

Measuring Public Transport Satisfaction from User Surveys

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Abstract

Customer satisfaction has been considered one of the most important factors in any industry or service due to its direct relation to customer retention. Recent estimates indicate that the mode share of public transport in Amman is only 17%; of these users 65% do not own a car, hence they are considered captive riders. This paper focuses on the user satisfaction with the public transportation system in the city. A user survey was developed to explore the satisfaction of bus users, minibuses users and jitney users. Bus users were found to be the most satisfied. However, the overall average of satisfaction reflects that generally all users are not sufficiently satisfied with the transit system. Transport planners and decision makers could utilize the results and findings of this study, to focus on the attributes that are important for public transport users. The outcomes also direct the attention of transit authorities and operators towards the attributes that scored low in satisfaction, consequently requiring improvement. It is necessary to increase user satisfaction through improving the public transport system in Amman, in order to maintain existing users and attract new passengers. These improvements will make the city more sustainable and reduce the use of private cars in the future. Future research could replicate the adopted methodology with public transport users in similar countries for comparison purposes.

Keywords: satisfaction; public transport; user surveys, Jordan

1. Introduction

General customer satisfaction studies link the use or reuse of a commodity or service to the extent to which customers are satisfied. High quality of service is correlated with relatively high customer satisfaction (Alireza et al., 2011). This research investigated the extent of customer satisfaction for users of public transport services in Amman. Public transport users have needs and preferences, including reliability, convenience, safety, comfort, accessibility, and affordability, that affect their satisfaction with the services provided. A comprehensive list of travel attributes influencing public transport-user satisfaction has been derived from the literature and investigated through user surveys. In order to determine the quality of a public transport system, user surveys are used to collect ratings on specific operational aspects, such as network coverage, waiting time, availability of service, among others. The results and findings of this research highlight to transport planners and decision makers the attributes that are important for public transport users, by mode, to focus on. The outcomes also draw the attention of transit authorities and operators towards the attributes that had a low score in satisfaction; thus these features require improvement.

2. Literature Review

Over the last two decades, service quality has been a subject of interest for many studies (Oliver 1993; Spreng & Mackoy, 1996). It has also been increasingly receiving academic attention by management scholars, and has been prioritized in the management domain (Sweis et al., 2013). In addition, service quality is important to industry practitioners, due to its positive impacts on both organizational success and company growth. Firms make every effort to meet their customers' demands to achieve better customer satisfaction and loyalty, in order to ensure their survival (Sweis et al, 2013). To put it in other words—the ultimate aim of any firm is to meet its customers' needs. Although there are many definitions of service quality in the literature, all of them state that it involves finding out if a customer's experiences of a service meets, exceeds, or fails short of the customer expectations (Cronin & Taylor, 1992). Accordingly, Parasuraman et al. (1988) defines service quality as “the degree and direction of discrepancy between the consumer's perceptions and expectations, or the extent to which a service meets or exceeds customer expectations.” By identifying differences between customer

expectations and perceptions of service, management personnel would be able to remedy shortcomings in the products or services they offer.

To relate this to public transport services, a transit user is viewed as a customer who needs to be satisfied with the quality of service; users of public transport services compare the provided transit services with their needs and expectations. Satisfaction could be represented as a function of the performance of the attributes of the service, personal needs (and/or preferences) of the user, past experiences, and previous knowledge. During the last decades, efforts have been made to evaluate transport user satisfaction by assessing the quality of the service and identifying users' priorities (TRB, 2004). It is important to differentiate between service quality and satisfaction, since quality judgment can be made without experiencing the service, while satisfaction judgment requires an experience of the service.

