

ASSESSMENT OF URBAN BUS SERVICES IN MINNA NIGER STATE

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MAY, 2015

DECLARATION

I declare that the work in the dissertation entitled “Assessment of Urban Bus Services in Minna” has been carried out by me in the department of Urban and Regional Planning. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this dissertation was previously presented for another degree or diploma at any University.

Muhammad Lawal Ibrahim

Signature

.....

Date

CERTIFICATION

This dissertation entitled “Assessment of Urban Bus Services in Minna” has been carried out by me in the department of Urban Management by Muhammad Lawal Ibrahim meets the regulations governing the award of the degree of Master in Urban Management, Ahmadu Bello University, Zaria, and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This work is dedicated to my late brother and sister: Mal. Sani Muhammad Ibrahim, and Malama Aisha Muhammad Ibrahim.

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Table of Contents

Title Page	i
Cover page.....	ii
Dedication page	iii
Certification page.....	iv
Acknowledge page.....	v
Table of content.....	vi
List of Table.....	vii
List of Figures.....	viii
List of Plates.....	ix
CHAPTER ONE.....	I
BACKGROUND TO THE STUDY.....	1
1.0 INTRODUCTION.....	I
1.1 STATEMENT OF RESEARCH PROBLEM.....	3
1.2 Research Questions.....	4
1.3 Aim.....	4
1.4 Objectives.....	4
1.5 Scope and Limitation of the Study.....	4
1.6 Structure of the thesis.....	5
CHAPTER TWO.....	6
LITERATURE REVIEW.....	6
2.0 Introductions.....	6
2.1 user satisfaction definition.....	6
2.2 Transit performance point of view.....	7
2.3 Transit performance perspective.....	8

2.4 Transit performance approach.....	9
2.5 sourcing performance data and standards.....	10
2.6 Transit performance indicators.....	15
2.6.1 Service frequency.....	15
2.6.2 Service Reliability.....	16
2.6.3 Comfort.....	18
2.6.4 Cleanliness.....	21
2.6.5 Safety and security.....	22
2.6.6 Fare... ..	23
2.6.7 Information.....	24
2.6.8 Customer care.....	26
2.7 Customer Satisfaction in Transportation Context.....	27
2.8 Studies regarding satisfaction in Public Bus Transport.....	2H
2.9 RECENT STUDIES ON PERFORMANCE ASSESSMENT MEASURES.....	33
2.10 The Concept of urban mass transit.....	36
2.11 Advantage of urban mass transport.....	36
2.12 Urban mass transit situation in Nigeria.....	37
2.13 Performance evaluation of the urban mass transit.....	38
2.14 Historical Background of the Niger State urban mass transit.....	39
2.15 Objectives of the Urban Mass Transit Program.....	40
2.16 Operating Characteristics of Niger State urban mass transit.....	40
2.17 Routes operated by the N.S.T.A.....,	41
2.18 The Organizational. Structure of the N.S.T.A.....	42

2.19 Other Services offered by the Niger state Transport Authority.....	43
2.20 BUS RAPID TRANSIT (BRT) A SOLUTION TO URBAN MASS TRANSIT PROBLEMS.....	-13
2.21 BRT System Performance around the globe.....	-45
2.22 Travel time and speed.....	45
2.23 Reliability.....	46
2.24 Image and Identity.....	46
2.25 Safety and Security.....	46
2.26 Capacity.....	47
CHAPTER THREE.....	4S
3.0 RESEARCH METHODOLOGY.....	48
3.1 INTRODUCTION.....	48
3.2 Data required and sources.....	48
3.3 sample frame and size.....	50
3.3 Data collection procedure.....	52
3.31 procedures.....	53
3.4 Method of data analysis.....	54
CHAPTER FOUR.....	56
4.0 RESEARCH FINDINGS.....	56
Introduction.....	56
4.1 PERFORMANCE OF NSTA BY SERVICE ATTRIBUTES.....	56
4.11 Service Frequency.....	56
4.12 Service reliability.....	58

4.13	Bus Crowding.....	60
4.14	Availability of Shelter at bus stops.....	62
4.15	Cleanliness of Bus.....	63
4.16	Safety Performance.....	64
4.17	Personnel Helpfulness.....	66
4.18	Bus Maintenance.....	68
4.19	Cumulative user Satisfaction results of NSTA services.....	69
4.28	Performance ranking of routes by technical assessment.....	71
4.3	DETERMINANTS OF SERVICE PERFORMANCE.....	73
4.31	Service Frequency.....	73
4.32	Service Reliability.....	74
4.33	Bus crowding.....	77
4.34	Bus stop Shelter.....	78
4.35	Cleanliness of Buses.....	79
4.36	Transit Safety.....	80
4.37	Personnel Flelpfulness.....	80
4.38	Bus Maintenance.....	81
	CHAPTER FIVE.....	82
	RECOMMENDATIONS.....	82
5.10	SUMMARY OF FINDINGS.....	82
5.20	RECOMMENDATIONS.....	82
5.2.1	Service Frequency.....	83
5.2.2	Service Reliability.....	83

5.2.3	Bus Crowding.....	84
5.2.4	Availability of Shelter at Stops.....	84
5.2.5	Cleanliness of Bus.....	85
5.2.6	Transit Safety.....	85
5.2.7	Personnel Helpfulness.....	85
5.2.8	Bus Maintenance.....	86
5.30	Future Research.....	86
	Reference.,.....	87

List of Tables

Table 2.1 Survey Types.....	13
Table 2.2 Focus On Performance Assessment Measures.....	35
Table: 3.1 Data requirement, description and sources.....	49
Table 3.2 Wards and details.....	50
Table 3.3 Household questionnaire administration.....	52
Table 3.4 Parameters observed under physical survey.....	53
Table 4.1 service frequency performance measure.....	57
Table 4.2 user satisfaction with service frequency.....	58
Table 4.3 Total journey time in minutes.....	59
Table 4.4 user satisfaction with service reliability.....	59
Table 4.5: Bus crowding.....	60
Table 4.6 user satisfaction with bus crowding.....	61
Table 4.7 Distribution of bus stop shelter.....	62
Table 4.8 user satisfaction with bus stop shelter.....	63
Table 4.9 cleanliness check.....	64
Table 4.11 user satisfaction with bus cleanliness.....	64
Table 4.12 safety check.....	65
Table 4.13 user satisfaction with bus safety.....	66
Table 4.14 Personnel check.....	67
Table 4.15 user satisfaction with personnel service.....	67
Table 4.16 Bus check.....	68
Table 4.17 user satisfaction with bus maintenance.....	69

Table 4.18 User Satisfaction Rating of the N.S.T.A Service.....	70
Table 4.8 dwelling time at the bus stop.....	76

List of Figures

Fig 1: Route Percentage Contribution.....	57
Fig: 2 satisfaction level.....	59
Fig. 3 bus crowdedness ranking.....	61
Fig. 4: bus stop shelter ranking.....	62
Fig.5: safely ranking.....	65
Fig. 6 Bus maintenance ranking.....	69
Fig. 7 satisfaction level.....	70
Fig. 8 cumulative performance of routes.....	71
Fig.9 Routes used by the N.S.T.A.....	72
Fig. 11 physical location of wards in Minna metropolis.....	51

