The Structure of Users' Satisfaction on Urban Public Transport Service in Developing Country: the Case of Nairobi

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Abstract:
The study investigates public transport service attributes that influence overall passengers' satisfaction and ultimately enhancing public transportation ridership in developing countries. An original questionnaire survey to public transport users was designed and conducted in the city of Nairobi, the capital of Kenya, to collect prerequisite information and data to facilitate the analysis. It also provided requisite variables which were used to develop Structural Equation Model (SEM) to elucidate the interrelationship between the observed variables and unobserved variables and their impact to the overall commuters' satisfaction. Unobserved attributes such as Service Quality (SQ), Safety (S) and Travel Cost (TC) were estimated. Level of satisfaction was found to be significantly influenced by Service Quality (SQ), Safety (S), Travel Cost (TC) and the perception on the systems' performance. The study therefore proposed the model to transportation engineers and planners in Nairobi city in the investigation of travel factors that do determine commuters' satisfaction with public transportation services.

***Key Words**: Public Transportation, Commuters' Satisfaction, Developing country*

1. INTRODUCTION

1.1 Overview

Formation of contemporary cities has been facilitated and influenced greatly by urban transportation. Public's travel demands have increased leading to complexity in the provision of extra capacity to handle and control the situation effectively. The condition has amplified road congestion, thus condensing urban mobility to critical points in many cities in the world (Robert A.F). Improved economic status coupled with rapid urbanization insert intense and unbearable demands in almost all cities in the world in the provision of social services such as transportation water, education etc. Today there are more vehicles making more trips over longer distances, most urban transport systems are at their point of dissemination and there is latent total dysfunction. The trend is worrisome and calls for an incorporated approach in the

search of solutions which include effective and efficient management of available infrastructure, controlled urban planning and growth management and promotion of public transportation modes (Zegras *et al*, 1999).

1.2 Urban Transportation Challenges

Travel Demand is a derived demand and the urban activities do cause and generate travel needs. Globally, there is great contribution of service sectors which are urban centric thus improvement of transportation infrastructure in urban areas takes precedence (Yelda, 2008). Transportation in urban areas is a critical and major concern in almost all mega cities in the world. Due to the rapid and uncontrolled urban and vehicle growth, there has been a conspicuous impact positively or negatively to the economic development of different nations of the world. Transportation systems i.e. air, water and land are classified among the major contributors of pollution to the environment leading to the global climate change. This is greatly ascribed to the fact that they consume high levels of energy thus emitting considerable amount of pollutants and particulate matters to the atmosphere (Quresh *et al)*

More so, environmental and social effects related to the urban transportation are increasingly being seen as a total menace to the entirety sustainability of the world climate. Increased use of automobile causes traffic jam, air pollution and accidents and generate threats of global warming (Quresh *et al*). According to researches carried out in several cities of the world, most commuters express their level of dissatisfaction with the quality of services provided or supplied. This is highly attributed to the rapid urban population growth resulting in raise in demand which various transport systems are unable to meet efficiently and effectively (Richard, 2005).

