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CUSTOMER SATISFACTION ASSESSMENT IN THE PUBLIC TRANSPORTATION SYSTEM OF ANBESSA CITY BUS SERVICES

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Abstract

Assessing public transportation services can significantly contribute to improving their quality, thereby attracting more commuters over time. In Addis Ababa, the capital city of Ethiopia, transport services are provided by the publicly owned Anbessa City Bus Service Enterprise (ACBSE), Alliance bus services, Sheger bus services, and various privately owned vehicles, including minibuses and taxis. This study aimed to analyze customer satisfaction with Anbessa city bus services in Addis Ababa using the SERVQUAL model, considering five service attribute parameters: Responsiveness, Reliability, Tangibility, Assurance, and Empathy. To achieve this objective, a questionnaire was designed and distributed to 500 regular users of Anbessa city bus services in the city. The data obtained was sorted and analyzed using SPSS 20.0 software. The research findings indicate that passengers are satisfied with ACBSE transport services based on responsiveness and tangibility, but they are unsatisfied with the reliability, assurance, and empathy dimensions of service quality. The results of this analysis are useful for transport planners seeking to improve ACBSE bus services at selected terminals in Addis Ababa.

Keywords: ***SERVQUAL Model, Ambessa City Transport, ACBSE, Reliability, Tangibility***

I. INTRODUCTION

Transportation is the basis for the local, regional, national, and international flow of goods and passengers in the country [1]. Public transportation encompasses services from various modes, including buses, trains, ships, airplanes, and rapid transit, depending on the country's requirements [2]. In Addis Ababa city, buses play an important role in transporting the public from their respective origins to destinations.

A study on the Anbessa City bus service in Addis Ababa found that inadequate infrastructure, poor transport operation, and ineffective performance of stakeholders have resulted in inaccessible

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service to the users [16]. The main constraints related to bus services in Addis Ababa city include poor service conditions. Such waiting distances, delays on the way, overloading, long waiting for work residents, and manually controlled signals without having proper automated systems. On the other hand, the private transport services such as Sheger buses, Star Alliance buses, mini buses, and taxis are dominating the public transport services with their better services and lower travel cost [3]. The study [3] found that buses are aged, there is a high breakdown of buses, a very limited supply of buses, and existing buses are not operating as per the schedule. As urbanization increases, the number of passengers obviously increases, and the bus services need to improve to attract passengers. This has become a challenging task for the transport planners in the city, which needs a lot of attention to improve the services of ACBSE. The improvement of customer satisfaction in Anbessa city service buses should be given priority to attract passengers from all directions.

The current study scientifically evaluates the Anbessa City Service bus service customers' satisfaction by considering five major parameters, such as 'Responsiveness', 'Reliability', 'Tangibility', 'Assurance', and 'Empathy', and using the SERVQUAL model and employing SPSS 20.0 Software. Regression models are developed and analyzed by considering Customer satisfaction as the dependent variable and the influencing parameters as the independent variables, whereas the study [3] overlooked a scientific approach without rigorously employing statistical regression analysis. Further, the study was focused only on the evaluation of the three parameters, i.e., 'Safety', 'Security', and 'Comfort' of the passengers by calculating the percentage of customers' opinions from the numerical data collection, and does not possess any scientific approach. On the other hand, the prime objective of the study [3] was to identify major challenges of ACBSE bus service, create awareness among concerned bodies, evaluate the demand of ACBSE customers, and provide hints to solve the problem. Our study considered the scientific sampling strata (random sampling), such as the 'Cooper and Sehindler' sampling method, but the [3] study overlooked the sampling techniques as a paramount activity of the research for revealing the hidden insights in the data collected.

A. Statement of the Problem: Addis Ababa city is the economic and political hub of Ethiopia, the diplomatic center of Africa, and the seat for many international organizations. The population of Addis Ababa is increasing significantly, and the size of the city is expanding horizontally day

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by day. As the population increases, the number of passengers using public transport also increases. To accommodate the increasing number of passengers, transport services are expected to expand within the city limits. In the existing state of transportation, the supply of transport services is not proportional to the demand. Due to limited numbers of buses as well as routes, poor people who cannot afford other modes of transport are exposed to walking for long distances and are subjected to longer waiting and travel times. During peak hours, the demand exceeds the supply of service, demotivating the usage of public transport vehicles. At this crucial time frame, many people wait for transport services for a long time, and there is a hard struggle to get the service. The results of a research [17] show that a solution of dual affordability metric, both in terms of observed and potential affordability, can provide an effective basis to improve the affordability of public transport in Addis Ababa city. Furthermore, buses are found to be overcrowded and operate without closing their doors, which may expose passengers to accidents, suffocation, pickpocketing, and communicable diseases. Also, it has become difficult for the elderly, pregnant, sick, and disabled people to get the service on time.

Under these circumstances, the present research is carried out to understand the difficulties of bus passengers with ACBSE bus services and to find out certain amicable solutions to improve the transportation services that benefit the majority of employees, business people, visitors, students, and other members of the public. The research is made to analyze the overall level of satisfaction of customers, taking quality indicators of bus transportation service as parameters, and recommend various improvement solutions.

B. Objective of the study: The primary objective of the research is to evaluate customer satisfaction with the Anbessa city bus service and provide recommendations for improving the public transportation system to significantly contribute to creating safe, sustainable, and equitable urban mobility in Addis Ababa.