List of Plates

Plate: 1 Bus Crowdedness.....	61
Plate: 2 Broken Strap Hangers Onboard.....	66
Plate: 3 Damaged Seat Onboard.....	66
Plate; 4 Excessive Dwelling Last Slop.....	77
Plate: 5 Shelter Without Passenger Information Bosso Route (Mobile Stop).....	79
Plate: 6 Worn-Out Pole Flag (Mobile Bus Stop).....	79
Plate: 7 Stop Located From the Road (Chanchaga Route).....	79

List of Tables

Table 2.2 FOCUS ON PERFORMANCE ASSESSMENT MEASURES

Table: 3.1 Data requirement, description and sources

Table 3.2 Wards and details

Table 3.3 Household questionnaire administration

Table 3.4 Parameters observed under physical survey

Table 4.1 service frequency performance measure

Table 4.2 user satisfaction with service frequency

Table 4.3 Total journey time in minutes

Table 4.4 user satisfaction with service reliability

Table 4.5: Bus crowding

Table 4.6 user satisfaction with bus crowding

Table 4.7 Distribution of bus stop shelter

Table 4.8 user satisfaction with bus stop shelter

Table 4.9 cleanliness check

Table 4.11 user satisfaction with bus cleanliness

Table 4.12 safety check

Table 4.13 user satisfaction with bus safety

Table 4.14 Personnel check

Table 4.15 user satisfaction with personnel service

Table 4.16 Bus check

Table 4.17 user satisfaction with bus maintenance

Table 4.18 USER SATISFACTION RATING OF THE N.S.T.A SERVICE

Table 4.8 dwelling time at the bus stop

List of Figures

Figure 2 Organizational Chart of Niger State Transport Authority

Fig11 physical location of wards in Minna metropolis

Fig 1: *Route Percentage Contribution*

Fig: 2 satisfaction level

Fig. 7*cumulative performance of routes*

Fig.8 Routes used by the N.S.T.A

List of Plates

Plate: 5 shelter without passenger information Bosso route (Mobil stop) Plate: 6 worn-out pole flag (Mobil bus stop)

Plate: 7 stop located from the road (Chanchaga route)

Abstract

Transportation plays a vital role in the economic and socio-cultural development of any nation. Its cost is a significant variable in the market price of any commodity. Transport needs of major cities in Nigeria now present significant challenges for policy makers as unpredictable shifts in population dynamics in response to the need for employment, housing, and sustenance continues. The expansion of the cities in Nigeria, coupled with increasing urban population, results in greater demand for transport provision. This demand has, however, not always been met, and efforts to provide adequate transport service in the cities, are uncoordinated, and poor (Aderamo 2008). This study sought to assess the performance of State Transport Agencies using technical and customer satisfaction parameter with a view to identifying problems and making recommendations. Data was collected from 216 respondents in Minna metropolis. The respondents rated their agreement with 9 attribute-related statements regarding public transport services. Performance indicators were also assessed based on the parameters in the Public Transit research institute manual and previous research conducted in this field. The result indicate that over all, the transit service performed poorly with a below average score of 5.2 as against an acceptable score of 6.0. The result also shows that only two attributes had an unsatisfactory average score, because the users assign them a mean score rate lower than the sufficiency measure of 6.0. The attributes include availability of shelter at stops and bus crowdedness attribute. The attributes with the highest satisfaction mean scores are safety, bus maintenance and cleanliness. Regarding the variability of user satisfaction, the judgments on perceived quality were not very homogeneous.

CHAPTER ONE

BACKGROUND TO THE STUDY

1.0 INTRODUCTION

Due to the inadequacy of the various modes of public transportation in virtually all the urban centers in the country, the Urban Mass Transit Programme was established in 1988 as the government response to mobility challenges (Filani, 1991). In line with the objectives of the programme, was the need to mobilize state governments in the Federation to set up mass transit agencies to help combat the urban mobility problem. Overtime, several states owned transport agencies have been established across the country. The objective of the Urban Mass Transit Programme was to modernize the nations urban mass transit system ,to alleviate the problem of urban commuting and to lay the foundation for organized mass transit in Nigeria(Report of the urban mass transit taskforce, 1988).According to Bolade (1980),the urban transport system before 1988 had some deficiencies ,which included general inadequacy of supply relative to demand ,disorganized private operators of Para-transit transport ,defective public owned transport companies in the few cities where they existed ,traffic congestion and defective traffic management in bigger cities .

Mass transit by definition connotes a high capacity means and mode of transporting large number of people within a given network, with relatively short –term headways and reasonable turnaround time .Broadly speaking, mass transit entails rapid rail system, light rail system, tramways and monorails, bus system and where feasible water transport system .However, the bus system is the most commonly used in Nigeria, perhaps because of its flexibility and low investment cost. Generally, state urban mass transit Authorities are far from achieving their

stated objectives of providing quality and affordable transport service for the urban majority in Nigeria. Their performance presents a picture of gross mismanagement and inefficiency. Their financial performance is also poor while private investors continue to increase their fleet of buses, taxis and aircraft (Ogunsanya, 1989:29). Transport demand has continued to increase beyond the capacity of the programme due to the ever increasing population in the Nigerian urban centers. State urban mass transit programmes have also been characterized by inadequate and insufficient service delivery. They have been generally mismanaged and politicized. The level of service is unsatisfactory and passengers still experience discomfort due to overcrowding, long waiting time, high cost of intra city mobility, and the preponderance of the use of motor cycles as a mode of urban passenger transport among others (Ogunsanya, 1995).

The performance of state owned Transport Agencies, may be assessed using standard evaluation criteria. That is, Operational performance could be evaluated using such measures as fleet utilization rate, passenger volumes, staff-bus ratio, vehicle kilometers, accident rates, and breakdowns in service. The standard of services could also be assessed by employing such measures as passenger waiting time, passenger journey times, service affordability and walking distance to bus stop. Similarly variables such as the revenue-cost ratio, and cost-per passenger-kilometers could be used in assessing financial performance. Behind these assessment is the need to learn lessons that can pave way towards improving the operations of mass transit in order to satisfy the mobility needs of the people is all the time pertinent. This relates to the provision and sustenance of effective services and the planning of public transport operations. Transportation plays a vital role in the economic and socio-cultural development of any nation. Its cost is one of the most significant variables in the market price of any commodity.

1.1 STATEMENT OF RESEARCH PROBLEM

The mandate of the Niger State Transport Authority (NSTA) established in 1988 is to provide intra-city, inter-city and inter-state transport services. The objective is to ease transportation within urban areas and between rural villages by providing easy, convenient, cheap and reliable transport service to commuters. Overtime, there have been indicators suggesting poor performance of the Agency, but this requires validation and explanation. For instance, service schedules of the Agency appear to be seldom followed, fleet utilization rates are declining, waiting times are long and there is lack of responsiveness in the face of growing competition with private and paratransit operators. There has also been a growing concern that buses are simply ineffective to meet daily travel needs.

Many studies of State owned transport agencies are instructive but have shortcomings by failing to relate performance with satisfaction. That is, in the majority of cases, the two issues are treated independent of one another as seen in the works of Ademo (2004), Zainab (2009), Kato (1997) and Adamu (2011) where emphasis is tilted heavily on operational and financial matters. The limited knowledge on mass transit bus performance from both technical and user perception point of view is what calls for new approach to assessment with expanded scope and method. The use of this approach is demonstrated in this research as the contribution to knowledge. The underlying assumption being that there is a direct link between actual service delivery and customer perceptions of services. As observed by Beirao and Sarsfield Cabral (2007), to increase public transport use, the service should be designed and performed in a way that accommodates the levels of services required by customers. That is, to meet potential and present customer requirements, quality investments that really raise the perceived service performance regarding these attributes constitute an important issue.