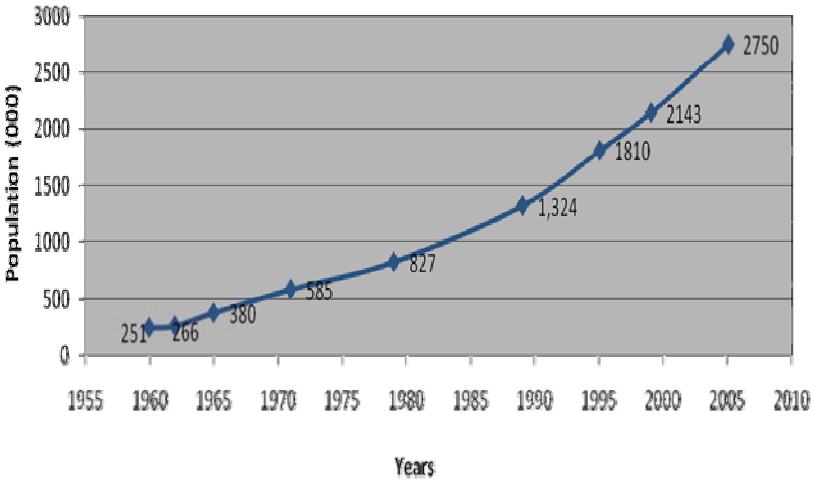
1.3 Research Objectives

Improving public transport quality is one of the most important issues for both private car users and present public transport users including future potential private car users for relieving urban traffic condition in developing cities. This study focuses on public transport service attributes that influence overall passengers' satisfaction and ultimately enhancing public transportation ridership in developing countries. The fundamental objective of this research is to explore the identified travel factors and further to establish their interrelationship. An original questionnaire survey to public transport users was designed and conducted in the city of Nairobi, the capital of Kenya for this analysis. Structural Equation Model (SEM) is applied to elucidate the interrelationship between the observed variables representing perceived level of services of public transport such as frequency, reliability, travel cost, time of travel, safety, comfort etc and unobserved (latent) variables, and evaluate their impact to the overall commuters' satisfaction. Latent attributes such as Service Quality (SQ), Safety (S) and Travel Cost (TC) are estimated by observed variables representing perceived level of services. Level of satisfaction (Consumer Satisfaction: CS) is composed by Service Quality (SQ), Safety (S) and Travel Cost (TC). Through the analysis, correlation between service attributes and their impact to the overall commuters' satisfaction would be established and subsequently express commuter satisfaction as a function of the identified attributes. The study therefore proposed the model to transportation engineers and planners in developing cities as well as Nairobi city in the investigation of travel factors that do determine commuters' satisfaction with public transportation services.

2 CASE STUDY- NAIROBI KENYA

2.1 Background of Nairobi City

The study is based on a case of Nairobi, Kenya. Nairobi city was founded in 1899 as a railway construction supply depot and resumed capital status in 1905. Nairobi became a city in 1954 and after independence in the year 1963 the city continued to be the capital of the new republic. Figure 1 summarizes the city population since 1960. Sustainability in transportation for Nairobi is overdue. There exist inefficient, unreliable, and unsafe public transportation systems. Rise in income levels stimulated by improved economy, has led to great need of personal mobility with increased ownership and use of automobile on the inadequate infrastructure facilities which cannot handle the increased capacity volume especially during peak hour (JICA, 2006).



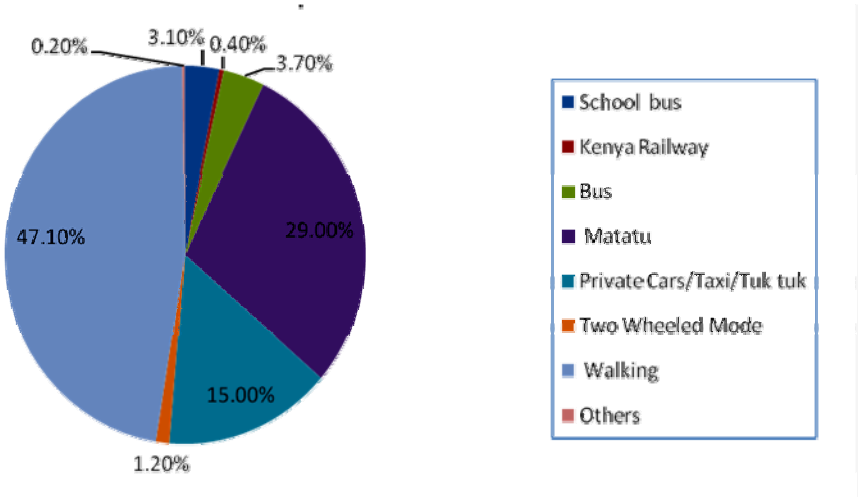
Source: Ministry of Planning and Economic Development Kenya

Figure 1 Population of Nairobi (1960- 2005)

Since the construction of the railway line the growth of the city has been very phenomenal. There have been several Master Plans which have been developed to monitor the city growth. The first Master Plan was developed in the year 1948, (Nairobi Master Plan for a Colonial Capital) as a guideline for the subsequent 20 years to cope with diverse urban problems resulting from the concentration of population and economy in Nairobi. Nairobi Metropolitan Growth Strategy in 1973 was the second plan targeting year 2000. The strategy comprised of several basic policies addressing urban development and physical planning. The main development aspects were; population forecast and transportation policies.

2.2 Nairobi Urban Transportation

The Nairobi urban transport is composed of various modes (fig. 2). The modes mentioned include; private cars, taxi, matatus, and buses two wheeled modes, walking, school buses and others. It is apparent that walking dominates the Nairobi city urban transportation with 47% although the Non-Motorised-Traffic (NMT) facilities in the city are not properly and adequately developed. Matatu (mini-bus) dominates the public transport modal split by 29% followed by bus 3.7%. There has been an increased use of private cars (15.30%), school buses takes about 3.10% of the total urban transportation in the city with two wheeled mode i.e bicycles and motorcycles, railway and others taking 1.20%, 0.40% and 0.20% respectively (JICA, 2006).



- Sources: NUTRAN 2006

Figure 2. Nairobi Transport Modal Share

Income levels of people and the state of economic development of a country have a direct impact on the quality of public transport commonly used by the citizen. It can thus be argued that, the income levels of households in developing countries have a strong bearing on the quality of utilized public transportation (Kanyama *et al*, 2005). Current existing public transport in Nairobi is predominantly road based. The transport systems comprises of conventional buses and matatus (mini-bus). Kenya railway services are insignificantly felt in the provision of public transportation for the city. Like in any other city, taxis, and other three wheeled taxis (tuk tuk) are also operated in the city (JICA, 2006).