II. LITERATURE REVIEW

Customer satisfaction is the result of a customer's assessment of a service based on a comparison of their perceptions of service delivery with their prior expectations. If customers' perception of the actual service is below their expectation, a service gap is said to have happened, and their satisfaction level is rated as poor [3]. Satisfaction or dissatisfaction with facilities is influenced by

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prior expectations regarding the level of [1]. For many organizations in the public sector, customer satisfaction will itself be the measure of success. According to [18] satisfaction is defined as the customer's fulfillment.

Transportation is the movement of people with goods from one place to the other, while road transport is popularly referred to as the engine and wheel of society that helps the world to go round and function actively [4]. Quality is defined as an adherence to customers' specifications [5], which are sought to meet the criteria that customers want. A major reason why customers switch service providers is due to unsatisfactory service. Various research studies suggest that when the service provider accepts responsibility and resolves the problem, the customer becomes "bonded" to the organization [6]. Customer satisfaction is a main issue for transport services. Customer satisfaction is important for the travel demand that works for the continuity and profitability of the suppliers of public transport [18]. The quality of transport service can be measured against reliability, convenience, safety, security, and comfort [12]. Speed, accessibility in time, reliability, and Frequency are quality indicators of transport services [13] and are useful to measure the quality of travel in terms of customer travel satisfaction.

According to studies [19], customers use 10 service quality dimensions to judge the quality of the service offered. The ten original determinants are further grouped into five service quality dimensions, namely reliability, responsiveness, assurance (including competence, courtesy, redibility, security), empathy (including access, communication, and understanding), and tangibles.

III. Materials and Methods

A. Study Area

Addis Ababa is the capital and the largest city in Ethiopia and in Africa. It covers an area of 527 sq. km and has a population of about 4 million. The city is located at an elevation of 2355 meters above sea level and is associated with political, economic, and cultural activities. Anbessa bus, Higer bus, and Star Alliance bus are the popular buses in Addis Ababa city. The other transportation services include cars, taxis, motorcycles, bicycles, and a light rail transit system.

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Fig. 1.: Addis Ababa City

Fig. 2.: Double-decker Anbessa bus

Rapid urbanization, along with inadequate public transport services and poor infrastructure facilities in the city, causes frequent traffic congestion and road safety issues. Fig 1 & 2 depicts the city transportation facilities.

B. Anbessa Bus Transport System in Addis Ababa City

The public transport in Addis Ababa city is named Anbessa City Bus Service Enterprise (ACBSE) and is owned by the Federal Government of Ethiopia. Its operations are also financially supported by the city administration (Eshetie Berhan, Birhanu Beshah, & Daniel Kitaw, 2013) with a fleet of 1006 buses. It operates on 121 routes and transports about 600,000 passengers per day. In addition to these, peak hour services are operated on 34 routes out of the existing 121 routes. The bus stops were about 1440 in number. It utilizes buses that have a high passenger carrying capacity of 100 (30 seated and 70 standing passengers), but double-decker new buses have a high passenger carrying capacity of 140 (80 seated and 60 standing passengers). The fare system is flat but varies on different routes.

C. Terminals

The Addis Ababa city bus enterprise has four major terminals for its city bus operations. These major terminals are located at Addis Ketema (Merkato), Legahar, Megenagna, and Menelik II Square. The enterprise has also other minor terminals for its operations, which are located at Gerji, Balcha Hospital, Kera, Bole Michael, Menilik Hospital, Shiro Meda, Ayertena, Saris Abo, Arat kilo and Sidist kilo.

D. Questionnaire Design

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A self-completion questionnaire with closed questions was prepared by referring to the five SERVQUAL Model Scale constructs. The questionnaire was designed to collect relevant data and information intended to address the objectives of the study. A list of questions was prepared and distributed to the selected respondents. The questionnaire forms were then distributed to the respective drivers, passengers, pedestrians, and commuters in all the selected bus stop locations. All of the items were measured by using a five-point Likert-type response scale anchored at 5 strongly satisfied and 1 strongly unsatisfied. Questionnaires are administered in different ways: face-to-face, by telephone, and by email. The target population of the study consists of all type of travel customers (who travel short, medium, and large distances), Public Transport core process employees within the selected terminal (Legehar terminal) and technical employees in Yeka depot, key informants, general manager, and public transport core process owner of the enterprise.

E. Sampling Method

According to a study [14], the sampling method selected for a given research depends on the requirements of the project, its objectives, the funds available, and time constraints. Two types of sampling methods are recommended: namely, probability (or random) sampling methods and non-probability sampling methods by [10]. According to a study [15], probability sampling involves four considerations. Firstly, the target population must be specified. Secondly, the method for selecting the sample needs to be developed. Thirdly, the sample size must be determined. Employing the 95 percent confidence level and confidence interval, the following algorithm used in a study [20] was adopted to ascertain the minimum sample size for each of the case studies. Given the confidence level = 95%, and e = 0.05

$$n = \frac{N}{1+N\,(e^2)} \quad \frac{51{,}450{,}796}{1+51{,}450{,}796(0.05^2)} = 499.99, \quad n=499.99= 500 \text{ people}$$

Where n = sample size, N = population, e = margin of error set at 5%

The study thus targeted a minimum of 500 samples to collect the customer data that will support the research to determine the customer satisfaction over the public transport service in Addis Ababa city.