1.2 Research Questions

1. What is the performance of the N.S.T.A?
2. What is the explanation of the performance?

1.3 Aim

The aim of this study is to assess the performance of the Niger State Transport Authority (N.S.T.A) using technical and customer perception parameter with a view to identifying problems and making recommendations.

1.4 Objectives

- To review the indicators and approaches to the performance measurement of transport service Agencies.
- To review the operational characteristics of the Niger State Transport Authority.
- To assess the performance of the Niger State Transport Authority.
- To provide explanations for the performance and make recommendations.

1.5 Scope and Limitation of the Study

This study focus on the urban bus transport services and is limited to the intra city bus-transit system of the Niger State Transport Agency. Its primary focus is on how well service is provided to customers by the NSTA, and how customers perceptions of transit service relates to the existing performance. It focuses only on the intra-city routes plied by the Agency and excludes the intra state, interstate or special services rendered to schools such as federal university of technology Minna and freight services.

1.6 Structure of the thesis

The Initial section consists of background to the research area, overview about Niger state Transport Authority condition, objective, scope and structure of the thesis. The second section presents related studies regarding customer need and satisfaction in public transport area. The third section presents the research method, respondents, questionnaire, procedure and method of data analysis. The fourth section present result from the statistical analysis. The fifth section present discussion and conclusions drawn from this work, a summary of the contributions, study limitations and a prospect of future research.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introductions

This chapter gives an overview of literature that is related to the research problem. It introduces the concept of customer perception and perceived service quality by public transport users.

2.1user satisfaction definition

The definition of user satisfaction lacks consensus in the literatures reviewed. According to the outcome-oriented definitions, the satisfaction can be appreciated as a summation of satisfactions with various attributes (Stauss& Seidel, 1995).However, Tse and Wilson (1988) found that the evaluation, perception, and psychological process contribute to the satisfaction. They stated that it is important that the nature of process at servicing the user is involved in the significant part of actions he/she passes through the service episode. During the evaluation process the user compares his/her expected and experienced fulfillment in reference to public transport service. In case of the transport activities: satisfaction/dissatisfaction is a cognitive, emotive response based on the subjective evaluation process (Oliver, 1997). Researchers who focus on user satisfaction, attributes of public transport, physical facilities, and personnel agree that satisfaction is an essential component for economic success (Stauss&Neuhaus, 1997; Muffatto&Panizzolo, 1995). The user will be satisfied if the service gives value for him/her (Dumond, 2000). This value is one of the most important connections between the cognitive components of perceived quality, the experienced performance, and future behavior directed towards the company (Patterson &Spreng, 1997). The literature shows that satisfaction does not only depend on the service attributes fulfillment, but on the expectations.

2.2 Transit performance point of view

There is a variety of performance measures developed for describing different aspects of the transit services. Transit performance measures can refer to the passenger, agency, and/or community's point-of-view. Passenger's viewpoint reflects the passenger's perception of the service. The agency point-of-view reflects transit performance from the perspective of the transit agency as a business. The community's point-of-view measures transit's role in meeting broad community objectives. Measures in this area include measures of the impact of a transit service on different aspects of a community, such as employment, property values, or economic growth. This viewpoint also includes measures of how transit contributes to community mobility and measures of transit's effect on the environment.

The assessment of an organizations output as a product of the management of its resources (money, people, vehicles, facilities) and the environment in which it operates is defined as performance measurement (Transportation Research Board, 1994, 2004b). Performance measurement is very useful for different aims: assisting in evaluating the transit system's overall performance, assessing management performance expectations of the transit system in relation to community objectives, assessing management performance and checking for problems such as disproportionate cost in relation to service, allocating resources among competing transit properties, providing a management control system for monitoring and improving transit services, facilitating the accountability sought by government funding agencies and demanded by legislators, regional and transit authority boards, and the general public.

2.3 Transit performance perspective

The importance of performance delivery of any transit service will depend significantly upon perspective (Transportation Research Board, 2003a). For example, the traditional cost efficiency and effectiveness indicators can be considered as performance measures from the transit agency perspective, while they are not linked to customer-oriented and community issues, which are fundamental perspectives in the evaluation of a service (Transportation Research Board, 2003a). Many studies consider the customer's point of view the most relevant for evaluating transit performance; as an example, Berry et al. (1990) pointed out that "customers are the sole judge of service quality. Passengers evaluate services in many ways that may not be systematically associated with the amount of use of the service, because the measures of efficiency and effectiveness, as aggregate indicators of total output, implicitly assume homogeneity of service quality (Hensher, 2007). So, from the passenger's point of view, transit performance must be evaluated by considering indicators of service quality (Transportation Research Board, 2003b).

Transit service quality can be measured by a range of simple disaggregate

Performance measures which can be used for measuring the ability of a transit agency to offer services that meet customer expectations (Transportation Research Board, 1999b). These performance measures are quantitative measures expressed as a numerical value, which provides no information by itself about how "good" or "bad" a specific result is, and for this reason it must be compared with a fixed standard or past performance. These measures can be considered as objective measures. Service quality can be also evaluated on the basis of transit user judgments. These judgments, which can be considered a subjective measure of service quality, generally derive from the well-known Customer Satisfaction Surveys

(CSS), which help transit operators to identify which service quality factors are considered the most important by their customers. Customer judgments can be expressed in terms of expectations, which represent what customers expect of the service, and perceptions, which represent what customers receive from the service (Parasuraman et al., 1985). Service quality measurement based on customer opinions allows the perceived performances of a given transit service to be analyzed. The main disadvantages of this type of measure are the strong subjectivity of transit users' judgments and the failure to take non-users' perceptions into account. In addition, considerable statistical errors could occur when respondents are not correct sampled, or users' judgments are too heterogeneous. In order to minimize these problems, several researchers have proposed methodologies based on the use of SP or mixed RP-SP survey, as a consequence of their belief that passengers behavioral intentions significantly depends on the perceived value of service quality linked to their level of satisfaction. Interesting readers can take some examples in Hensher and Prioni (2002) and in Eboli and Mazzulla (2008, 2010).

2.4 Transit performance approach

To allow for a more useful and reliable measurement tool of transit performance, current research about the topic is ever more oriented to consider both objective and subjective service quality measures (e.g. Tyrinopoulos and Aifadopoulou 2008; Nathanail, 2008).

Also, the authors experience suggests that very promising results could be obtained through the use of the two types of measures combined. As an example, in Eboli and Mazzulla (2011) a methodology for measuring transit service quality is proposed which aims to develop an indicator with an intermediate value between subjective and objective measures, calculated by considering the bias of the two different measures. The final indicator was obtained

by solving a problem of optimization which minimizes the distance of the desired indicator from the subjective and objective ones. In addition to the above mentioned approaches, Zak (2011) emphasizes that there are several stakeholders interested in the efficient, comfortable, and effective operations of the transit systems; as a consequence, a conflict of interests is observed. As an example, while passengers insist on high level of transportation services, operators are focused on cost-effective operations of the transit system, as well as the authorities play a double role of a stakeholder and decision maker at the same time. In order to search for compromise solutions, Zak (2011) proposed the application of the methodology of multiple criteria decision making/aiding for public transportation analysis. This methodology enables the decision maker to take into account several contradictory points of view, and assures that the most satisfactory and compromise solution is finally selected.