Matatu is a fixed-route minibus with 14-25 passenger capacity operated by so many small operators. They play a significant role in the movement of people, goods and services in Kenya since 1973 when they were given a presidential decree to operate. The term "matatu" is derived from Kikuyu language term "mangotore matatu" which means "thirty cents", the standard charge for a single trip at that time. Its entry in public transport in Kenya can be dated to 1950's when they started operating in Nairobi and were considered an illegal commercial entity (Khayesi, 1999). The presidential decree of 1973 allowed matatus to carry fare paying passengers. Matatu is getting a very popular mode among the city dwellers. This is attributed to the fact that the system operations are very flexible. It is strongly argued that matatu is the major causes of traffic jams and accidents because of the dangerous way of driving employed by the drivers (Ndungu *et al*, 2004)

3. APPROACH AND METHODOLOGY

3.1 Overview

As stated in the preceding sections, the fundamental objective of the study is to identify and explore the travel factors that determine commuters' satisfaction and also establish their impact to the overall public transportation ridership. Data collection is made by original questionnaire surveys for public transport users (commuters). In the questionnaire survey, the requisite information consists of variables that are related to socio economic characteristics, trip, mode characteristics, travel factors and behavioural statements. Using the stated level of satisfaction, a model is developed by Structural Equation Modeling (SEM) techniques to

measure the impact and evaluate travel factors or attributes that determine commuters' satisfaction with public transportation service quality and overall system performance.

3.2 Questionnaire Design,

The questionnaire survey is designed to identify the relevant individual socioeconomic attributes, trip, mode characteristics and behavioural statements. The socio economic and personal attributes consist of gender, age, occupation, monthly income, car ownership, possession of driving license and private car use. Trip characteristics, such as trip purpose, time of travel, origin and destination are also covered in the questionnaire. Other details include mode characteristics i.e. the common mode of travel, waiting time, travel cost and the reason for choosing the particular mode. The perceived preferences of respondents, shown in the Table 1 are expressed at the scale of 1 to 4 i.e. 1= very satisfactory, 2 = satisfactory, 3 = less Satisfactory, 4= not satisfactory and the respondents are expected to indicate their level of satisfaction.

Table 1. Items of the questionnaire on users' perceived preferences

No.	Description	No.	Description
1	Bus Reliability	14	Ticketing and fare system
2	Matatu Reliability	15	Absence of delay and congetion
3	Bus Frequency	16	Noise and air pollution
4	Matatu Frequency	17	Walking time to and from the bus stop
5	Puntuality/precision (*buses and matatus*)	18	Boarding a bus or a matatu on time
6	Time table/travel information	19	Travel cost (*using bus*)
7	On board Safety	20	Travel cost (*using matatu*)
8	Bus stop location	21	Convenient (*buses*)
9	Bus stop facilities (*shelter, light etc)*	22	Convenient *(matatu*)
10	Bus waiting time	23	Treatment by crew members
11	Matatu waiting time	24	Overall evaluation of Bus performance
12	Availability of seats	25	Overall evaluation of Matatu performance
13	On board comfort		

3.3 Survey and Sampling

The questionnaire survey was conducted in March 2008. The samples were collected by two ways; the residential based survey (paper based home visit interview) at a certain district located in the suburb of Nairobi city, and an office based survey (paper based) at a certain office located in the CBD. Finally there are 150 respondents but about 10 questionnaires are discarded due to the inaccuracy of the information collected. Precise analysis is conducted to identify all questionnaires with incomplete and insufficient data or information. A total of 140 questionnaires are found to be accurate and are considered for subsequent detailed analysis. The basic results for the questionnaires are therefore summarized into, trip characteristics, mode characteristics and cross aggregation of parameters with common mode as outlined in section four.

4. NAIROBI URBAN TRANSPORTATION ANALYSIS

4.1 Trip and Mode Characteristics

This section shows the relevant parameters and attributes related to individual's travel behaviours and characteristics. Trip characteristics, mode characteristics, are analyzed and they are graphically presented as follows:

(i) Trip Characteristics

From figure 3, it is apparent that most of the trip purposes are related to work (73%) followed by business (18%). One way expenditure on transport ranges from Ksh.20 to Ksh.70 (US$ 0.33 to US$ 1.2) depending on the residential area and the distance of travel. The total monthly expenditure on transportation is between Ksh. 2,000 and Ksh. 4,000 (US$ 30 to US$ 60). It is established that majority of the respondents started their daily trip between 5.00am and 7.00am and most of them started their work between 7.00am and 9.00am.

