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ANALYZE FACTORS INFLUENCING PASSENGERS' SATISFACTION IN ADDIS ABABA CITY LIGHT RAIL TRANSIT SERVICE

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Abstract
The main purpose of this study was to analyze factors influencing passengers' satisfaction in Addis Ababa City Light Rail Transit Service. The researcher has taken 364 passengers' for survey questionnaire and 20 informants for semi-structured interview questions. The data collected by survey method were analyzed using SPSS version 20. The results of Pearson's correlation analysis of the study indicated that there was a significant positive correlation of all independent variables; safety and security, reliability, comfort, ticket payment system, affordability, staff behavior, accessibility and availability with passengers' satisfaction. The multiple regression analysis of the study depicted that, all the independent variables contributed only 56.8% of variances on passengers' satisfaction and the remaining 43.2% explained by other variables, which were not included in the model. Based on the findings of this research, the Light Rail Transit Service management should sustain and continue the better provisions of the light rail transit services primarily to satisfy passengers and secondly to attain organizational goals.
Keywords: Light rail transit, Passengers' satisfaction, Service quality dimensions, Ticket payment system

1. INTRODUCTION

These days, due to the innovations of modern vehicles' in the city, passengers' need better transportation from the service provider company in order to make their life easy than ever and consequently to increase their satisfaction level (Ovuezireie et al, 2014). In Addis Ababa city, from time to time, the demand for high capacity and speed transportation system has become a severe question (Abadi, 2014).

Passengers' satisfaction for public transport in Addis Ababa city affected by road accidents, inadequate road infrastructure, poor vehicle conditions and poor infrastructure for non-motorized modes (Private Sector Development Hub, 2009). These problems happened due to the increasing population number, migration, accessibility of jobs, foreign direct investment in the city and others' (PSDH, 2009). Besides, economically the majorities of passengers' in the city are low and middle - income generator groups, given that they use public transport (Abadi, 2014).

In all, these problems forced the needs of the modern and reliable railway system that can accommodate and enhance passengers' satisfaction. To tackle public transportation challenge, the government introduced the first light rail transit transport in the city since September 2015. Introducing such service would help passengers to reduce their transport costs (Olesen, 2014), diminish vehicle dependence and emissions (Hurst and West, 2014); cut traffic congestion (Olesen, 2014) and generating urban development as a whole (Abadi, 2014). A number of studies argued that the railway transit service should have to be affordable, accessible, reliable and attractive to all passengers (Peng et al, 2008).

Despite these, the Addis Ababa City Light Rail Transit Service practiced with many bottleneck, such as long queuing and waiting time, over capacity loading, access difficulty for old and people with disability, poor ticket payment system, pitiable safety and security and availability of inconvenience stations. This might cause to affect passengers' satisfaction initially and meanwhile, it might go ahead to limit the overall service provision capacity of Addis Ababa City Light Rail Transit Service.

The Addis Ababa City Light Rail Transit service provision far from passengers' expectation and satisfaction. A previous study by Akpoyomare et al (2014) have shown that customer satisfaction was influenced by age, income, gender, perceived quality and perceived value but not by pre-purchasing expectation. Contrary to this, according to the Consistency Theory and SERVQUAL model, customer satisfaction is influenced by pre-purchasing expectation. To cover this gap the researcher analyzes the effects of pre-purchasing expectation of passengers' satisfaction using qualitative analysis.

Additionally, the results of a study by Khalid et al (2014) in Malaysia on commuter perceptions for rail service reported that passengers' spent 25% of their time for queuing and waiting to purchase a ticket. Such problem arose, because of the poor ticketing payment system. This showed that there was given a little attention to investigating ticket payment system as an independent variable, which affects passengers' satisfaction. Hence, to fill this gap ticket payment system had been taken as an independent variable. Additionally, in order to fill the above gaps the researcher was conducted descriptive and explanatory research. Overall, in this study, the researcher intended to analyze factors influencing passengers' satisfaction in Addis Ababa City Light Rail Transit Service.

This study aimed to address the following research questions:

- ✓ What are the factors that affect passengers' satisfaction in Addis Ababa City Light Rail Transit Service?

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- ✓ How service quality dimensions influence passengers' satisfaction in Addis Ababa City Light Rail Transit Service?
- ✓ What is the overall level of passengers' satisfaction in Addis Ababa City Light Rail Transit Service?

2. LITERATURE REVIEW

In recent years, there has been an increasing interest in identifying and analyzing, customer satisfaction factors. Service providers and scholars have recognized the importance of customer satisfaction as contributing to the market share and the return on investment for companies. Here empirical reviews on factors influencing customer satisfaction in the public transportation sector were addressed.