Transport agencies need to realize the importance of customer satisfaction, since it is much cheaper to retain existing customers than to attract new passengers. Under the limited budgets available for increasing the quality of public transport systems, transport authorities must identify priorities for increasing the users' global satisfaction. The relationships between quality and satisfaction and between quality judgements and satisfaction judgements are complex. In the context of transportation, this implies the identification of the factors that reflect the proper functioning of the transport system. Namely, improving these significant factors should maximise the global satisfaction perceived by the users. Tyrinopoulos and Antoniou (2008) defined user satisfaction in a public transport system as "the overall level of attainment of a customer's expectation, measured as the percentage of the expectations actually fulfilled". This satisfaction level is an aggregate measure of the satisfaction perceived by the user for different aspects of the transportation system.

There are many available methods for finding an aggregate measurement from a series of observations, measurements or scores. In principle, these methods are broadly divided into two types: with or without statistical hypotheses being made on the observations. The methods without statistical hypotheses are diverse, ranging from methods based on the use of aggregation functions or operators, to methods relying on fuzzy logic models and neural networks. Eboli and Mazzulla (2009) provide a list of works that use non-statistical methods to obtain global indices. The methods based on statistical hypotheses are also diverse. The majority rely on structural equations modelling as a method for obtaining the global satisfaction index. This is the case of the works by Friman and Gärling (2001) and Friman et al. (2001) in Sweden. Methods that use different types of regression analyses are also encountered: Agarwal (2008) in India and Budiono (2009) in Indonesia employed linear regression whereas Ji and Gao (2010) in China used a multilevel logistic regression.

The quality of public transport systems have been directly observed through user surveys by collecting ratings given by the users to specific aspects of the system (Del Castillo & Benitez, 2013). Surveys are a common and useful tool to determine the quality of a transit service and/or measure the satisfaction of public transport users. Stradling et al. (2007) measured 68 items that bus users liked/disliked about the bus network in Edinburgh. Fellesson and Friman (2008) compared customers' perceived satisfaction with public transport services in nine European cities. The results showed that significant aspects contributing to users' satisfaction are timetable adequacy and service frequency, service reliability and information, bus stop design, staff skill and safety, among others.

Although there has been substantial research concerning transport users satisfaction elsewhere, there have been no attempts to investigate public transport users' satisfaction in Jordan. Given this gap in the literature, this study seeks to identify and measure the factors that affect transit user satisfaction in Amman, Jordan, through user surveys.

3. Background

Amman, the capital of Jordan, is a growing city with an estimated population of over 3 million people. The rapid population growth is expected to continue in the coming years and reach 6.4 million inhabitants by the year 2025 (GAM, 2009). Approximately 55% of Amman's population is under the age of 25 (Department of Statistics, 2012), among which there is a large number of students in schools, colleges, and universities. The median annual household income of the city's residents is estimated at 5,200 Jordanian Dinars (GAM, 2009), of which approximately 750 JD, or 14%, is annually spent on transportation. This latter number has been increasing over the past few months, following the government's decision since 2008 to lift its subsidies on fuel, and periodically revise fuel prices in Jordan to reflect worldwide market prices. The city's rapid growth and unplanned urban sprawl has resulted in reduced mobility and accessibility, increased traffic jams, and weakened the insufficient public transport systems. It is worth mentioning also the undesirable negative environmental (both noise and pollution) and safety impacts associated with increased vehicular traffic. This is reflected in the

high percentage of licensed vehicles in Amman; making up 79% of the total vehicles of Jordan, with a total of 963,211 vehicles in 2012 (Salameh & Imam, 2014).

The mode share of public transport (excluding regular taxis) in Amman is estimated to be 17% with residents making about 500,000 public transport trips per day, of which 48,000 are during the peak hours. Currently, the system is largely used by captive riders. A recent estimate (GAM, 2009) indicated that around 65% of public transport users in Amman do not own a car and have no other alternative besides public transport. On the supply side, the current public transport system is characterized as being fragmented, unplanned, unreliable, and not responsive to mobility needs of the citizens. The transit service lacks the characteristics of a modern system. All three transit services do not provide their users with adequate information about routes, frequency of services (or schedules), and service times. Nevertheless, the minibus and jitney services operate without designated stops; they are simply hailed at any point along their routes.