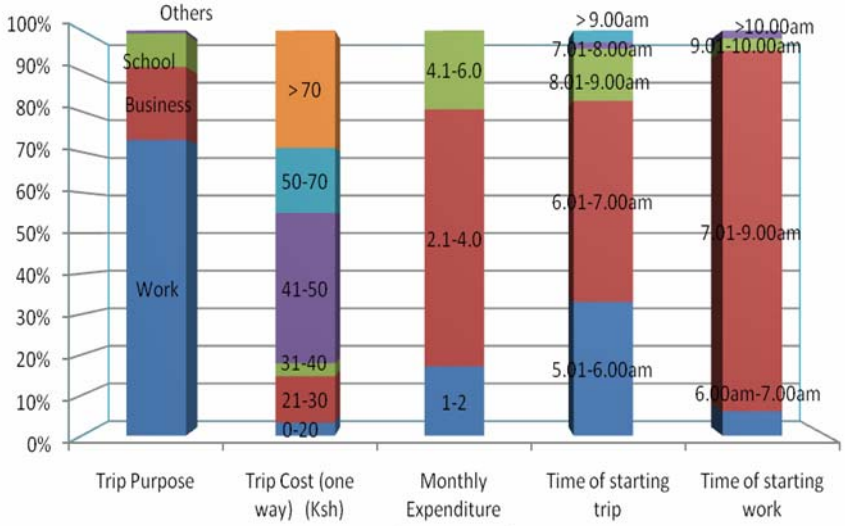


Figure 3 Trip characteristics

(ii) Mode Characteristics

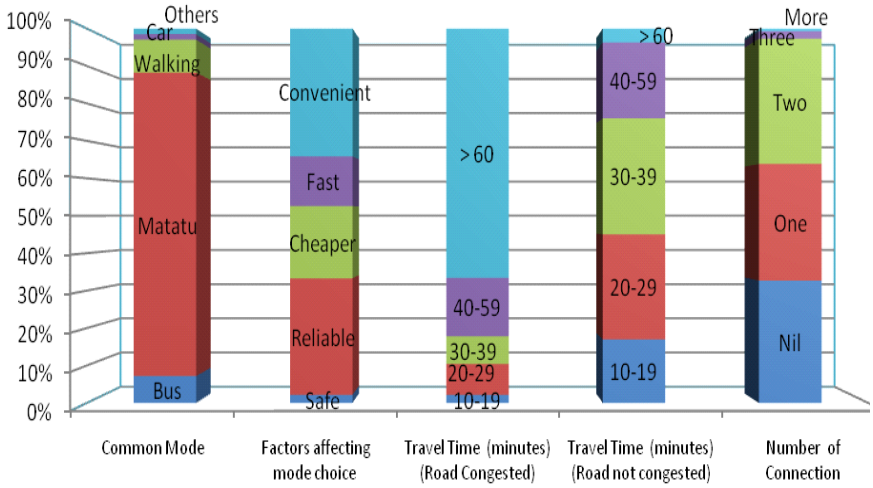


Figure 4 Mode characteristics

Figure 4 illustrates the mode characteristics which include common mode (transport mode mostly used), factors affecting mode choice, travel time (the cases when roads are congested and not congested) and the number of connection (transfer). The common mode is found to be matatu with 81% of the respondents using this mode and 7% using bus. Factors affecting mode choice ranges from convenience (34%), reliability (31%) to affordability or economical (19%). When roads are congested, the majority of the respondents (67%) take more than 60 minutes and when there is no traffic congestion the travel time ranges from 10-60 minutes. Majority of the respondents have nil, one or two connections.

4.3 Cross Aggregations

There are factors that govern and control travel behaviours of commuters and they are directly or indirectly influenced by socioeconomic attributes, trip and mode characteristics. There is therefore great need to cross aggregate the above mentioned variables with the common mode of travel to comprehend the interrelationship between these variables. The common modes of travel in this analysis include bus, matatu, car, walking and others (train).

4.3.1 Age versus Common Mode

Common mode by age is illustrated in figure 5. Most commuters are in the 25 years to 35 years age bracket. Common mode for all age groups is identified as matatu. Bus is the second popular mode for age groups 21-25 years and 25-35 years, while car is the second most popular mode for age group 35-45 years.

4.3.2 Occupation versus Common Mode

From the basic questionnaire survey results, most respondents compose of office workers. Figure 6 shows a brief summary of the popular modes amongst the various groups of occupation. It is evidently clear that matatu is the most popular mode of transport for students (90%), office workers (82%) and business or self employed (79%). Private car use is the second most popular mode for business and self employed category (14%).