Transit agencies might be interested in collecting a wide array of information, since both subjective and objective transit performance measures support transit agencies for monitoring, evaluating, and implementing improvements in service definitively. As a result, data collection and analysis activities should be concentrated on those aspects of transit service that are important and that reflect more accurately the needs of customers. The objective is to match the most important perceptions to specific aspects of transit service and to identify one or more corresponding service performance indicators (Transportation Research Board, 1999b).

2.5 Sourcing performance data and standards

Studies have for the past few years showed great interest in customer satisfaction and service quality measurement, besides in the definition and implementation of service quality indicators which can be used by a transit operator in order to evaluate their performances. Primarily in the USA, the Transportation Research Board (TRB) was

promoter of the Transit Cooperative Research Program (TCRP), from which some guidebooks and manuals were developed for measuring customer satisfaction in public transport (Transportation Research Board, 1999b), calculating transit performance measures (Transportation Research Board, 2003a), and evaluating transit capacity and quality of service (Transportation Research Board, 2003b). Several reports and syntheses focused on specific transit bus service aspects, like bus route (Transportation Research Board, 1995a), customer information (Transportation Research Board, 1996; 1999a), transit bus service line and cleaning functions (Transportation Research Board, 1995b).

Also in the European Union (EU) countries some programmes were encouraged, and the European Committee for Standardization (CEN) introduced a manual for measuring public transit quality, in which the categories of parameters which constitute the criteria of the benchmarking of the service were established (European Committee for Standardization, 2002). Among the various EU research and development efforts, Specifically in Greece, the Hellenic Institute of Transport promoted quality control programmes for public transport operators have been able to introduce and apply a variety of performance and quality indicators (Hellenic Institute of Transport, 2003; 2005). In the past, measuring transit performance was very difficult and collecting the data necessary to evaluate transit systems was very costly. A number of performance measures has been traditionally calculated from information an agency would normally have on hand for other purposes, like schedule data, system maps, service design standards, accident and incident records, financial data, fleet data, complaint records, and so on. Additional alternative data has been provided by national transit database and other transit agencies.

Recently, as a result of the widespread implementation of Intelligent Transportation Systems (ITS) and Advanced Public Transit System technologies (APTS), data collection is no longer a limiting factor (El-Geneidy et al., 2007). Nowadays, a large amount of data is provided by Automated Vehicle Locators (AVL), which detect in real-time a vehicle's time at locations and supply schedule deviation information, and Automatic Passenger Counters (APC), which allow passenger boarding and alighting to be detected by means of infrared sensors and optical imaging. Also the common electronic fare-boxes (as substitution of the operator trip cards) are an excellent source of ridership data because of their ability to register passenger boarding by fare category (Transportation Research Board, 2000).

However, automated collection methods are not always the best way to collect data (Dalton et al., 2000). In fact, some objective measures of transit performances are more appropriately derived from other different sources of data, such as manual data provided by operators, dedicated trained checkers or field supervisors. A particular form of manual data collection can be represented by the Passenger Environment Survey (PES), which generally assesses qualitative elements which are difficult to measure by any other way. In fact, PES use a "secret shopper" technique, according to which mystery riders travel through the transit system and rate a variety of trip attributes in order to provide a quantitative evaluation of factors that passengers would think of qualitatively (Transportation Research Board, 2003a).

Table 2.1 SURVEY TYPES

Survey type	Information	Method	Output
Service reliability	System effectiveness Vehicle performance	In-vehicle, continuous, by observation	Journey time
Bus crowding	Vehicle seat capacity & passenger carried	In-vehicle, by observation	Vehicle seat capacity
shelter at bus stop	Stop condition	Off-vehicle, continuous or ad-hoc, by observation	Availability of shelter at stops
Cleanliness of bus	Frequency of cleaning	In-vehicle observation	Number of cleaning service
Bus frequencies	System effectiveness	Off-vehicle, continuous or ad-hoc, by observation	User waiting times
Household surveys	Demand System effectiveness	Off-vehicle Ad-hoc by questionnaire	Opinions of service
Personnel observation	Staff performance	Off-vehicle Ad-hoc observation	Appearance & helpfulness

Source: Field survey

In the evaluation and monitoring of service quality, performance standards should be established for each objective measure. Alternatively, the performance indicators can be expressed in a format that provides built-in interpretation. For example of such formats is represented by Levels-of-Service (LoS) analogous to those developed by the highway Capacity Manual for the evaluation of the road traffic flow quality levels (Transportation

Research Board, 1965). Another format is represented by ratios, which are developed by dividing one individual measure by another; they facilitate comparisons between routes, areas, or agencies. Finally, index measures are adopted when service quality aspects involve a number of different factors; these indexes combine results from several other performance measures in an equation to produce a single output measure (Transportation Research Board, 2003a).

In the TCRP Report 88, some methods that agencies could use to develop standards for measures regularly tracked were defined; a combination of all the methods is suggested (Transportation Research Board, 2003a). One of the methods is the Self-identification of the standard values is another method which allows customer and community issues to be considered. Under this approach, transit agency management sets targets based on a combination of current agency performance, professional judgment, and agency goals. The last two methods are based on the comparison to typical industry standards or to peer systems. In the first case, the agency surveys other representative agencies or finds examples of standards in the transit literature and applies an average or typical standard to its own operations. In the second case, an agency identifies other agencies with similar conditions (e.g., city sizes, fare levels, cost of living index values, or other similar criteria), and determines how well those agencies are performing in the measurement categories. Standards are based on the average values of the peer agencies for given measures, or alternatively, on some percentile value.

2.6 Transit performance indicators

Starting from the various studies regarding quality determinants in public transportation the aspects mainly characterizing bus services are: service availability, service reliability, comfort, cleanliness, safety and security, fare, information, customer care and environmental impacts. Each of these aspects can be measured in many ways by considering different indicators. In the next subsections some of these indicators will be fully described, and some target values are suggested.

2.6.1 Service frequency

Service frequency is the most distinctive aspect among service characteristics. Service frequency measures how often transit service is provided. It is a crucial factor in one's decision to use transit; in fact, the more frequent the service, the shorter the waiting time when a bus or train is missed, and the greater the flexibility that customers have in selecting travel times (Transportation Research Board, 2003a). Tyrinopoulos and Antoniou (2008) found that service frequency is the most important attribute across transit operators. Also, in Eboli and Mazzulla (2008) service frequency resulted to be the attribute with the highest weight on the overall transit service quality. The indicator regarding service frequency can be calculated as average value of the number of runs scheduled for each hour of the day. Levels-of-service were suggested as a function of the average headway among vehicles expressed in minutes (Transportation Research Board, 2003b). Friman and Felleson (2009) propose an aggregate measure of the vehicle km per inhabitant as indicator of the service frequency and coverage.