The public transport fleet in Amman is composed mostly of smaller vehicles operated by either independent operators or small companies. The fleet mix consists of buses, minibuses (or coasters), jitneys (fixed-route taxis), or regular taxis. Table 1 presents a breakdown of the fleet composition, as well as the number of operators and routes. As can be seen from Table 1, there is a relatively large number of regular (yellow) taxis in Amman. These taxis are considered fairly cheap and are often used as a commuter mode, contrary to what is the case in many other cities worldwide. Table 1 also shows that jitneys are run on an owner-operator basis.

Table 1. Fleet composition of Amman's public transport system

Type	Operators	Vehicles	Routes
Buses	15	470	96
Minibuses (Coasters)	307	440	148
Jitneys	3,215	3,257	70
Regular Taxis	280	10,636	-

4. Methodology

A survey was conducted among public transport users in Amman, the capital of Jordan, in order to measure their satisfaction with the services provided. The surveys were carried out by boarding operative buses, minibuses, and jitneys on working days and interviewing randomly selected passengers. Therefore, the respondent population corresponds to all types of transit users in the city. Regular taxis were not included in the sample, due to their high cost; making them categorized as a form of private transport. The survey consisted of two parts; the first part contains general questions about gender, age, occupation, and the most regularly transit mode used. The second part is the major part of the questionnaire which consists of eighteen travel attributes. In previous literature, the most relevant features of the transportation system regarding the user satisfaction were found to be: trip duration, reliability, fare, network connectivity, information, comfort, safety, accessibility, and staff's behaviour. Besides those, environmental impacts and sustainability have been considered recently. A sample questionnaire is provided in Appendix A.

Each respondent was asked to rate their satisfaction with each item on a scale from 1 to 10; where 1 is least satisfied, and 10 most satisfied. Similarly there were asked to rate the importance of each feature using a Likert Scale on five levels from 1 "Not important" to 5 "Very important". Since it was impossible to administer surveys to all transportation system users; sampling was necessary to obtain a representative proportion of all users of transportation system. Simple random sampling was used to ensure that each potential respondent within the target population stood an equal chance of being included in the sample. Four hundred and fifty questionnaires were distributed, 191 of them were returned from males, while 185 from females. Figure 1 shows the percentage of returned questionnaires categorized by the respondents' occupation.

To effectively represent and measure customer satisfaction with the public transportation system in Amman and for the purpose of data analysis, responses were collected from all transportation modes used as follows:

- Bus Users (119 users);
- Minibus Users (132 users);
- Jitney Users (125 users);

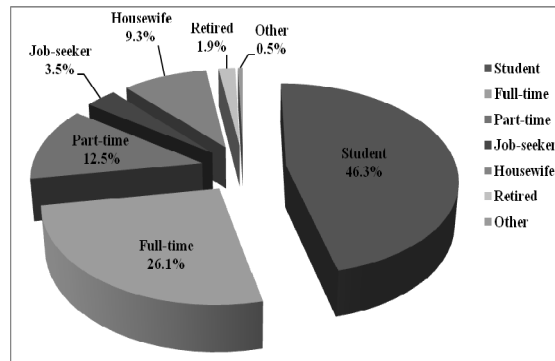


Figure 1. Respondents of the survey categorized by their occupation

5. Data Analysis and Results

This section summarizes the analysis carried out on the data obtained from the survey and the results of this analysis. Means of valid responses for each question are summarized, by transit mode and for all three modes together, in Table 2.