Figure 5. Age versus common mode

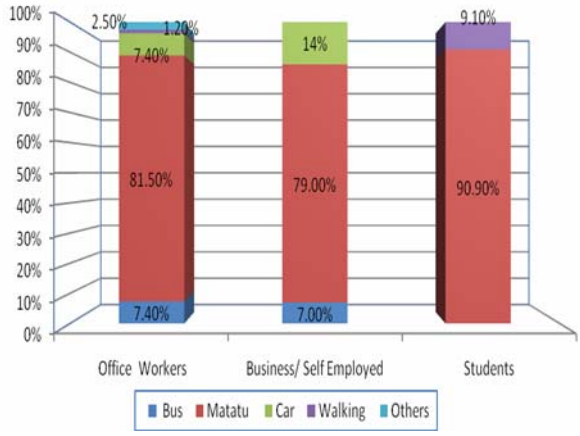


Figure 6. Occupation versus common mode

4.3.3 Travel Frequency versus Common Mode

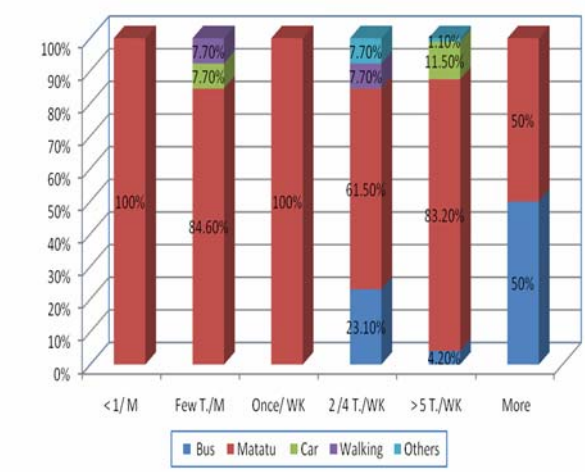


Figure 7. Travel Frequencies vs. Common Mode

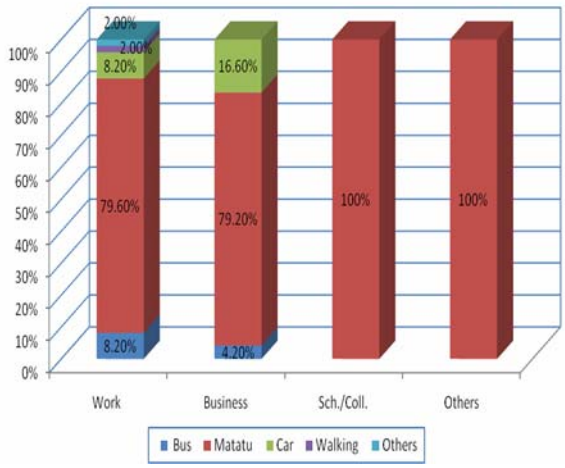


Figure 8. Trip Purpose vs. Common Mode

Figure 7 summarizes the relationship between travel frequency and common mode. Most of the respondents use matatu as their regular mode. Most respondents travel more than 5 times in a week and majority of them (83%) use matatu as their popular mode. Matatu is found to be popular among all commuters with travel frequency ranging from once in a month to more times per week. Bus is the most popular mode among the commuters who travel more than five times (50%) and two to four times (23%). Walking, use of private cars and other modes are less popular to all the respondents.

4.3.4 Trip Purpose versus Common Mode

Matatu is the most preferred mode for all trip purposes. Figure 8 summarizes the findings related to the relationship between trip purpose and common mode. It is apparent that matatu is the dominant mode for work (79%), business (79%), school or college (100%) and others (100%) and private car is the second most popular mode for business trips (16%).

5. MODELING OF COMMUTERS' SATISFACTION

5.1 Overview

Individual's travel behaviours solely depend on his/her preferences on the various latent variables referred as travel factors. These latent travel factors also depend on other indicator variables. Equally, commuters' satisfaction depends on their perceptions on travel factors such as comfort, reliability, accessibility, convenience etc. It is possible to analyze these factors using Structural Equation Modeling (SEM) (Arbuckle *et al,* 1995). It is important to note that the model developed in this study can be used by transportation planners, engineers and other related agencies in analyzing and investigating the correlation between service attributes and identifying the more suitable and convenient attributes for improving the transportation services and systems provided. An improved transportation service attracts more users thus aiding in reducing traffic congestion, air and noise pollution as many travelers tend to use public transportation system.

The major goal of this section is to analyze and investigate the commuters' indices for evaluation of transportation systems in terms of service quality, safety and travel cost. This chapter also explores the relationship between commuters' satisfaction and the transportation systems attributes based on the needs of the travelers. Structural Equation Model is developed which are vital tools for transportation researchers as an evaluation technique for travel attributes and their correlation.

5.2 Hypothesis

The model developed in this section investigates the impact of matatu and bus services on users' satisfaction. This model tests the following two hypotheses;

- System (matatu and bus) factors such as Service Quality (SQ), Safety, and Travel Cost (TC) are closely related to other travel variables which include but are not limited to frequency, on board comfort, bus stop facilities, absence of delay, on board safety etc.(see fig 5.1).
- Overall commuters' satisfaction can be expressed as a function of Service Quality (SQ), Safety (S), Travel Cost (TC) and perception of the system (matatu and bus) performance (see fig. 5.2).

Data for model estimation are collected by the questionnaire survey that was conducted in Nairobi in March 2008.