In Nathanail (2008) service frequency is assessed through the number of train-kilometers; the indicator is graded based on the comparison of actually observed values to the average

value of the five-year period preceding the analysis year, and obtains 0 when no train-kilometer have been realized, 10 when they exceed double the five-year average, and intermediate values for intermediate cases. Span of service is the number of hours during a day that transit service is provided. Hours of service can vary by day of the week, by route, and even by stop. Then, an indicator can be calculated as average value of the number of hours per day in different periods of the year (winter, summer, etc.) and/or for different routes/stops. The length of the service in a day can impact the convenience of using transit system and constrain the types of trips that the passengers are able to make by transit. The level-of-service thresholds reported in TCRP Report 100 (Transportation Research Board, 2003b) can be adopted as target values for the service span.

2.6.2 Service reliability.

Turnquist and Blume (1980) define transit service reliability as “the ability of the transit system to adhere to schedule or maintain regular headways and a consistent travel time”. Service reliability is one of the most investigated transit service aspects and it is considered as a very important aspect for the transit users. Strathman et al. (1999) and Kimpel (2001) agree that reliability is mostly related to schedule adherence, as well as Beirao and Sarsfield-Cabral (2007), who state that the lack of control due to the uncertainty of the vehicle arrival makes the service unreliable. Unreliable service results in additional travel and waiting time for passengers (Wilson et al., 1992; Strathman et al., 2003). As a consequence, service unreliability can lead to loss of passengers, while improvements in reliability can lead to attraction of more passengers (El-Geneidy et al., 2007). A study proposed by Eboli and Mazzulla (2010) confirmed that service reliability is one of the most important service aspect for the users. Research studies conducted in the seventies have already shown that

arriving on time at destination is often seen by travelers as more important than minimizing elapsed travel time (Nash and Hille, 1968; Hartgen and Tanner, 1970). The study of Wachs (1976) found that reliability or variance in travel time is an important component of attitude toward transportation modes, and also revealed that time spent in waiting, walking, transferring modes, or parking a vehicle is consistently viewed by travelers as more onerous than time spent on board.

Public transit agencies have developed multiple indicators to measure service reliability, but the three most common measures are on-time performance, headway regularity and running time adherence (Transportation Research Board, 2003a; Lin et al., 2008).

The percentage of transit vehicles departing from or arriving to a location on time is considered in the evaluation of On-time performance. The indicator is generally calculated as the ratio of the number of runs that come on time to the number of total runs Nakanishi (1997) introduces an indicator of on-time performance as the percentage of trips departing from all scheduled time points, not including terminals, between 0 and 5 min after their scheduled departing time, as well as suggested in TCRP Report 100 (Transportation Research Board, 2003b). However, TCRP Synthesis 10 suggests to consider on-time the runs up to 1 minute early and up to 5 minutes late (Transportation Research Board, 1995a), as well as the Italian legislation (DPCM 30.12.1998).

The evenness of intervals between transit vehicles defined as Headway regularity is an indicator (expressed in %) and calculated as the ration of the average difference between the actual and the scheduled headway to the scheduled headway (Transportation Research Board, 2003a). The same indicator is named by Tyrinopoulos and Aifadopoulou (2008) as excessive waiting time of the passengers at the stop points; the authors calculate the indicator

for each line by taking into account the outcome of the operator's scheduling process and actual measurements on site. As reported in Nakanishi (1997) a transit vehicle was considered "regular" if it is within $\pm 50\%$ of the scheduled interval (for intervals of 10 minutes or less) or within ± 5 minutes of the scheduled interval (for intervals greater than 10 minutes). In addition, TCRP Report 100 (Transportation Research Board, 2003b) defines Level-of-service ranges for headway adherence. Reliability of runs that come on schedule can be also easily evaluated on the basis of the runs removed from the daily schedule. An indicator can be calculated as the ratio of the number of runs executed in a period of data gathering to the number of runs scheduled for the same period.

Adherence to running time can be defined, analogously to the headway regularity, as the average difference between the actual and the scheduled running times compared to the scheduled running time. Also this indicator is measured in percent. Lin et al. (2008) state that the concurrent use of more indicators of service reliability can make difficult the determination of the routes having the overall worst performance; in fact, routes doing well on some measures may be poor on others. Thus, they propose one comprehensive service reliability indicator by aggregating the various service reliability measures by means of data envelopment analysis (DEA). El-Geneidy et al. (2007) introduced a regression model for estimating the amount of time it takes a bus to travel along its route as a function of several determinants of bus running time, like segment length, number of signalized intersections, number of bus stops, number of passenger boarding or alighting, departure delay, stop delay time, and so on.

2.6.3 Comfort.

Transit users, considers comfort during the journey as crucial, for both the physical comfort regarding vehicles and comfort regarding ambient conditions on board or at stops. Comfort on

board means having soft and clean seats, comfortable temperature, not many people on board, smoothness of the bus ride, low levels of noise and vibrations, not nasty odours. These many factors are differently evaluated across different groups of users. Beirao and Sarsfield Cabral (2007) found that habitual public transport users consider the new vehicles with air-conditioning and lower floor as “very good and very comfortable”, but the overcrowding on board at peak hours is considered a problem. On the other hand, car users and occasional public transport users usually see buses as uncomfortable, overcrowded, smelly and airless. Wachs (1976) underlined that vehicle comfort is less important to the traveler’s decision process than other service aspects.

Availability of comfort at bus stops can be considered as a function of the passenger amenities provided at the stops. Amenities include shelters, benches, vending machines, trash receptacles, lighting, phone booths, and so on. The effects of particular amenities on transit passengers are not well known. Some researchers have argued that the term “amenities” implies something extra and not necessarily required (Transportation Research Board, 2003a). Iseki and Taylor (2008) found that stop and station-area amenities were ranked as the least important by the users; however, these elements provided at bus stops or stations enhance also convenience and security.

The most frequently used indicator for evaluating comfort during the journey is linked to the degree of crowding on bus. Tyrinopoulos and Aifadopoulou (2008) estimate the load of the vehicles as the number of passengers on board divided by the capacity of the vehicles. The maximum vehicles load, the mean vehicles load and the lines percentage where the load exceeds were calculated. The calculation of the maximum load is based on the sum of the passengers on board the vehicles of all the journeys examined per line segment separately. In Eboli and

Mazzulla (2011) the indicator was calculated on the basis of the number of passengers per run and the number of offered seats per run, by introducing a formula in which a quadratic relationship between the indicator and the ratio of the number of passengers to the number of offered seats is hypothesized; the indicator has values close to 10 when the number of passengers is small, and to 0 when the number of passengers is equal to or higher than the number of available seats. An indicator of the load factor is proposed by the TCRP Report 100 (Transportation Research Board, 2003b), which provides separate Level-of Service thresholds for bus and rail. Passenger load LoS is based on two measures: passengers per seat when all passengers can sit, and standing passenger area, when some passengers must stand or when a vehicle is designed to accommodate more standees than seated passengers.

On bus air conditioning indicator can be calculated on the basis of the percentage of vehicles with functioning climate control systems it is the common indicator linked to air conditioning and can be calculated as the ratio of the number of buses with the functioning air conditioning system to the total number of buses used for the line; a trained checker could verify the functioning of the air conditioning in different days of the same time period. Similarly, Nathanail (2008) evaluates the train temperature on the basis of the existence of air-conditioning. Specifically, the grade attributed to the trains is calculated as the proportion of the wagons equipped with air-conditioning over the total number of wagons, multiplied by 10. Therefore, a value of 10 or 0 is given to a train when all or not of its wagons, respectively, are equipped with air-condition. Intermediate grades are given to the intermediate conditions.