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F. Variables and their Measurements

This research analyzes Customer Satisfaction of the Anbessa city Bus service using existing bus service conditions. The study thus determined dependent and independent variables for assessing the quality of customer service by the respective bus department organization. Table I below describes the independent and dependent variables with their measurements.

TABLE I: Measurement of independent and dependent variables

Variables	Dimensions	Indicators	Code
Independent Variables	Responsiveness (X1)	Ease of access for booking/ ticketing	C1
		Willingness to accept criticism and suggestions	C2
		Friendliness and employee comfort	C3
		Customer facilities around the station	C4
	Reliability (X2)	Frequency Services so that waiting times are short	C5
		Service's punctuality	C6
		Service regularity	C7
		Waiting time at bus stops during off-peak hours	C8
		Waiting time at bus stops during the peak times	C9
		Frequency of service on weekends	C10
		Comfort of seats on the bus, temperature on the buses	C11
		Bus stops and shelters	C12
		Crowding inside the bus	C13
		Cleanliness inside the bus	C14
		Cost effectiveness, affordability, and value	C15

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	Tangible (X3)	Buses are well-maintained	C16
		The buses are good in their technical capacity, and the Frequency of technical failures during the journey	C17
		Physical comfort of the service environment	C18
	Empathy(X4)	Ability to assist customers with difficulties	C19
		Giving individual attention	C20
		The ability to get service locations, visible, and signage	C21
	Assurance(X5)	Staff behavior	C22
		Feel safe and comfortable using the services	C23
		The employees speak with you by using the appropriate address form	C24
		Buses carry as per the specified capacity	C25
		Not afraid of a pickpocket on the buses	C26
Dependent Variable	Customer Satisfaction (Y)	Customer Satisfaction of Anbessa City Service Bus Service	Y

G. Data Collection

The data was collected in the study with two components: primary and secondary. Primary data was collected by utilizing questionnaire forms. The information was collected from the field, through the drivers of Anbessa city bus service, conductors, normal people (passengers) and students, and Anbessa city bus service enterprise management. The secondary data was collected by means of consulting available literature on the subject under investigation. Tables II to VI show a sample of data collected in the field using data collection tools on Responsiveness, Reliability, Tangible, Empathy, and Assurance service quality attributes, respectively.

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TABLE II: Sample data collected for estimating responsiveness attribute

Items	Strongly Unsatisfied		Unsatisfied		Neutral (No opinion)		Satisfied		Strongly Satisfied	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Responsiveness										
Ease of access for booking/ticketing	90	**22**	120	**26**	30	**6**	160	**28**	100	**18**
Willingness to accept criticism and suggestions	90	**18**	110	**24**	70	**14**	135	**25**	95	**19**
Friendliness and employee comfort	80	**16**	200	**40**	40	**8**	100	**20**	80	**16**
Customer facilities around station	85	**17**	175	**35**	15	**3**	160	**32**	65	**13**

TABLE III: Sample data collected for estimating reliability attribute

Items	Strongly Unsatisfied.		Unsatisfied		Neutral (No opinion		Satisfied		Strongly Satisfied	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Reliability										
Frequent Services so that waiting times are short	120	**24**	155	**31**	5	**1**	135	**27**	85	**17**
Service's punctuality	110	**22**	160	**32**	15	**3**	115	**23**	100	**20**
Service regularity	90	**18**	100	**20**	0	**0**	200	**40**	110	**22**
Waiting time at bus stops during off-peak hours	40	**8**	70	**14**	10	**2**	280	**56**	100	**20**

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Waiting time at the bus stop during peak times	180	**36**	200	**40**	2	**0.4**	100	**20**	18	**3.6**
Frequency of service on weekends	120	**24**	210	**42**	10	**2**	110	**22**	50	**10**

Table III explicitly elaborates on the responsiveness attributes estimated values on parameters of the study.

TABLE IV: Sample data collected for estimating tangible attribute

Items	Strongly Unsatisfied		Unsatisfied		Neutral (No opinion)		Satisfied		Strongly Satisfied	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Tangible										
Comfort of seats on the bus, temperature on the buses	70	**14**	190	**38**	0	**0**	180	**36**	60	**12**
Bus stops and shelters	110	**22**	120	**24**	20	**4**	160	**32**	90	**18**
Crowding inside the bus	140	**28**	220	**44**	10	**2**	100	**20**	30	**6**
Cleanliness inside the bus	90	**18**	200	**40**	30	**6**	120	**24**	60	**12**
Cost effectiveness, affordability, and value	20	**4**	40	**8**	0	**0**	240	**48**	200	**40**
Buses are well-maintained	130	**26**	140	**28**	20	**4**	170	**34**	50	**10**
The buses are good in their technical capacity and Frequency from technical failure during the journey	50	**10**	100	**20**	40	**8**	220	**44**	90	**18**
Physical comfort of the service environment	40	**8**	170	**34**	20	**4**	180	**36**	50	**10**

The Tables IV, V, and VI depict tangible, empathy, and assurance attributes, estimated values, respectively.