5.3 Structural Equation Model

The SEM technique has been widely used in diverse research fields such as psychology, social sciences and economics. Over the years there has been a rapid development of different software packages such as LISREL (Joreskog *et al* 1988, 1989) and AMOS (Arbuckle *et al,* 1995) which have greatly enabled the use and application of SEM techniques in diverse contexts. The tool allows for the modeling of the interrelationship of the observed indicators or factors that outline the conditions of the unobserved latent variables or path diagrams (Laura *et al*). SEM tools constitute of two main parts (i) latent variable model which describes the relationship between the endogenous and the exogenous latent variables and allows the direct assessment of both path and strength of the underlying impacts among this variables (ii) measurement model which depicts the correlation between latent and observed variables.

Both models described above consist of basic equations that describe the relationship between the independent variables (Bollen, 1989). Equation for the latent variable model consists of;

$$\eta = \beta\eta + \Gamma\xi + \zeta$$

Where

η (Eta)	(M×1) vector of the endogenous variables
ξ (xi)	(N×1) vector of the exogenous variables
ζ (Zeta)	(M×1) vector of the random variables

It should be noted that β (beta) and Γ (gamma) are the structural coefficients of the model where

β (Beta)	(M×m) coefficient matrix for the latent endogenous latent variable and
Γ (Gamma)	(M×n) coefficient matrix for the latent exogenous latent variable

The equation for the measurement model consists of;

$\chi = \Lambda_X\xi + \delta$ $\rightarrow$For exogenous variables and $\gamma = \Lambda_Y\eta + \varepsilon$ $\rightarrow$ endogenous variables

Where

χ And δ (delta)	column q- vectors related to the observed exogenous variables and errors respectively.
Λ_X (Lambda)	(Q×n) structural coefficient matrix for the causal effects of the latent exogenous variables on the observed variables
γ And ε (epsilon)	column p- vectors related to the observed endogenous variables and errors respectively
Λ_γ (Lambda)	(P×m) structural coefficient matrix for the latent endogenous variables on the observed variables

5.4 General Model Structure

The SEM model structure estimated in this study in shown in figure 9. The observed variables for this model are 11 public transport perceived preference and quality indicators for performance represented by four scales in the questionnaire. The assumed latent variables are the unobserved quality aspects. Latent variables are defined in the form of principal component analysis (uncorrelated linear combination of observed variables that do account for maximum variance in the observed variables) (Bollen, 1989) by using exploratory factor analysis (EFA) method and a correlation matrix. Eigen value method (latent root criteria) is used to select the factors that would be analyzed. A total of 3 factors with Eigen values

greater than or equal to one are considered for further analysis. The latent variables identified including; **(i) Service Quality (SQ)** which is related to bus frequency (BF), matatu frequency (MF), on board comfort (OBC), absence of delay (AOD) and bus stop facilities (BSF). **(ii) Commuters' Safety (S)** which is related to on board safety (OBS), treatment by crew members (TCMs) and bus stop location (BSL). **(iii) Travel Cost (TC)** which is related to travel cost by bus (TCB), travel cost by matatu (TCM) and ticketing and fare systems (TFS). To relate the three identified exogenous latent variables to endogenous latent variables i.e. **Commuters' Satisfaction (CS)**, latent variable model was used.

5.5 Model for All Respondents

5.5.1 Measurement Model for All Respondents

Preliminary estimation is conducted so as to arrive at a more accurate model and the measurement model outlined in the table 2 is finally derived. The model contained the following variables:

(i) Observed, endogenous variables; Bus frequency (BF), Matatu Frequency (BF), On board Comfort (OBC), Absence of Delay and Congestion (AOD), Travel Cost by Bus (TCB), Travel Cost by Matatu (TCM), Treatment by crew members (TCMs), On Board Safety (OBS) Bus Stop Facilities (BSF), Bus Stop Location (BSL), Ticketing and Fare Systems (TFS)

(ii) Unobserved Exogenous Variables; Service Quality (SQ), Safety (S) and Travel Cost (TC)

Table 2 provides the estimates output for the measurement model for all and the subsequent correlation between the observed and the unobserved variables.