An indicator regarding seat comfort measured by trained checker in terms of seat-back slope, seat width, and available leg distance, as compared to the desired values was also

introduced by Nathanail (2008). Grade 10 is given when desired values have been measured, 0 when they fall below the lowest threshold values selected by the operator, and intermediate values are given to intermediate cases. Eboli and Mazzulla (2011) propose a methodology for evaluating the availability of furniture at bus stop based on a score assigned to each line stop on the basis of the various available amenities (e.g. Shelter or benches, or both, et cetera). The indicator varies from a minimum value of 0 to a maximum value of 10; the minimum value was assigned to the stops without any kind of furniture; the maximum value to the stops with all the furniture identified in a previous step.

2.6.4 Cleanliness.

The physical condition of vehicles and facilities, and specifically the cleanliness of the bus interior and exterior, having buses and shelters clean of graffiti, cleanliness of seating and windows, and so on is considered to be indicators regarding cleanliness. Clean buses tend to promote a good public image and help to attract and maintain ridership (Transportation Research Board, 1995b).

Specific recommendations regarding transit practice which could be performed by transit agencies on cleaning functions are reported in TCRP synthesis 12 (Transportation Research Board, 1995b). These functions include exterior washing, interior cleaning, detailed cleaning, and graffiti removal and protection. In reference to the bus exterior washing a daily frequency is recommended; also periodic detailed cleaning is recommended, although a specific frequency is not suggested. Detailed cleaning functions are typically scheduled during off-peak hours such as midday or late evenings.

Daily bus interiors cleaning are performed by every transit agency even if only to remove coarse refuse such as bottles and newspapers. As a consequence, transit agencies could perform periodic detailed cleaning of the entire bus, which includes the interior. Depending on the agency, detailed cleaning is performed monthly, quarterly, or annually; the level of detailed cleaning depends on how much is daily done as part of the service line function.

Specific precautions could be adopted by transit agencies to prevent graffiti and vandalism from occurring; graffiti cleaning and removal procedures could be defined. As an example of the indicators regarding cleanliness the frequency of interior cleaning and exterior washing can be calculated. Standard values of interior cleaning and exterior washing services per week can be assumed by referring to the TCRP synthesis 12 (Transportation Research Board, 1995b).

2.6.5 Safety and security.

Aspects linked to safety indicate the degree of safety from crime or accidents and the feeling of security resulting from psychological factors; therefore, this aspect refers not only to safety from crimes while riding or at bus stops and from accidents, but also to safety related to the behavior of other persons and to the bus operation. Generally, the term “safety” is used to indicate the possibility of being involved in a road accident, while the term “security” refers to the possibility of becoming the victim of a crime.

Safety during a journey may be considered as a not very relevant aspect in the modal choice decision; in fact, the probability of being involved in an accident or becoming the victim of a crime is not explicitly considered as a part of the choice mechanism. However, when explicitly queried about the importance of safety, this factor is given an extremely high rating of importance (Solomon et al., 1968). These findings are confirmed by Iseki and Taylor

(2008) in their study about safety and security at stops, and by Eboli and Mazzulla (2010) who explicitly investigated safety and security on board.

Nathanail (2008), defined safety during the trip as the number of passenger fatalities, owing to the responsibility of the transit operator. Passenger fatalities are collected and retained by the operator for the year of analysis, and compared to the average number of fatalities in the last five years. Grade 0 is given in case that the fatalities of the current year are higher than double the five-year average, and 10 grade when the fatalities are less than the five-year average; intermediate grades are proportionally assigned to intermediate cases. Also in Eboli and Mazzulla (2011) the indicator concerning safety and competence of drivers was calculated on the basis of the number of road accidents verified during the last year, but this value was compared with a standard value equal to the average number of road accidents verified during the last three years. Analogously, the indicators of the service aspect regarding security against crimes on board and at bus stops were calculated on the basis of the number of complaints registered during the last year, and compared with the average number of complaints registered during the last three years.

2.6.6 Fare.

The characteristics of monetary cost of the journey by bus, like the cost of a one-way ride, the cost of a transfer, the availability of discounted fares (e.g. For students), the availability of volume discounts (e.g. for monthly passes), the cost of parking at bus stops are all considered as service aspect regarding fare. There is an extensive literature supporting the thesis that costs affect mode choice behavior of travelers. On the other hand, many studies about the attitudes toward transportation system alternatives found that the monetary travel cost does not constitute a salient factor in the modal-choice decisions. As an example, Wallin and Wright

(1974) concluded that “cost does not play a major role in the choice of a transportation mode”, whereas Beirao and Sarsfield-Cabral (2007) stated that public transport is generally perceived as cheaper than car and monetary cost does not appear as a key factor for changing to public transport, with the exception of the users with low income, who consider travel cost as a very important aspect.

The average one-way ticket cost was adopted as indicator regarding ticket cost In Eboli and Mazzulla (2011) . The authors considered standard values corresponding to the average cost of the tickets for different typologies of service adopted by transit agencies operating in similar territorial contexts characterized by high standards of transit service quality.

2.6.7 Information.

Availability of information pertinent to the planning and execution of a journey ,is another service aspect affecting transit service quality. Passengers need to know how to use transit service, where the access is located, where to get off in the proximity of their destination, whether any transfers are required, and when transit services are scheduled to depart and arrive. Without this information, potential passengers will not be able to use transit service (Transportation Research Board, 2003a).

According to Beirao and Sarsfield-Cabral (2007) , several respondents think that the bus system is difficult to use and information is difficult to obtain; among bus users, the main problem occurs when bus companies change timetables or routes and do not provide enough information to users. In recent years, many transit agencies have taken steps for increasing and improving transit service information. These steps reflect the growing awareness among transit agency managers that service information is important to transit users and can be effectively

used to increase ridership by retaining existing riders and potentially attracting new riders to the transit system (Transportation Research Board, 1996). For designing and preparing information materials which will meet the needs of all transit customers, TCRP report 45 (Transportation Research Board, 1999a) could be of interest to schedulers, transit planners and others. Ideally, passenger information should be available at every stage of the rider's transit trip. Pre-trip information helps the rider to plan routes and connections. Pre-trip information needs consist of the location of the nearest bus stop, routes that travel to the desired destination and transfer locations, fare, time of departure, and approximate duration of the trip.

In-transit information assists the rider at each decision point during the trip. In-transit information needs consist of the identification of the correct bus to board at the departure point; identification of bus stops for transfers or disembarking on the bus; how to transfer to another route at transfer points; cost, time limits, and restrictions; identification of the correct bus to board; area geography (i.e., location of the final destination in relation to the bus stop); return trip information at the destination (e.g., departure times and changes in route numbers). Supportive/confirming information repeats and reinforces data and decisions; it should be provided at any point during the trip when the rider may want to be reassured that he/she is progressing correctly and not getting lost.

An indicator was proposed by Nathanail (2008) for the passenger information during the trip, graded by a trained checker, depending on the type and quality of information provided at five, arbitrarily selected, stations along a train itinerary. The average grade of all five stations is used as the itinerary grade.