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TABLE V: Sample data collected for estimating empathy attribute

Items	Strongly Unsatisfied		Unsatisfied		Neutral (No opinion)		Satisfied		Strongly Satisfied	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Empathy										
Ability to assist customers with difficulties	90	**18**	150	**30**	10	**2**	200	**40**	50	**10**
Giving individual attention	180	**36**	200	**40**	0	**0**	60	**12**	60	**12**
The ability to get service locations, visible, and signage	170	**34**	190	**38**	20	**4**	80	**16**	40	**8**

TABLE VI: Sample data collected for estimating assurance attribute

Items	Strongly Unsatisfied.		Unsatisfied		Neutral (No opinion)		Satisfied		Strongly Satisfied	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Assurance										
Staff behavior	90	**18**	120	**24**	80	**16**	160	**32**	50	**10**
Feel safe and comfortable using the services	30	**6**	60	**12**	10	**2**	260	**52**	140	**28**
The employees speak with you by using the appropriate address form	170	**34**	230	**46**	30	**6**	40	**8**	30	**6**
Buses carry as per the specified capacity	200	**40**	210	**42**	0	**0**	60	**12**	30	**6**
Not afraid of pickpocket in buses	190	**38**	210	**42**	2	**0.4**	50	**10**	48	**9.6**

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H. Statistical Analysis

The results of the survey were analyzed using descriptive statistics and multiple linear regression analysis. The SERVQUAL SOFTWARE was applied to determine perceptions and quality of service using the five dimensions of service quality, namely empathy, responsiveness, reliability, tangibles, and assurance, as was done by [20]

IV. DATA ANALYSIS AND DISCUSSION

A. Customers' Responses on Responsiveness Attribute of Service Quality

Responsiveness attribute is concerned with the willingness and readiness of employees to provide a service to satisfy the needs and desires of customers. Customers were asked to give their opinions on the responsiveness dimension of the service quality of the enterprise. The result obtained is summarized in Table VII.

TABLE VII: Field survey (Feb. 2018) - responsiveness dimension of service quality attributes (n=500)

Code	Items	Strongly Unsatisfied		Unsatisfied		Neutral (No opinion)		Satisfied		Strongly Satisfied		Mean
		Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	
	Responsiveness											
C1	Ease of access for booking/ Ticketing	90	**22**	120	**26**	30	**6**	160	**28**	100	**18**	**3.12**
C2	Willingness to accept criticism and suggestions	90	**18**	110	**24**	70	**14**	135	**25**	95	**19**	**3.07**
C3	Friendliness and Employee comfort	80	**16**	200	**40**	40	**8**	100	**20**	80	**16**	**2.80**
C4	Customer facilities around the station	85	**17**	175	**35**	15	**3**	160	**32**	65	**13**	**2.89**

Table VII above shows that out of 500 respondents, 80 to 90% of the respondents are strongly unsatisfied, 24 to 40% are unsatisfied, 20 to 32% are satisfied, whereas 13 to 19% are strongly satisfied with the ease of access for booking/ ticketing.

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B. Customers' Responses on Reliability Attribute of Service Quality

Customers could measure the reliability of the enterprise by considering safety during the service provision process, timely provision of service, and informing of bus delays in advance. Customers are asked to rate the reliability of the enterprise by taking into account its activities. Their responses are illustrated in the following Table VIII.

TABLE VIII: Customers' responses on the reliability dimension of service quality

Code	Items	Strongly Unsatisfied		Un-satisfied		Neutral (No opinion		Satisfied		Strongly Satisfied		Mean
		Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	
	Reliability											
C5	Frequency Services so that waiting times are short	120	**24**	155	**31**	5	**1**	135	**27**	85	**17**	**2.82**
C6	Service's punctuality	110	**22**	160	**32**	15	**3**	115	**23**	100	**20**	**2.87**
C7	Service regularity	90	**18**	100	**20**	0	**0**	200	**40**	110	**22**	**3.28**
C8	Waiting time at bus stops during off-peak hours	40	**8**	70	**14**	10	**2**	280	**56**	100	**20**	**3.66**
C9	Waiting time at bus stops during the peak times	180	**36**	200	**40**	2	**0.4**	100	**20**	18	**3.6**	**2.15**
C10	Frequency of service on weekends	120	**24**	210	**42**	10	**2**	110	**22**	50	**10**	**2.12**

Table VIII shows that out of 500 respondents, 8 to 36% of the respondents are strongly unsatisfied, 14 to 42% are unsatisfied, 20 to 56% are satisfied, whereas 3.6 to 22% are strongly satisfied towards punctuality, regularity, waiting time at bus stops, and Frequency of services on weekends.

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C. Customers' Response on Tangible Attribute of Service Quality

According to a study [20] tangible dimension of service quality focused on physical facilities, equipment, and the appearance of the employees. To measure the service quality from the tangible dimension, the following questions were raised for the respondents

TABLE IX: Field survey (Feb. 2022)- tangible dimension of service quality

Code	Items	Strongly Unsatisfied		Un-satisfied		Neutral (No opinion)		Satisfied		Strongly Satisfied		Mean
		Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	
	Tangible											
C11	Comfort of seats in the bus, Temperature on the buses	70	14	190	38	0	0	180	36	60	12	2.58
C12	Bus stops and shelters	110	22	120	24	20	4	160	32	90	18	3.00
C13	Crowding inside the bus	140	28	220	44	10	2	100	20	30	6	2.32
C14	Cleanliness inside the bus	90	18	200	40	30	6	120	24	60	12	2.72
C15	Cost effectiveness, affordability, and value	20	4	40	8	0	0	240	48	200	40	4.12
C16	Buses are well-maintained	130	26	140	28	20	4	170	34	50	10	2.72
C17	The buses are good in their technical capacity and Frequency from technical failure	50	10	100	20	40	8	220	44	90	18	3.40
C18	Physical comfort of the service Environment	40	8	170	34	20	4	180	36	50	10	2.82