Table 2. The means of responses for each question

Question	Transit Mode			All 3 Modes
	Bus	Minibus	Jitney	
1	5.27	3.4	3.78	4.15
2	6.05	4.89	5.11	5.35
3	6.2	3.66	4.22	4.69
4	5.15	4.11	3.76	4.34
5	5.74	5.11	4.56	5.14
6	5.2	3.21	4.0	4.14
7	4.75	3.77	3.44	3.99
8	5.85	4.21	4.87	4.98
9	3.05	2.74	1.85	2.55
10	6.85	4.84	5.78	5.82
11	7.33	6.66	6.47	6.82
12	6.86	5.24	4.84	5.65
13	6.61	7.43	8.55	7.53
14	6.29	3.12	5.72	5.04
15	4.2	5.31	6.18	5.23
16	4.3	4.65	5.87	4.94
17	5.21	2.65	4.33	4.06
18	6.5	2.39	5.83	4.91
Total/180	101.41	77.39	89.16	89.33

5.1 Satisfaction and Importance Results

Tables 3 through 5 lists the three attributes users were most satisfied and least satisfied with, as well as, the three attributes found to be most and least important for bus users, minibus users, and jitney users, respectively. These were derived from the detailed importance ratings of each attribute, presented per public transport mode in Appendix B.

Table 3. Attributes of bus users

Rank	Most satisfied	Least satisfied	Most important	Least important
1	Ease of payment	Wheelchair space	Availability	Driver behavior
2	Number of serviced routes	Journey time	Safety in the vehicle	Privacy
3	Ease of entering/exiting the vehicle	Waiting time	Cost of travel	Seat comfort

Table 4. Attributes of mini bus users

Rank	Most satisfied	Least satisfied	Most important	Least important
1	Cost of travel	Personal Security	Safety in the vehicle	Noise
2	Ease of payment	Safety in the vehicle	Availability	Crowding
3	Journey time	Wheelchair space	Personal Security	AC Availability

Table 5. Attributes of jitney users

Rank	Most satisfied	Least satisfied	Most important	Least important
1	Cost of travel	Wheelchair space	Vehicle cleanliness	Waiting time
2	Ease of payment	Crowding	Privacy	Availability
3	Journey time	Privacy	AC Availability	Seat comfort

5.2 One-Way ANOVA Results

The ANOVA is a statistical test used to compare means of two or more samples to determine the heterogeneity of the means through an analysis of group variances (Sweis et al., 2013). The one-way ANOVA is commonly used to compare means of at least three groups (using the F-distribution). A one-way analysis of variance (ANOVA) was carried on the response means for each question in the survey to test for significant differences among respondents' perceptions. The results of the ANOVA are presented in Table 6.

Table 6. One-way ANOVA results

Question no.	P-value	Question no.	P-value
1	0.054	10	0.003
2	0.135	11	0.028
3	0.042	12	0.416
4	0.209	13	0.812
5	0.493	14	0.041
6	0.367	15	0.914
7	0.271	16	0.238
8	0.022	17	0.542
9	0.810	18	0.355

The analysis of the ANOVA results reveals that the users of the three public transportation modes disagreed (p -value < 0.05) regarding the following features: AC Availability, Availability of the Transit Service, Ease of Entering/Exiting the vehicle, Ease of payment, and Staff Behavior.

6. Discussion

This research has explored public transport user satisfaction through user surveys. As shown in Table 2, the associated means of the service quality attributes demonstrated that costumers were dissatisfied with ten out of the 18 attributes of the public transport systems in Amman ($M < 5$). The highest scoring attribute (7.5/10) was cost of service. With the high government customs on cars, soaring fuel taxes and insurance premiums, many low-income Jordanians are priced out of car ownership, becoming captive riders of the transit system. The cost of public transport remains affordable, especially when compared to the cost of auto travel.

From the bus user survey results in Table 3, it is not surprising that they were generally satisfied with the service's fare collection, since smart cards are introduced on all routes. Similarly, users are satisfied with the network's coverage and the presence of two doors, which facilitates entrance and exit from the vehicle. On the

other hand, none of the three attributes that bus users are least satisfied with are important to them. This has resulted in the highest satisfaction score (101/180) for the service.