The attribute “availability of schedule/maps on bus, and announcement’s indicator was calculated in Eboli and Mazzulla (2011) as the ratio of the number of vehicles with functioning information device on board to the total number of vehicles sampled in a certain time period; a trained checker verifies the functioning of the information devices on different days. In addition, an indicator of the attribute “availability of schedule/maps at bus stops” was evaluated on the basis of a score assigned to each stop of a line, from a minimum value of 0 to a maximum value of 10. The minimum value was assigned to the stops without any kind of information device at the stop; the maximum value to the stops with schedule and maps. The indicator was calculated as average value of the scores assigned to all the line stops. Similar indicators can be calculated by considering other user information devices; TCRP Synthesis 17 (Transportation Research Board, 1996) provides a useful review of the types and tools of information at bus stops, with an indication of the relative costs.

2.6.8 Customer care

Those elements needed to make easier and more pleasant journeys, like courtesy and knowledge of drivers, courtesy and helpfulness of ticket agents, personnel appearance, together with elements linked to the easiness of purchasing tickets or paying fare, presence and condition of the ticket issuing and validation machines, and effectiveness of the ticket selling network are all entailed in Customer care .

Personnel appearance was evaluated by means of trained checkers who verified if personnel use the uniform. An indicator was proposed as the ratio of the number of uniformed staff to the total staff number Eboli and Mazzulla (2011) . Personnel helpfulness was evaluated by means of a mystery rider who verified the behavior of the

personnel and assigned a score to each personnel unit, according to a scale from 0 to 10. In the same research work the authors propose an indicator for evaluating the ease of purchasing the ticket by taking into account the only opportunity of purchasing the tickets on bus by a manual operator or automatic ticket machines. This indicator was calculated as the ratio of the number of vehicles with functioning automatic ticket machines to the total number of vehicles sampled in the period of data gathering. A trained checker verified the functioning of the automatic ticket machines in different days of the same time period.

An indicator aiming to assess the sufficiency and effectiveness of the ticket selling network and the easiness to purchase tickets was introduced by Tyrinopoulos and Aifadopoulou (2008). For each selling point mystery-shoppers collect some data regarding tickets availability, existence of the special indication informing customers about availability of tickets, position and visibility of the indication. This information can be used for calculating the percentage and location of the selling points that do not have tickets to sell, and of the selling points having special and clearly visible indication.

2.7 Customer Satisfaction in Transportation Context

Current transportation customer satisfaction practices, its definition measurement, survey design and data analysis methods, as well as the applications, usage, and integration with decision making of current and emerging customer satisfaction research for multiple modes in a transportation context is what this section tends to describe. Since the 1970s, transportation authorities have become more engaged with the public in terms of public meetings, marketing campaigns, stakeholder involvement and educational programs to inform and empower the transportation customer (O'Connor, 1999). This is partially due to litigation over engineering methods of alternatives analysis and the public's demand for a transparent government decision-

making process. An outcome of this era in transportation policy was that the customer perspective and ultimately their satisfaction have been elevated as a valued measure of the service provider's performance (O'Connor, 1999).

Some researchers have found that customer satisfaction also has greater potential for application by a wider range of agencies and organizations (Cantalupo, 2002). With an aging transportation infrastructure public agencies are shifting focus from building to maintaining their systems and the efficient use of resources to maximize performance. Including customer satisfaction as a performance measure for investment decisions shows a culture shift in transportation as a service industry rather than strictly production. Even with their limitations many government agencies have conducted extensive customer surveys to rate how well they are meeting expectations and what customers think of their products and services. These surveys are often used as part of public relations campaigns but the satisfaction rating is not integrated into the decision making process or as a tool for prioritizing projects.

2.8 Studies Regarding Satisfaction in Public Transport

2.8.1 Several studies regarding satisfaction and dissatisfaction in public transport has been conducted to develop and create attractive public transport. For instance, Stradling et al. conducted a survey by sending self-completion questionnaire in eight areas of the city of Edinburgh, Scotland. From 68 these items that were measured as "things that I dislike" or "things that discourage me from using the bus in Edinburgh", eight underlying factors were reported. One factor was labeled as "feeling unsafe" which contain the behavior of other passengers, feeling unsafe while travelling at night and feeling unsafe while waiting for buses. Another factors were labeled as "preference of walking and cycling", "problem with service

provision like no direct route”, “unwanted arousal” (i.e., intrusions and interruptions such as inconvenience journey because of overcrowded passengers, other passenger smoking habit, and other annoyed people behavior on the bus), “preference of car use”, “cost”, “disability and discomfort”, and “low self image” because of travelling with public transport.

Uzzell (2007) investigated affective experiences of daily commute. Surveys were sending to Surrey University’s employees. The results revealed that commuting by car as well as by public transport can be stressful because of delays caused by the traffic volume. Public transport was perceived as unpleasant and public transport users expressed a more negative attitude toward their daily commute than users of other transport modes. The negative attitudes were shown to be related to stress as well as boredom caused by delays and waiting time. Gatersleben and Uzzell (2007) also suggest that public transport is stressful due to unpredictability and longer travel times. This study also acknowledges some sources of pleasure for public transport users. Attributes relating to pleasurable feelings were as the possibility to read during the trip, to listen to music, to interact with other people, and to look at the passing scenery.

2.8.2 UK Department for transport (2003) has also conducted studies regarding customer need in public transport. High frequency of service, services that are reliable and fares that offer value for money are revealed as important needs of UK public transport users. The bus also has to have a broad range of destinations to fulfill travel demand of customer. In this report, the users also reported about the importance of understandable time table information in bus stop and in local newspaper in order to make them aware of the existence of the service. Simple ticketing arrangement is also important in order to make them use public transport.

2.8.3 Fujii et al. (2001) conducted an investigation in Osaka (Japan) during a temporary closure of freeway that connected between Osaka and Sakai City. The survey was distributed at three tollgates from 6:00am to 8:30am. An important finding was that the closure of the freeway increased public transport use. Second, it was also found that the expected commute time by public transport was overestimated by automobile commuters. Third, after experiences of public transport the overestimates of commute times were corrected. And finally, people who corrected their commute time continued to use public transport when the freeway was reopened.

2.8.4 Van Vugt et al. (1996) conducted an investigation of the motivational factors underlying the decision to commute by car or public transportation. 192 employees of a publishing company participated and filled out a questionnaire containing questions relating to social value orientation, the commuting situation and a series of post-experimental questions. The findings provided strong evidence for the conclusion that individuals prefer options yielding shorter travel time as well as an alternative with high frequency of public transport.

2.8.5 Fellesson and Friman (2008) conducted a transnational comparison of customers' public transport perceived service satisfaction in eight cities (Stockholm, Barcelona, Copenhagen, Geneva, Helsinki, Vienna, Berlin, Manchester and Oslo) in Europe. The result showed four general factors: system such as traffic supply, reliability and information; bus and bus stop design that makes customer comfortable and enjoy the travel experience; staff skill, knowledge and attitude toward customer; and safety not only both in the bus and bus stop but also safe from traffic accident. Furthermore, it was concluded that differences in public transport technology and infrastructure may cause differences in individual item loadings.