Also, Peng, et al (2008) discussed that the levels of passenger satisfaction using KANO model on Light rail transit in Malaysia and the results of the paper outlined that passengers' were ranged on at a satisfactory level with facility, comfort, information delivery and prices of the service provision. However, commuters were dissatisfied with efficiency, services of staff and safety. In the same vein, the study of Nandan, (2010); Agunioye and Oduwaye, (2010) observed that passenger satisfaction at the railway transit service influenced by safety, information system, security, availability, time schedule, and cleaning.

According to the study of Irfan, Kee, and Shahbaz (2012) examined service quality in rail transport from the passengers' perspective, using a modified SERVQUAL instrument, including eight service quality constructs: empathy, assurance, tangibles, timeliness, responsiveness, information system, food, safety, and security were employed to measure the passengers' perceptions about the service quality of railways. The results of the study contend that commuters perceive the quality of services offered to them were not satisfactory. Finally, the study identified based on descending order like responsiveness, catering, tangibility, assurance, safety, information and punctuality as the main determinants that influence commuter satisfaction to the train.

In another major study of the effects of service quality on customer satisfaction and customer loyalty by Esmaeili, Manesh, and Golshan (2013**)** found that passengers of the rail service were satisfied with employee interest in solving the problems of passengers, the employees' tendency toward helping out passengers and modest treatment of employees toward passenger.

The study suggested that improvements in waiting area, escalator, quality and quantity of seats in the train, comfort and convenience of parking and public transportation to the surrounding areas had to be

made in order to enlarge the earning powers of the company. Similarly, with an investigation of rail service on the above empirical literature, Buluma (2014) also studied on service quality and passenger satisfaction in Rift Valley Railways corporation-Kenya. The study aimed to found out what service quality attributes passenger value and how much they were satisfied. In this study, the researcher found that passengers were dissatisfied with seating space, comfort, on-time delivery, and frequency of trains as scheduled.

Besides, the results of this study supported the idea that the concerned body of the company would establish continuous customer satisfaction evaluation strategy. Finally, the researcher concluded that service quality was significantly related to passenger satisfaction and therefore service quality dimensions implementation leads to passenger satisfaction.

3. METHODOLOGY

In this study, the researcher has been used mixed research approach for the purposes of triangulations of data and analysis methods. The researcher also used sequential transformative method, which helps to collect and analysis either quantitative or qualitative data first and next integrating results into the interpretation phase. The survey questionnaire prepared based on the five point likert scale and analyzed using correlation and multiple regression analysis. Additionally, the researcher used semi-structured interview in order to collect a qualitative data and such data were analyzed using narrative method.

For this study, passengers aged 15 and 15+of the city light railway in the two routes were the target population of the study. Meaning, children below 15 years old were not included in the study. Respondents and informants for survey questionnaire and semi-structure interview questions selected using convince sampling technique from stations. The light rail transit in Addis Ababa city has two lines, which stretched from North-South and East-West direction. The two lines have a total number of 39 stations. From these stations, 22 stations stretched from North-South and the remaining 17 stations (all are workable) prostrated in the second line.

The study used Cochran (1963) sample size determination formula for unknown or large sample size and consequently adjusted sample size formula was applied to reach the total number of sample units.

$$n = \frac{z^2 \times p(1-p)}{e^2}$$

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$$n = \frac{(1.96)^2 \times 0.5(1-0.5)}{(0.05)^2} = 384$$

- **N----**Populations of the study
- **n-----**sample sizes of the study
- **Z----**Z-score
- **e----**error
- **P----**probability

Therefore, the study used 384 sample units; 212 (55.2%) respondents from the North-South line stations and 172 (44.8%) respondents from the East –West line stations. The questionnaire distributed randomly for seven consecutive days from [Friday/February 17 up to Thursday/February 23/2017]. Respondents were asked during peak, off and weekend time. Right after the completions of survey data collection, the researcher took only the North-South line stations to select 20 informants for semi-structured questions. Because this line served large numbers of passengers due to the fact that it has many stations.

4. ANALYSES

4.1. Descriptive analyses

To measure the levels of passengers' satisfaction in Addis Ababa City Light Rail Transit Service, a five point Likert scale which was categorized 1 for highly dissatisfied, 2 for dissatisfied, 3 for somewhat satisfied, 4 for satisfied and 5 for highly satisfied would have been used.