Service Quality (SQ)

(i) SQ = 0.59(Bus Frequency) + 0.59, (R^2 =0.348)

(ii) SQ = 0.31(Matatu Frequency) + 0.67, (R^2 = 0.961)

(iii) SQ = 0.68(Onboard Comfort) + 0.57, (R^2 = 0.462)

(iv) SQ = 0.62 (Absence of Delay) + 0.71, (R^2 = 0.384)

(v) SQ = 0.62 (Bus Stop Facilities) + 0.83, (R^2 = 0.384)

Table 2. Estimates for the Measurement Model

Observed variables		Latent variables	Estimate	Std Estimates	S.E.	C.R.	P	Error
BF	<---	Service Quality	1.000	0.59				0.59
MF	<---	Service Quality	0.579	0.31	0.170	3.413	***	0.67
OBC	<---	Service Quality	1.244	0.68	0.186	6.684	***	0.57
AOD	<---	Service Quality	1.413	0.62	0.210	6.737	***	0.71
TCB	<---	Travel Cost	1.000	0.69				0.54
TCM	<---	Travel Cost	0.993	0.66	0.142	6.999	***	0.65
TCMs	<---	Safety	1.000	0.66				0.64
OBS	<---	Safety	0.989	0.64	0.151	6.552	***	0.72
BSL	<---	Safety	0.981	0.61	0.156	6.277	***	0.83
TFS	<---	Travel Cost	1.096	0.73	0.143	7.691	***	0.53
BSF	<---	Service Quality	1.262	0.62	0.203	6.214	***	0.83

From the above relationship, the coefficients are all positive and therefore it is apparent that Service Quality (SQ) increases with increase in the other travel factors which include but not limited to Bus Frequency (BF), Matatu Frequency (MF), On board Comfort (OBC), Absence of Delay (AOD) and Bus Stop Facilities (BSF). All standard estimates except SQ to MF are

within the range from 0.59 to 0.68, while standard estimates of SQ to matatu frequency (MF) is much lower than others (0.31). This suggests that all observed variables (except MF) consisting the latent variable SQ are approximately equally evaluated by uses. Actual frequency of matatu is very short and this high frequency is not directly related to the service quality item by users.

Safety (S)

(i) S = 0.66(Treatment by crew members) + 0.64, (R^2=0.436)

(ii) S = 0.64(On Board Safety) + 0.72, (R^2 = 0.410)

(iii) S = 0.61 (Bus Stop Location) + 0.83, (R^2 = 0.372)

The coefficients are all positive. The phenomena indicates that an increase in the observed travel factors i.e. Treatment by Crew Members (TCMs), On Board Safety (OBS), Bus Stop Location (BSL) leads to subsequent increase in Safety (S). The value of the estimates suggests that these three observed variables consisting this latent variable S are approximately equally evaluated by uses.

Travel Cost (TC)

(i) TC = 0.69(Travel Cost By Bus) + 0.54, (R^2 = 0.476)

(ii) TC = 0.66(Travel Cost By Matatu) + 0.65, (R^2 = 0.436)

(iii) TC = 0.73(Ticketing and fare System) + 0.53, (R^2 = 0.533)

The coefficients for all variables i.e. Travel Cost by Bus (TCB), Travel Cost By Matatu (TCM) and (Ticketing and Fare System (TFS) are all positive and an increase in one of them leads to an increase in Travel Cost (TC). The value of the estimates suggests that these three observed variables consisting this latent variable TC are approximately equally evaluated by uses.

5.5.2 Latent Model for All Respondents

Commuters' Satisfaction = CS

CS = 0.32(Safety) - 0.35(Travel Cost) + 0.78(Service Quality) +0.51……. (i)
(R^2= 0.608)

CS = 0.78(Overall Bus Performance) + 0.70(Overall Matatu Performance) +049 ……. (ii)
(R^2= 0.608)

Table 3. Estimates for the Latent Model

Relationship			Estimate	Std Estimates	S.E.	C.R.	P	Error
Commuters' Satisfaction (CS)	<---	Safety	0.458	0.32	0.783	1.862	0.06	0.51
Commuters' Satisfaction (CS)	<---	Travel Cost	-0.387	-0.35	1.095	0.354	0.02	0.51
Commuters' Satisfaction (CS)	<---	Service Quality	0.760	0.78	1.485	0.725	0.06	0.45
OEB	<---	Commuters' Satisfaction	1.000	0.78				0.3
OEM	<---	Commuters' Satisfaction	0.877	0.70	0.117	7.522	***	0.49

From equation (i), Commuters' Satisfaction (CS) is positively affected by Safety (S) and Service Quality (SQ) and their β are 0.32 and 0.78 respectively. This shows that an increase in one of the above factors leads to a subsequent increase in satisfaction. It is noteworthy that the level of satisfaction is negatively affected by travel cost (TC) with β value of 0.35. An increase in the level of travel cost would lead to a decreased level of satisfaction. Commuters' Satisfaction (CS) is highly consists of Service Quality (0.78) than Safety (0.32). In equation

(ii), the level of satisfaction is positively affected by the perception on the overall performance of the systems i.e. bus and matatu. The β values for Overall Evaluation of Bus (OEB) and Overall Evaluation of Matatu (OEM) are 0.78 and 0.70 respectively.

5.6. Goodness of Fit Test for the Model

The model is subjected to the goodness of fit test and the values of indices attained i.e. GFI, AGFI, and CFI are as shown in table 4. All the indices observed shows acceptable levels of significance based on the standard values as they are bounded by the model permissible values. Root Mean Square Residual (RMR) and the Root Square Error of Approximation (RMSEA) indices shows a significant statistical level as they are low and within the acceptable range.