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Table XI clearly indicates that out of 500 respondents, 4 to 28% of the respondents are strongly unsatisfied, 8 to 42% are unsatisfied, 20 to 48% are satisfied, whereas 6 to 40% are strongly satisfied towards comfort of seats, bus shelters, crowding, cleanliness, cost effectiveness, maintenance,

D. Customers' Responses on the Empathy Dimension of Service Quality

This refers to the ability of the service provider to understand the customers' needs and then provide the required dimension of service quality.

TABLE X: Field survey (Feb. 2022) - customers' responses on empathy service quality

Code	Items	Strongly Unsatisfied.		Un-satisfied		Neutral (No opinion)		Satisfied		Strongly Satisfied		Mean
		Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	
	Empathy											
C19	Ability to assist with customer difficulties	90	18	150	30	10	2	200	40	50	10	2.94
C20	Giving individual attention	180	36	200	40	0	0	60	12	60	12	2.12
C21	The ability to get service locations, visible, and signage	170	34	190	38	20	4	80	16	40	8	2.26

Table X above shows that out of 500 respondents, 18 to 36% of the respondents are strongly unsatisfied, 30 to 40% are unsatisfied, 12 to 40% are satisfied, and 8 to 12% are strongly satisfied with the individual attention, accessibility, etc.

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E. Customers' Responses on Assurance Dimension of Service Quality

Table XI below shows customers' responses about employees related to the assurance dimension of the service. Substantial customers are not satisfied with the employees during service provision.

TABLE XI: field survey (Feb. 2022)- assurance dimension of service quality (n= 500)

Code	Items	Strongly Unsatisfactory.		Un-satisfied		Neutral (No opinion)		Satisfied		Strongly Satisfied		Mean
		Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	
	Assurance											
C21	Staff behavior	90	18	120	24	80	16	160	32	50	10	2.92
C22	Feel safe and comfortable using the services	30	6	60	12	10	2	260	52	140	28	3.84
C23	The employees speak with you by using the appropriate address form	170	34	230	46	30	6	40	8	30	6	2.06
C24	Buses carry as per the specified capacity	200	40	210	42	0	0	60	12	30	6	2.02
C25	Not afraid of a pickpocket on buses	190	38	210	42	2	0.4	50	10	48	9.6	2.11

Table XI above shows that out of 500 respondents, 6 to 40% of the respondents are strongly unsatisfied, 12 to 46% are unsatisfied, 8 to 52% are satisfied, and 6 to 28% are strongly satisfied with staff behavior, carrying capacity, picketers, and so on.

F. Customers' Response on the Overall Satisfaction with the Service Delivery Process

As service quality has a significant impact on customers' satisfaction level. Johnston and Clark (2008) indicated that customer satisfaction is a good measure of how effective the service delivery

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system is because it links to the level of service that the company is currently providing to its customers. Then, customers evaluate their level of satisfaction based on the processes that exist in the enterprise.

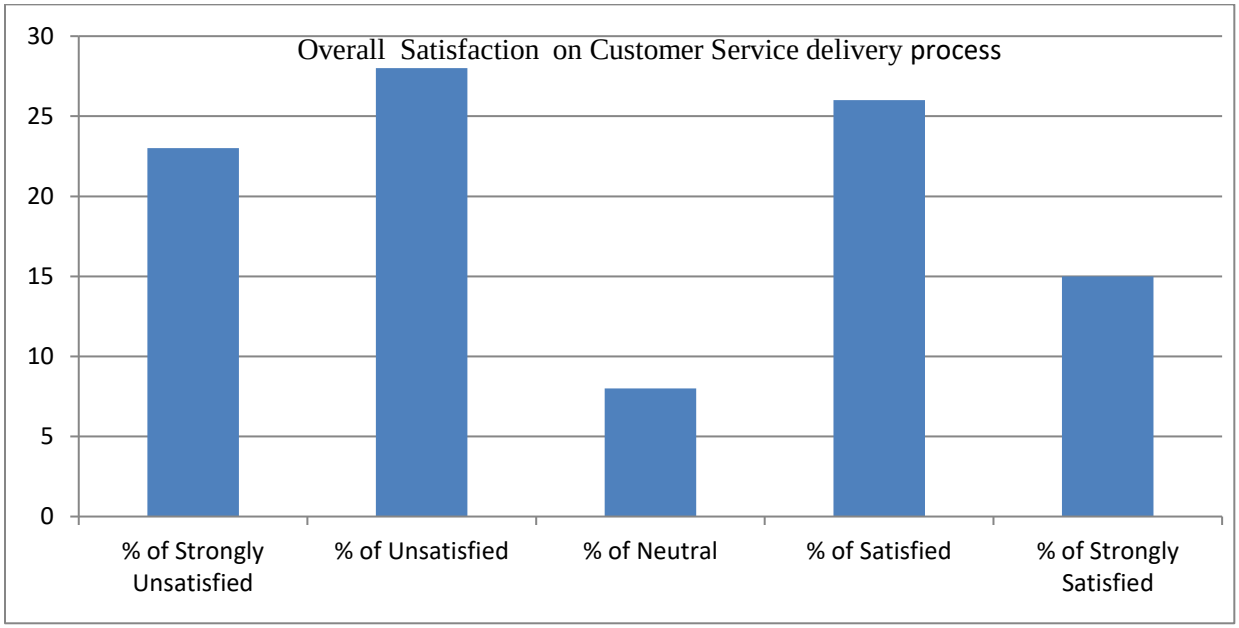

Fig. 3.: Overall customer satisfaction level on Anbessa bus service delivery process (Field survey data)