TABLE 1. LEVELS OF PASSENGERS' SATISFACTION FOR THE INDEPENDENT VARIABLES

Independent variables	Mean	S.D
Affordability	3.56	1.29
Safety and security	2.71	1.31
Comfort	3.10	1.21
Accessibility and availability	3.48	1.10
Ticket payment system	3.83	1.01
Reliability	2.87	1.27
Staff behavior	3.78	1.04

Source: (SPSS output, 2017)

As it is depicted from the data in table 1, the mean score and standard deviation values of affordability$(\mu = 3.56, \sigma = 1.29)$, safety and security$(\mu = 2.71, \sigma = 1.31)$, comfort$(\mu = 3.10, \sigma = 1.21)$, accessibility and availability$(\mu = 3.48, \sigma = 1.10)$, ticket payment system$(\mu = 3.83, \sigma = 1.01)$, reliability$(\mu = 2.87, \sigma = 1.27)$ and staff behavior $(\mu = 3.78, \sigma = 1.04)$.

Ticket payment system has the highest mean score value (3.83) followed by staff behavior (3.78), affordability (3.56), accessibility and availability (3.48), comfort (3.10), reliability (2.87) and safety and security (2.71). The first three variables mean score rounded to four and it represents the satisfied categories on a Likert scale. Hence, passengers' are satisfied with ticket payment system, staff behavior and affordability of the Light Rail Transit Service.

The mean score of the remaining four variables rounded to three (somewhat satisfied). This indicates that passengers' are somewhat satisfied with accessibility and availability, comfort, reliability, safety and security. Additionally, safety and security, affordability, reliability and comfort variables have the highest standard deviation values of 1.31, 1.29, 1.27 and 1.21 respectively, which depicts that there is the highest data variability in the variable. Whereas, staff behavior, ticket payment system, accessibility and availability are approximately equal numbers of data varying.

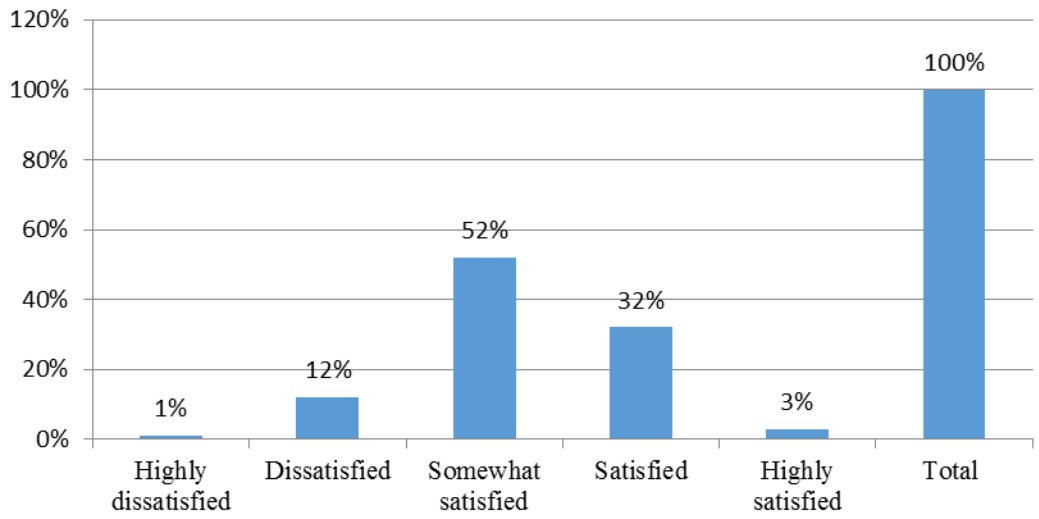

FIGURE 1. FREQUENCY OF PASSENGERS' SATISFACTION LEVEL
Source: (SPSS output, 2017)

As figure 1 shows that the overall level of passengers' satisfaction, 52% of passengers' are somewhat satisfied, 32 % of passengers' are satisfied, 12 % of passengers' are dissatisfied, 3% of passengers' are

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highly satisfied and the remaining 1% of passengers are highly dissatisfied in Addis Ababa City Light Rail Transit Service. This implies that the majority of respondents are somewhat satisfied with the provided service followed by satisfied, dissatisfied, highly satisfied and highly dissatisfied.

4.2. Inferential analysis

In this study, ordinal data were transformed to continuous variable due to this reason, Pearson Correlation analysis was performed to identify the association between variables and to test the research hypothesis (Hogan and Agnello, 2004).