As for mini bus users, it is worth noting that these vehicles have one door only, and a conductor handles the manual payment of the fare. These services operate on a hail-and-ride basis, and do not have formal stops. The results of minibuses users in Table 4 highlight that they are least satisfied with personal security, this stems from the lack of designated well-lit, waiting areas for the buses (i.e., a bus stop with amenities). Nevertheless, the safety issue is reported due to the fast and reckless driving of the minibuses, along with the vehicles' high-floor, rendering it inaccessible. Safety and security are among the most important attributes for users, so the overall satisfaction score was the lowest (77/180) for the service.

Finally, jitneys are shared taxis that operate on a hail-and-ride basis on a fixed route. The users of the service enjoy the benefits of a taxi service at a margin of the cost. As expressed in Table 5 results, jitneys users are least satisfied with the crowding and lack of privacy, since the back seat is usually occupied by three passengers. Bus seats are further apart with less personal interaction than the experience of sharing a jitney. Overcrowding is in itself uncomfortable, especially when accompanied with annoying fellow passenger behavior like smoking or talking loudly on the mobile phone. In addition, users were not satisfied with the accessibility, since the vehicles are not wheelchair accessible. Since privacy was an important attribute to them, their overall satisfaction score was (89/180) for the service.

Comparing the results in Tables 4 and 5, minibuses users and jitney users are most satisfied with the cost, ease of payment, and journey travel time. The cost of both services is relatively cheap, and payment to the driver or conductor was considered easy. All modes of public transport in Amman are street transit systems, i.e. they share the street space with mixed traffic, with no form of right-of-way or preferential treatment. Therefore, the interesting attribute of travel time could be explained by the fewer stops that these vehicles make, as opposed to the many stops on scheduled bus services.

7. Conclusion

The total average of satisfaction for each mode of transportation shows that the users of buses are the most satisfied, followed by the users of jitneys, and minibuses, respectively. However, the overall average of satisfaction reflects that generally all users are not sufficiently satisfied with the transit systems, since even the highest score of (101/180) translates to merely 56%. It is necessary to increase user satisfaction through improving the public transport system in Amman. These improvements will make the city more sustainable and reduce the use of private cars in the future. High quality transit services will maintain existing users and attract new passengers. Nonetheless, public transport system enhancements will lead to resolving problems such as: traffic congestion, accidents, traffic noise, air pollution, and fuel consumption.

8. Implications and Future Research

This study identified, described, and measured satisfaction of public transportation system users. The results have clear implications for the public transportation system in Jordan. The most critical implication of this paper is the identification of the overall level of satisfaction of transit users. These findings allow decision makers and governmental bodies to direct their efforts towards improving the items that were regarded as critical in the analysis. Yet, further research in this domain is encouraged. In particular, it may be useful to target car users, to find out their needs and preferences, and explore the potentials for a modal shift towards transit.

Although this study is specific to Jordan, its results could be applicable and beneficial to other developing countries who share similar cultural and economic characteristics, similar transportation system components, and infrastructure conditions (like Lebanon, Palestinian Territories, Syria, Yemen). It may be useful to perform similar research in such countries for comparison purposes.

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Appendix A

Public Transportation Satisfaction Survey

Part I

1. Gender: Male Female
2. Age: 15-19 Years 20-29 Years 30-39 Years
40-49 Years 50-59 Years 60-69 Years
3. Occupation: Student Full-time Part-time
Job Seeker Housewife Retired Other(please specify) _____
4. Which of the following public transportation modes do you use regularly?
Large bus Mini bus (Coaster) Jitney

Part II

Below is a list of some travel attributes. In the column labeled importance, indicate on a scale of 1-5, the importance of the relevant attributes. 1 means not important and 5 means very important. Also, indicate in the

column labeled transport satisfaction, on a scale from 1-10 your degree of satisfaction with the level of provision of the attribute by your most regularly used means of transport. 1 means least satisfied and 10 means very satisfied.