Fig. 3 shows the overall satisfaction level of the customers with Anbessa city service buses in Addis Ababa city. Out of 500 respondents, 23% % of the respondents are strongly unsatisfied, 28% are unsatisfied, 26% are satisfied, whereas 15% are strongly satisfied with the ease of access for selecting the Anbessa city service buses. This clearly indicates that the majority of regular customers of the Anbessa bus service enterprise in Addis Ababa city are not satisfied with the facilities, travel behavior, and ticket price, etc., and this needs strategic solutions to improve customer satisfaction by proper management measures and customer choices.

G Regression Analysis

In this study, multiple linear regression analysis is employed to test whether customers of Anbessa bus city were satisfied or not by five service quality dimensions, namely reliability, responsiveness, assurance, empathy and tangibles, and different models are developed by

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considering Customer Satisfaction as the dependent variable and the quality attributes as independent variables.

The general form of the Multiple Linear Regression equation is

$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + Ɛ$, or

Hence, Customer satisfaction= B_0 + B_1 (Responsiveness) + B_2 (Reliability) + B_3 (Tangible) + B_4 (Empathy) + B_5 (Assurance)

Multiple linear regression equations are developed using SPSS 20.0 software, for each evaluation parameter by considering the customer satisfaction on the respective parameter as the dependent variable and the factors responsible for the evaluation of the parameter as the independent variables. The equations are found to be logically good and are validated properly. The following are the developed customer satisfaction models.

Model 1: Customer satisfaction on Responsiveness service quality = 69.140 +**0.731***(Ease of access for booking/ticketing) + **0.885***(Willingness to accept criticism and suggestions) + **0.798***(Customer facility around stations) + **0.041***(Friendliness and Employees comfort) -- Equation (1)

Therefore, overall customer satisfaction on Responsiveness service quality= 69.140 **+ 0.731**(3.12) + **0.885** (3.07) + **0.798** (2.80) + **0.041** (2.89) = **76.49%**

The interpretation of the above equation is that the slope of the regression line is significantly greater than zero, indicating that overall satisfaction tends to increase as the four underlying factors increase. Slope of the regression line indicates the rate of change in the dependent variable (y) for every one-unit increase in the independent variable (x), which is verified in these developed models. The coefficients of the developed model are the indicators for better output and are found to be more appropriate. The equation shows that the overall satisfaction of Anbessa bus transport services by passengers in Addis Ababa will be 76.49% when all 4 service quality attributes are at the zero level. Again, the equation obtained denotes that customers' satisfaction with Ethiopian Anbessa city bus service, taking Responsiveness quality indicator as a whole, will increase when their satisfaction with Ease of access for booking/ticketing, Willingness to accept criticism and suggestions, Friendliness, and Employees comfort, and Customer facility around stations increase.

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Thus, it indicates that if satisfaction with all the above variables increases by one unit, overall satisfaction increases by 0.764, 0.240, 0.059, and 0.281 percent, respectively.

Model 2: Customer satisfaction on Reliability Service Quality = 37 + 0.170*(Service punctuality) + 0.148*(Waiting time at bus stops off-peak hours) + 0.258*(Waiting time at bus stops during the peak hours) +0.076*(Frequency of services on weekends) + 0.223*(Frequency service so that waiting time is short) + 0.321 *(Service Regularity) -------- Equation (2)

Therefore, overall customer satisfaction on Reliability Service Quality =37.084 + 0.170 (2.82) + 0.148 (2.87) + 0.258 (3.28) + 0.076 (3.66) + 0.223 (2.15) + 0.321(2.12) = 40.27%

The above equation indicates that the overall satisfaction of Anbessa bus transport services by passengers in Addis Ababa will be 40.27% when all 6 service quality attributes are at the zero level. Again, the equation obtained denotes that customers' satisfaction with Ethiopian Anbessa city bus service, taking Reliability quality indicator as a whole, will increase by 0.216, 0.337, and 0.140 percent, and decrease by 0.561 percent, respectively, when five variables increase by one unit, and one variable decreases by one unit. The coefficients of the developed model are appropriate to get the best output from the model.