TABLE 2. PEARSON CORRELATION

Correlation analysis									
Pearson correlation		PS	SB	TP	AA	SS	A	R	C
Passengers' satisfaction	Correlation cofficent	1.00	0.554**	0.395**	0.610**	0.381**	0.332**	0.549**	0.565**
	Sig.(2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	263	263	261	262	261	263	262	263
**. Correlation is significant at the 0.01 level (2-tailed).									
**. Correlation is significant at the 0.05 level (2-tailed).									

PS(Passengers' satisfaction), SB (Staff behavior), TP (Ticket payment), AA (Accessibility & availability), SS (Safety & security), A (Affordability), R (Reliability) and C(Comfort).
Source: (SPSS output, 2017)

As it can be seen from the above table 2, the correlation between staff behavior (ticket seller and driver behavior), ticket payment system, availability and accessibility, security and safety, affordability, comfort and reliability with passengers' satisfaction. The Pearson's correlation analysis result set out that availability and accessibility has the highest positive correlation (r=*0.610, p=.000*) with the dependent variable passengers' satisfaction followed by comfort (*r=0.565, p=.000*), staff behavior *(r=0.554,p=.000),* reliability *(r=0.549,p=.000),* ticket payment system (*r=0.395, p=.000*), safety and security *(r=0.381, p=.000)* and affordability (*r=0.332, p=.000*). This implies that all variables have a positive and significant relationship with passengers' satisfaction.

4.3. Multiple linear regression analyses

The researcher was employed multiple linear regression analysis to investigate the effects of seven independent variables on the dependent variable of passengers' satisfaction.

$$y_t = \beta_0 + \beta_1 x_{1t} + \beta_2 x_{2t} + \beta_3 x_{3t} + \beta_4 x_{4t} + \beta_5 x_{5t} + \beta_6 x_{6t} + \beta_7 x_{7t} + \mu_t$$

Model Description

- $y = Passengers' satisfaction$
- $\beta = Constant\ term$
- $x_1 = safety\ and\ security$
- $x_2 = Reliability$
- $x_3 = Affordability$
- $x_4 = Accessibility\ and\ availability$
- $x_5 = Comfort$
- $x_6 =$ $Staff\ behavior(Driver\ \&\ ticket\ seller)$
- $x_7 = Ticket\ payment\ system$
- $\mu = error\ term$
- $t = time$

Plot Area

TABLE 3. MODEL SUMMARY

Mode	R	R Square	Adjusted R Square	Std. Error of the Estimate	df	F-statistics	Sig.
1	.753[a]	.568	.556	.47861	7 251 258	47.093	0.000

a. Predictors: (Constant), Accessibility and availability, Affordability, Security and safety, Ticket payment, Comfort, Reliability, staff behavior
Source: (SPSS Output, 2017)

As depicted in the table 3 above, the value of R^2 shows that, 56.8% changes of passengers' satisfaction explained by the seven explanatory variables of the model and the remaining 43.2% of the changes of the dependent variable passengers' satisfaction explained by variables, which are not included in the model. The second diagnosis analysis is to test whether the entire model is significant or not. The null hypothesis H_0 fittest of the model states that all regression coefficients are equal to zero, which means none of the independent variables play any role. The alternative hypothesis H_1, states that at least one coefficient is different from zero. To perform this test, the researcher carried out an analysis of variance **(ANOVA)** test. As we have seen in the above F-statistic ANOVA test, table 1.3, F= (7,251) =47.093, P<0.01, which revealed that the model was statistically significant at 1% and it depicts that the seven explanatory variables explained the dependent variable of passengers' satisfaction. Therefore, the null hypothesis H_0 of the fittest model rejected. The final test of diagnosis analysis is the test of the significances of each independent variable. As the table below, 1.4 shows that, except affordability and ticket payment system, all variables are statistically significant at 5% significance level.

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TABLE 4. THE COEFFICIENTS OF VARIABLES

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.116	.189		.612	.541
	Safety and security	.070	.033	.101	2.111	.036
	Affordability	.008	.029	.013	.280	.779
	Reliability	.210	.046	.253	4.537	.000
	Comfort	.170	.051	.180	3.328	.001
	Staff behavior	.224	.059	.216	3.813	.000
	Ticket payment	.036	.049	.039	.733	.464
	Accessibility and availability	.214	.059	.214	3.653	.000

a. Dependent Variable: Passengers' satisfaction
Source: (SPSS Output, 2017)

As table 4 shows that except affordability and ticket payment system, all other independent variables are statistically significant at 5% significance level.