Question no.	Travel attributes	Importance (1-5)	Satisfaction (1-10)
1	Facilities at station (Protection from weather, lighting, etc.)		
2	Cleanliness of Vehicle		
3	AC Availability		
4	Privacy		
5	Seat Comfort		
6	Noise		
7	Crowding		
8	Availability of Service		
9	Availability of Wheelchair Space		
10	Ease of Entering/Exiting the vehicle		
11	Ease of Payment		
12	Network Coverage (Number of Routes)		
13	Cost of Travel		
14	Staff Behavior		
15	Journey Time		
16	Waiting Time		
17	Safety in the Vehicle		
18	Personal Security		

Appendix B

Table B1. Importance questions results for mini bus (coaster) users

Question Number	Very Important (5)	Important (4)	Moderately Important (3)	Of Little Importance (2)	Not Important (1)
Q1	52%	26%	11%	6%	5%
Q2	50%	19%	19%	8%	3%
Q3	40%	26%	16%	6%	11%
Q4	44%	18%	16%	15%	8%
Q5	42%	27%	13%	13%	5%
Q6	31%	15%	26%	13%	16%
Q7	55%	19%	10%	3%	13%
Q8	69%	18%	8%	3%	2%
Q9	40%	24%	20%	6%	10%
Q10	42%	27%	16%	8%	6%
Q11	32%	24%	16%	18%	10%
Q12	35%	23%	21%	15%	6%
Q13	55%	23%	10%	6%	6%
Q14	53%	19%	10%	8%	10%
Q15	58%	19%	15%	4%	5%
Q16	63%	27%	4%	3%	3%
Q17	73%	11%	5%	5%	6%
Q18	66%	16%	6%	3%	8%

Table B2. Importance questions results for large bus users

Question Number	Very Important (5)	Important (4)	Moderately Important (3)	Of Little Importance (2)	Not Important (1)
Q1	50%	20%	20%	5%	5%
Q2	30%	40%	15%	10%	5%
Q3	40%	22%	23%	8%	7%
Q4	40%	25%	21%	5%	9%
Q5	50%	5%	20%	17%	8%
Q6	30%	35%	25%	5%	5%
Q7	35%	35%	18%	9%	3%
Q8	65%	10%	15%	5%	5%
Q9	35%	20%	6%	32%	7%
Q10	25%	30%	23%	15%	7%
Q11	22%	35%	20%	17%	6%
Q12	40%	15%	30%	10%	5%
Q13	55%	17%	5%	15%	3%
Q14	40%	38%	2%	8%	12%
Q15	35%	15%	15%	30%	5%
Question Number	Very Important (5)	Important (4)	Moderately Important (3)	Of Little Importance (2)	Not Important (1)
Q16	40%	30%	12%	14%	4%
Q17	60%	9%	5%	20%	6%
Q18	50%	15%	25%	8%	2%

Table B3. Importance questions results for jitney users

Question Number	Very Important (5)	Important (4)	Moderately Important (3)	Of Little Importance (2)	Not Important (1)
Q1	39%	17%	17%	22%	6%
Q2	76%	9%	5%	6%	4%
Q3	71%	11%	6%	10%	2%
Q4	76%	9%	5%	8%	2%
Q5	52%	16%	17%	9%	6%
Q6	53%	28%	6%	10%	3%
Q7	61%	16%	11%	6%	6%
Q8	39%	23%	17%	11%	10%
Q9	33%	48%	11%	6%	2%
Q10	32%	40%	16%	6%	5%
Q11	25%	44%	22%	6%	2%
Q12	17%	28%	39%	11%	5%
Q13	17%	33%	41%	6%	3%
Q14	22%	17%	40%	17%	4%
Q15	17%	44%	30%	6%	3%
Q16	20%	17%	28%	26%	10%
Q17	26%	17%	11%	44%	2%
Q18	17%	44%	17%	17%	6%

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