perpendicularly at the points (X, Y), where X is the average of the average score of the level of perception / satisfaction of users of all the items in service. Y is the average of the average score of importance of all factors affecting service user satisfaction (Figure 4).

The value of each factor is:

$$x_i = \frac{X_i}{n} \quad (2)$$

$$y_i = \frac{Y_i}{n} \quad (3)$$

The determinant as the midpoint on the X and Y axes:

$$\bar{x}_{\max} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \quad \dots \dots \dots (4)$$

$$\bar{y}_{\max} = \frac{y_1 + y_2 + y_3 + \dots + y_n}{n} \quad \dots \dots \dots (5)$$

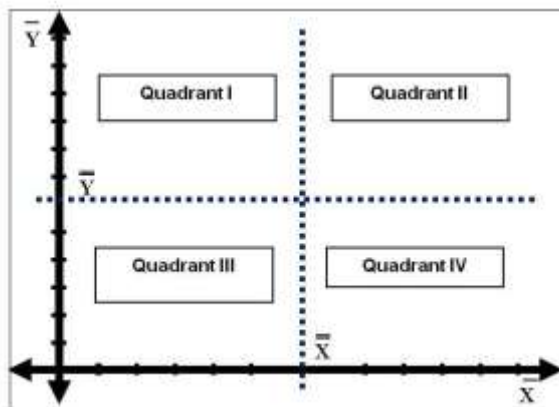


Fig. 4 Cartesian diagram

The following is an explanation of the four quadrants contained in the IPA method [7]:

1. Quadrant I: Concentrate Here

The factors in this quadrant are considered to be a very important factor by consumers but the current conditions are not satisfactory so the management is obliged to allocate adequate resources to improve the performance of these various factors. The factors in this quadrant are a priority to be improved.

2. Quadrant II: Keep Up The good Work

Factors in this quadrant are considered as supporting factors for customer satisfaction so that the management is obliged to ensure that the performance of the institutions they manage can continue to maintain the achievements that have been achieved.

3. Quadrant III: Low Priority

Factors in this quadrant have a low level of satisfaction and at the same time is considered not very important for consumers, so the management does not need to prioritize or pay too much attention to these factors.

4. Quadrant IV: Possible Overkill

The factors in this quadrant are considered less important and management needs to allocate resources related to those factors to other factors that have higher handling priorities that still require improvement.

3 Result and discussion

The result of IPA is a quadrant divided into 4 (four) sections bounded by two intersecting lines (Figure 5 and Table 2). The X axis is obtained from the average of the satisfaction rate score (\bar{X}) of 3.58 whereas the Y axis is derived from the average of the average interest rate score (\bar{Y}) of 4.09.

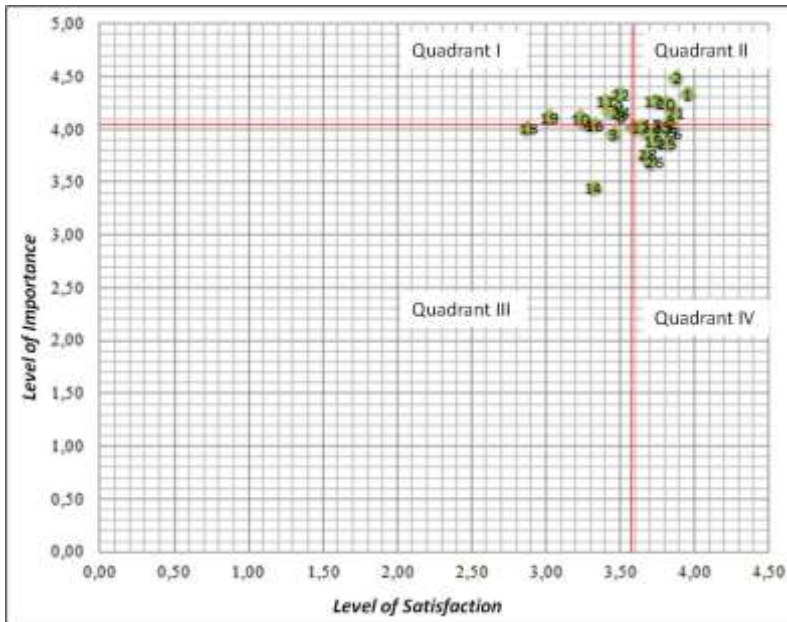


Fig. 5 IPA diagram

Variables or attributes in quadrant I by society (passengers of LDG transport) is a variable with the main priority that must be improved and improved performance. This is because the variables contained in quadrant I is a component of LDG transport service which is considered as a factor with a very high level of importance but in its implementation has not been satisfactory or not in accordance with the wishes of the community.

The criteria of improvement of public transportation service (LDG route) in Malang City according to the community needs to be prioritized handling that consists of:

1. Comfort with criteria that need to be improved include driver's behavior in driving, transport conditions (inside or outside), cleanliness of transport and availability of place to put luggage.
2. Load Factor with components such as seat availability in the sense that passengers do not sit squashed.
3. Reliability includes the availability of route information / LDG transport routes.
4. Travel time with components that need to be repaired is the length of time to stop transport in the terminal and the length of time travel or transport time in the vehicle (transport) is short.

Table 4 Variable coordinate points existing in quadrant I

No.	Sub variable	X	Y
1	Avoidance of accidents	3.96	4.33
2	Free of crime or criminality in transport	3.89	4.49
3	Protection from bad weather	3.84	4.05
4	The availability of public transport that serves passengers at all times	3.73	4.27
5	Transportation operates by route / route that has been determined	3.81	4.25
6	The number of LDG transport that operates / serves passengers at all times.	3.88	4.17

4 Conclusion

The main factors causing the decrease of the number of passengers on the LDG route in Malang City based on the public perception such as driver behavior, the condition of the transport (inside and outside), transportation hygiene, the availability of place to put luggage, the availability of seating, the availability of route/route information LDG transport, duration of stop transportation time at the terminal, and length of travel time.

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