Hypotheses testing results

Hypotheses	Decision
H1= Safety and security have a positive and significant influence on passengers' satisfaction.	Accepted
H2=Affordability has a positive and significance influence on passengers' satisfaction.	Rejected
H3=Reliability has a positive and significance influence on passengers' satisfaction.	Accepted
H4=Comfort has a positive and significance influence on passengers' satisfaction.	Accepted
H5= Staff behavior has a positive and significance influence on passengers' satisfaction.	Accepted
H6=Ticket payment system has a positive and significance influence on passengers' satisfaction.	Rejected
H7=Accessibility and availability have a positive and significance influence on passengers' satisfaction.	Accepted

5. CONCLUSIONS

The Addis Ababa City light rail transit service provides better services by speed, fare, congestion and accident. For that reason, passengers' would like to travel their trips using the rail. Despite this, the light rail transit offered a service below passengers' expectations. Because passengers' believe that public transportation will not be problematic son long in the city, yet the difficulty still exists. Additionally,

passengers' also complained while they use the rail because of the poor qualities of service provision, like the existences of insufficient seat both inside the rail and at the station, suffocation, theft and robbery, poor ventilator capacity, stumpy rail frequency, pitiable cleanness of the stations, few numbers of rails, money exchange problem, poor information delivery, awareness creation problems and absences of automatic generator.

Hence, all these problems will jeopardize the future success of the light rail transit because both actual and potential customers may hesitate to use its service. Besides, passengers' had different levels of satisfaction for the service attributes of the light rail transit.

Because commuters satisfied with the staff behavior, affordability, and ticket payment system and somewhat satisfied with reliability, comfort, safety and security, accessibility and availability. Also, the service quality dimensions like, safety and security, comfort, reliability, accessibility and availability and staff behavior had a positive significant effect on passengers' satisfaction at 5% significance level. Whereas, affordability and ticket payment system had an insignificant effect on passenger satisfaction at 5% significance level. Hence, there is strong evidence, which supports except affordability and ticket payment system; other variables will have an influence to increase the passengers' satisfaction of the provided service. Moreover, only around 54% of the commuters were somewhat satisfied with the light rail transit service. This indicates that the overall service of the company has a problem to give better service to more users.

6. RECOMMENDATIONS

Based on the finding of the study, the following recommendations were forwarded:

- ✓ First, in order to alter passengers attitude towards the service ,the light rail transit service management should change the lower passenger expectations by increase its actual service provisions via adding new services like ,elevator or lift services, constructing toilets around stations, introducing and implementing electronic or magnetic payment systems ,arranging special seat rooms for pregnant females, disable and old passengers' and additionally the management should expands the lines of the rail to other areas to make the light rail transit more accessible and available to passengers'.
- ✓ Second, the light rail transit service management should sustain and continue its better provisions by speed, fare, accident, and congestion for the purpose to attract numerous

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passengers' and finally these might make the company more profitable and competence in the transportation sector.

- ✓ Third, to improve the poor quality attributes and to facilitate the smooth transit service, the light rail transit service management should have more rail, enhance local maintenance experts, restrict carrying/loading capacities and theft using supervisor and police at the door and inside the rail in order to achieve a better comfort, safety and security, integrating more powerful ventilator or windows, assembling flexible seat inside the rails and at the stations, creating rail usage awareness when passengers' wait rails at the stations through educated and fluent staff. Besides, the management should integrate passenger assistance intercommunication devices in the vehicles and at the stations. Because it helps passengers' to communicate with crew-members through hands-free two-way communication system when the emergency happened at both places. Moreover, the light rail transit service management should have an automatic generator in order to avoid service interruptions whenever the light is turned off and establish suggestion boxes at each station in order to get commuters complains daily like other service provider companies, e.g. Banks and Insurances.
- ✓ Fourth, the management should take better focus on safety and security, comfort, reliability, accessibility and availability and staff behavior because there was strong evidence which support the improvements of such variables will increase passengers' satisfaction.
- ✓ Finally, the light rail transit management should have to maximize passengers' satisfaction by offering a service that is more affordable to lower income population, more reliable by delivering consistent service to commuters without speculation to the service absences and interruptions like scheduling furgo rail (two-joined rails) at peak time, using accessible and ease ticket payment systems like magnetic payment systems, teaching staff (drivers and ticket sellers) more on ethics, maintenance and driving skills and paying good salaries and creating pleasant work environments. Because all these actions directly or indirectly help the company to enhance the overall, levels of passengers' satisfaction for the light rail transit service stipulations.

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