Table 4. Indices of Goodness of Fit

No	Description	Observed Values	Permissible Values
1	Chi-Square/Degree of Freedom	1.417	≤ 3.00
2	Goodness of fit Index (GFI)	0.913	≥ 0.90
3	Adjusted Goodness of fit (AGFI)	0.866	≥ 0.90
4	Comparative Fit Index (CFI)	0.926	≥ 0.90
5	Root Mean Square Residual (RMR)	0.060	≤ 0.10
6	Root Mean Square Error (RMSEA)	0.055	≤ 0.06 or ≤ 0.08

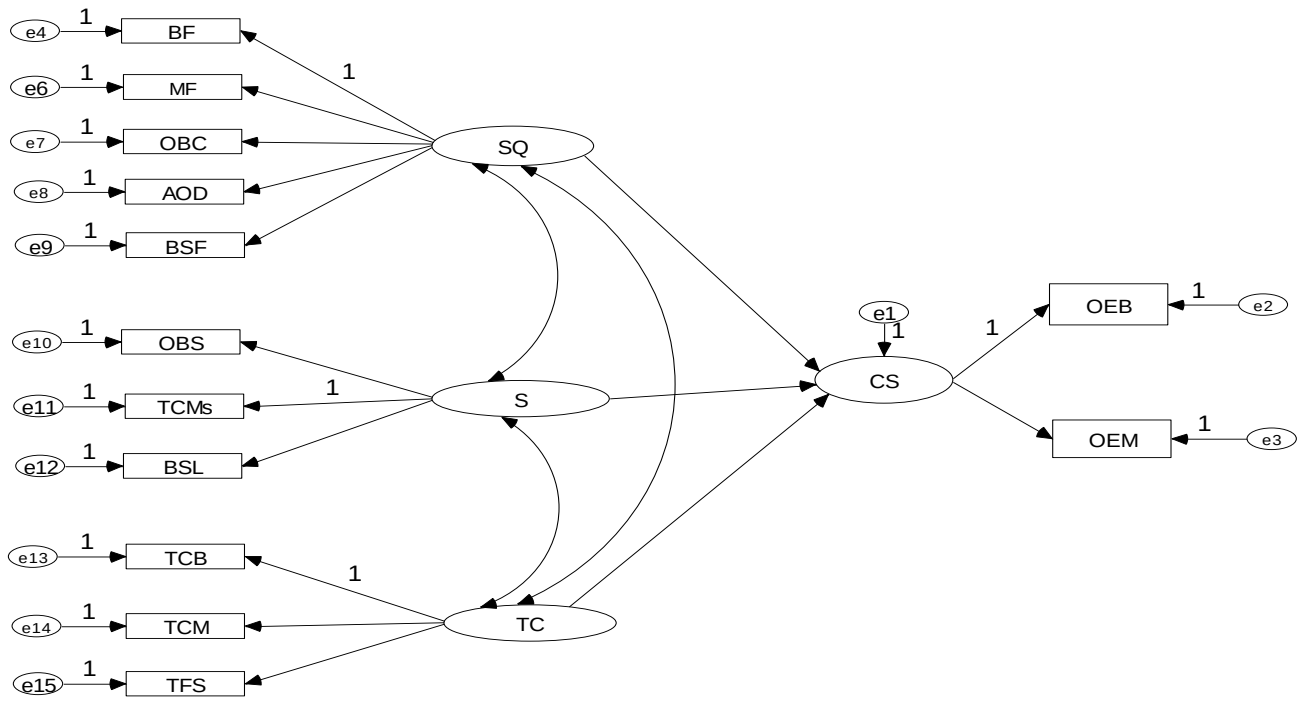


Figure 9. Proposed Model for All Respondents- (Measurement and Latent Model)

6. CONCLUSION AND RECOMMENDATIONS

From the results of the model analyzed above, the model offers empirical findings with some desirable practical applications. The model can therefore be appropriately used to investigate and ultimate upgrading of aspects that would improve the public transportation services being offered or supplied in Nairobi city.

This can be highly ascribed to the fact that there is a very strong relationship between the variables. In this particular case, the model findings showed that by improving the public transportation systems in terms of Service Quality (SQ), Safety (S) and Travel Cost (TC) would enhance ridership and use of the public transport services. In particular, Service Quality is highly affected to the total satisfaction of the consumers (CS), and the four observed indices (Bus frequency (BF)/ Matatu Frequency (BF) / On board Comfort (OBC) / Absence of Delay and Congestion (AOD)) are approximately evenly affected to the Service Quality of the urban public transportation. The above conclusion is derived at after establishing that, analyzed variables have surmountable impact and influence on overall commuters' satisfaction. Level of perception on the overall performance of the systems indicates a significant influence to the overall commuters' satisfaction.

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