Model 3: Results of Regression Analysis on Tangible Dimension of Service Quality

Customer satisfaction on Tangible service Quality = 58 +0.493*(Comfort of seats on the bus, Temperature on the buses) + 0.671*(Crowding inside the buses) + 0.562*(Cleanliness inside the bus) +0.321*(Bus stops and shelters) + 0.286*(Cost effectiveness, affordability, and value)+ 0.433(Buses are well maintained)+ 0.234*(The buses are good in their technical capacity and Frequency from technical failure during journey)+ 0.088*(Physical comfort of the services environment) ---------- Equation (3)

Therefore, overall customer satisfaction on Tangible service Quality= 58.013 + 0.493 (2.58) + 0.671 (3.00) + 0.562 (2.32) + 0.321 (2.72) + 0.286 (4.12) + 0.433 (2.72) + 0.234 (3.40) + 0.088 (2.82) = 66.90%

The above equation shows that the overall satisfaction of Anbessa bus transport services by passengers in Addis Ababa will be 58.01% when all 8 service quality attributes are at the zero level. Again, the equation obtained denotes that customers' satisfaction with the Ethiopian Anbessa city bus service, taking the Tangible quality indicator as a whole, will increase when their

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satisfaction with seven service quality indicators increases and crowding inside the buses decreases. The developed model has appropriate coefficients to explain a better relationship between dependent and independent variables.

Model 4: Result of Regression Analysis on the Empathy Dimension of Service Quality

Customer satisfaction of Anbessa city bus services on Empathy service quality indicator = 39.66 + 0.406*(Ability to assist customer difficulty) + 0.358*(Giving individual attention) + 0.160*(The ability to get service locations, visibility, and signage) ---------- Equation (4)

Therefore, overall customer satisfaction on Empathy service quality indicator = 39.664 + 0.406 (2.94) + 0.358 (2.12) + 0.160 (2.26) = 41.98%

The interpretation of the above equation is that the slope of the regression line is significantly greater than zero, indicating that overall satisfaction tends to increase as the three underlying factors increase. The equation also shows that the overall satisfaction of Anbessa bus transport services by passengers in Addis Ababa will be 39.66% when all 3 service quality attributes are at the zero level. Again, the equation obtained denotes that customers' satisfaction with Ethiopian Anbessa city bus service, taking empathy quality indicator as a whole, will increase when their satisfaction with the Ability to assist customer difficulty, giving individual attention, the ability to get to service locations, and visible signage increases. The model coefficients indicate that the relationship between dependent and independent variables is close to reality.

Model 5: Result of Regression Analysis on Assurance Dimension of Service Quality

Customer satisfaction on Assurance service quality indicator = 36.942 +0.247*(Staff behavior) + 0.220*(Feel safe and comfort using the services) + 0.083*(The employees speak with you by using appropriate address form) + 0.301*(Not afraid of pick pocket on the buses) +0.321*(Buses carry as per the specified capacity) ---------- Equation (5)

Therefore, overall customer satisfaction on Assurance service quality indicator = 36.942 + 0.247 (2.92) + 0.220 (3.84) + .083 (2.06) +0.301 (2.02) + 0.321 (2.11) = 39.96%

The above equation indicates that the overall satisfaction of Anbessa bus transport services by passengers in Addis Ababa will be 36.94% when all 5 service quality attributes are at the zero level. Again, the equation obtained denotes that customers' satisfaction with Ethiopian Anbessa

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city bus service taking Assurance quality indicator as a whole will increase when their satisfaction with feel safe and comfort using the services, staff behavior, the employees speak using appropriate address form, bus carry as per the specified capacity, and tot afraid of pick pocket on the buses increase. The coefficients in the model are true representatives for getting an appropriate output.

General evaluation of the services provided by the Anbessa City bus Transport Service by the customers

Customers were asked to evaluate their level of satisfaction in general based on the service attributes, and the results obtained are as follows:

TABLE XII: Responses of passengers on service quality indicators (n= 500)

Cod	Variables	Strongly unsatisfied		Unsatisfied		Neutral		Satisfied		Strongly satisfied		Mean
		Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	
X_1	Responsiveness	40	8	80	16	10	2	290	58	80	16	3.58
X_2	Reliability	150	30	216	43.2	55	11	60	12	19	3.8	2.17
X_3	Tangible	66	13.2	105	21	36	7.2	207	41	86	17	3.28
X_4	Assurance	118	23.6	200	40	25	5	125	25	32	6.4	2.51
X_5	Empathy	120	24	203	40.6	37	7.4	90	18	50	10	2.49

The results indicate that the respondents are strongly unsatisfied with the service attributes at the range of 8 to 30%, followed by satisfied at the range of 12 to 58%, and strongly satisfied at the range of 3.8 to 17%.

Variation on Overall Customer Satisfaction of Anbessa City Bus Service

In order to observe the variation of customer satisfaction with bus service attributes, different graphs are plotted by considering customer satisfaction on x – x-axis and the corresponding bus service attributes on y – y-axis, and are as shown in Fig. 4 to 8.

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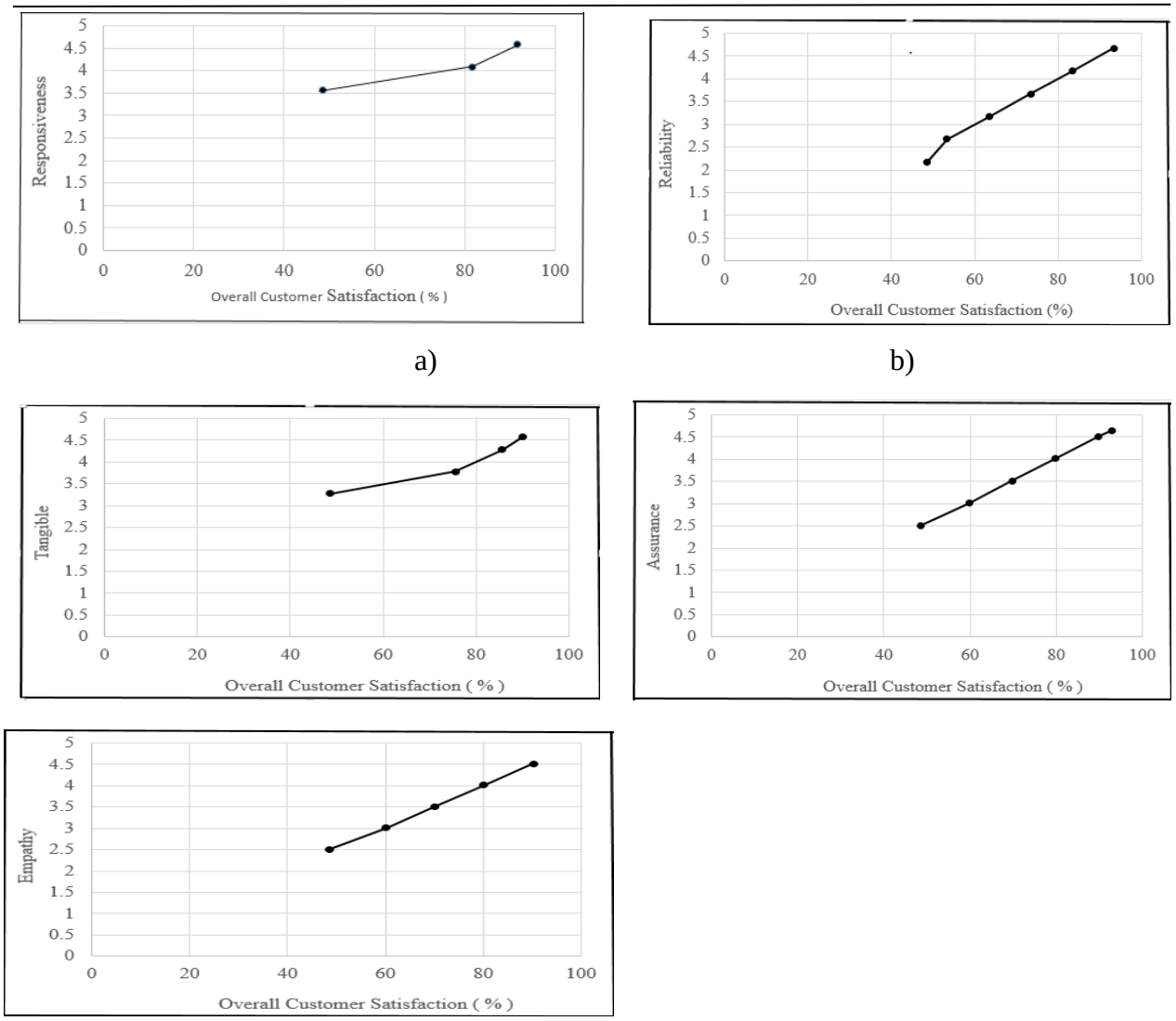

Fig.4. - 8: Variation of Bus service attributes with Customer Satisfaction

The above graphs indicate that customer satisfaction increases as the bus service attributes increase. To achieve a customer satisfaction of 60%, the responsiveness attribute shall range between 3.5 to 4, whereas the other attributes shall range between 3 to 3.5. In order to achieve 90 % to 100% satisfaction, all the bus service attributes shall range between 4.5 to 5.

V. CONCLUSIONS

The main objective of this thesis is to study the Road Asset Management (RAM) and the existing practices taking the Sodo district as a case study and making recommendations by preparing frameworks based on the findings. Organizational challenges, financial challenges, political

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awareness, overall asset management system, performance monitoring, condition assessment, planning of implementation of asset management, and professional competency were the major causes of problems identified for road asset management practice in the Sodo district.

Based on the research assessment the researcher concluded:

- There is a lack of asset management components implementation practice in its adequate form or sense in the Sodo district. The implementation stage of an asset management system is still at the planning stage. Most of the individual management systems have not been utilized, data collection decisions were not based on the standards and input needs of management systems or processes behind the rationalization of data collection. The Sodo district does not still formally identify and document existing links between the data they collect and the project selection decisions they support. The main problems faced in applying asset management practice are a lack of an organized asset management department, lack of professional employers, inadequacies of digitalized asset management system, and absence of short courses to acquire state-of-the-art techniques of road asset management.
- Therefore, this study strictly underlines the necessity of well-defined government road asset management policies, regulations, and strategies as the basis for better road asset management which treats roads as capital assets of both the nation and the study area. Moreover, the study tries to come up with a rational solution for a modern asset management system by investigating the current road asset management system in the study area and then recommending a better way of road asset management for the sustainable social and economic development of the districts as well as the region.
- Furthermore, the study recommends the best framework for decision-makers on how to make quality decisions between alternative maintenance strategies. Also, road operators at different levels should take into consideration the impacts of poor road asset management on the socio-economic life of their society. An integrated and holistic approach to road management is needed to align funding, management systems, and procedures.
- Moreover, the study presents relevant topics and future challenges for Road Asset Management. It also summarizes the latest issues related to road infrastructure maintenance and outlines new themes for future research.

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