2.8.6 Eboli and Mazulla (2007) investigated service quality attributes important for customersatisfaction with a bus transit service in Cosenza, Italia. Respondent were asked to rate the importance and satisfaction with 16 service quality attributes (bus stop availability, route characteristic, frequency, reliability, bus stop furniture, bus overcrowding, cleanliness, cost, information, promotion, safety on board, personal security, personnel, complains, environmental protection and bus stop maintenance). The result shows that the latent variable important for global customer satisfaction is service planning which is reflected in reliability, frequency, information, promotion, personnel and complaint.

2.8.7 Beiraoand Sarsfield Cabral (2007) summarizes advantages in using public transport according to Portugal public transport users. The result highlights the importance of a cost friendly and less stressful public transport service. It is perceived as less stressful since there is no need to drive, it is possible to relax and one may be able to rest or read. Travel time on exclusive bus lanes is considered faster than the car, there is less exhaust emissions and there are opportunities to talk to fellow passenger while travelling.

2.8.8 A literature review (Oktiani 2009) confirms that there is research with an aim to indentify unattractive and disappointing factors in public transport. For instance, Beirão (2007) conducted depth interviews in Porto to find out dissatisfying factors. Customers reported waste time, too crowded, lack of comfort, time uncertainty, lack of control, unreliability, long waiting times, need to transfer, they cannot change route to avoid traffic congestion, lack of flexibility, and long walking time. Edvardsson (1998) found that driver incompetence, punctuality and information were important factors causing dissatisfaction.

2.8.9 Friman et al. (Friman et al. 2001) conducted a mail survey to investigate factors affecting customer satisfaction in public transport service in Sweden. The results showed that overall

cumulative satisfaction related to attribute specific cumulative satisfaction and remembered frequencies of negative critical incidents (e.g., the driver behaves unexpectedly bad or the bus is leaving before scheduled departure time).. In yet another study, Friman (1998) examined the effect of quality improvements in public transport on customer satisfaction and frequency of perceived negative critical incidents. The studies were conducted in 13 regions in Sweden that were conducting quality improvements in public transport. Data were collected before and after implementation. Comparing passenger reaction is a way to understand the type of improvement that increases customer satisfaction. The conclusion of this study is that customer satisfaction influenced by quality improvements only to a limited extent. Furthermore, the effect was directionally opposite in that respondents reported less satisfaction and higher frequencies of negative critical incidents after the quality improvements had been implemented. Thus quality improvements do not always boost customer satisfaction. Thus, it is not the improvements per se that determine the success of public transport, but a given level of quality coupled with the perception of the service.

2.8.10 Safety issues were found by Smith and Clark (2000) as a constraint for people to choose public transport as travel mode of choice. Pick pocketing, overcharging facilitates by overcrowding and lack of supervisor is important factors. UK Department for Transport (2009) reported that young people (mostly male) involved in assaulting behavior, theft, vandalism and criminal damage are a problem for public transport users. 2.14.9 Adreassen (1995) conducted a survey among public transport users in Norway. As a result, he argued that in order to keep market share, public transport should provide service for different type of customers. Differentiation of service will lead to increasing customer satisfaction because of higher

degree of congruence between supply and demand. Most important factors to work with are travel time, fare level and design of public transport. To summarize, knowledge from previous research shows that public transport is still an alternative as a travel mode of choice for many people. In order to keep current passenger, public transport has to improve the service to accommodate wide range of customer need and expectation (BeiraoSarsfield Cabral 2007; Andreassen 1995)

2.9 Recent Studies On Performance Assessment Measures

Studies on performance measures are wide ranging and different authors have covered issues from various areas .Some authors have explained these issues from the point of view of customer perception and how quality improvement could affect customer satisfaction with public transport service (See Friman (2004), Tyrinopoulos and Antoniou (2008), Iseki and Taylor (2008), Joewono and Kubota (2007), Stuart et al (2000), Eboli and Mazzulla (2007), and Nurul-Habib et al (2009)Joewono and Kubota (2007) Stuart et al (2000) and in Eboli and Mazzulla (2007).

Other authors focused more on understanding the attitude of customers towards transit service quality. Such studies include Beirao and Sarsfield-Cabral (2007) Nurul-Habib et al (2009).while some others looked at service quality (InPrioni and Hensher (2000) and in Eboli and Mazzulla (2008a, 2010) Bertini and El-Generdy (2003) Tyrinopoulos and Aifadopoulou (2008) Nathanail (2008).Based on their focus, it is possible to classify important service quality attributes into at least four broader categories. These categories are equivalent to categories pointed out by Friman et al (2001): reliability of the system, treatment by employee, simplicity of information and design. First, reliability of the system consists of different dimensions like punctuality, travel time, and reliability in the service. Second, treatment by employee includes

driving skills and employee knowledge. Third, simplicity of information contains service attributes related to information, price and availability of ticket . The last category design is related to comfort in the vehicle, cleanliness and safety from traffic accidents.

Table 2.2 FOCUS ON PERFORMANCE ASSESSMENT MEASURES

FOCUS	AUTHOR	ISSUES COVERED
<p>These studies have focus ranging from Public transit user satisfaction; variability and policy implication.</p>	<p>Friman (2004) Tyrinopoulos and Antoniou (2008) Iseki and Taylor (2008) Joewono and Kubota (2007), Stuart et al. (2000), Eboli and Mazzulla (2007), and Nurul-Habib et al. (2009). Joewono and Kubota (2007) In Stuart et al. (2000) and in Eboli and Mazzulla (2007) Margareta Friman and Markus Felleson (2008) Karlstad University, Sweden</p>	<p>These authors examined whether quality improvements have effects on satisfaction with public transport services and frequency of perceived negative critical incidents and Subsequently, propose a methodology based on the application of two different statistical methods, factor analysis and ordered logic modeling.</p>
<p>These studies focus on Understanding the personal attitudes towards transport</p>	<p>Beirao and Sarsfield-Cabral (2007), Nurul-Habib et al. (2009)</p>	<p>They did a qualitative study of public transport users and car drivers in order to obtain a deeper understanding of travelers' attitudes towards transport.</p>
<p>The focus of these studies is on passenger services in the public transport business.</p>	<p>In Prioni and Hensher (2000) and in Eboli and Mazzulla (2008a, 2010) Nathanail (2008) Bertini and El-Geneidy (2003) Tyrinopoulos and Aifadopoulou(2008)</p>	<p>They studied how an archived database of Bus Dispatch System data can be used to generate performance measures that should be used by transit agencies in order to measure their own performance and help them to increase their service standards and effectiveness.</p>

Source: Author (2014)

2.10 The Concept of Urban Mass Transit

The subject of urban mass transportation is one with considerable theoretical interest and practical importance and has been the focus of attention over time in both developing and developed countries. This is because the interaction between the level and pattern of transport resources and the average level of living of the population of an area is a critical factor affecting economic and social progresses of that area. Mass transit by definition connotes a high capacity means and mode of transporting large number of people within a given network, with relatively short –term headways and reasonable turnaround time .Broadly speaking, mass transit entails rapid rail system, light rail system, tramways and monorails, bus system and where feasible water transport system (Ogunsanya, 1989:29) .However, the bus system is the most commonly used in Nigeria, perhaps because of its flexibility and low investment cost.

2.11 Advantage of Urban Mass Transport

The advantage of public transport are many; among them are its effective use of space , more energy efficient emit less airborne pollutants, minimize the amount of land used for transport purposes including parking and generally result in better physical environment in urban areas(Hilling, 1996). Public transport has also proved to be an effective tool in combating congestion (Banister, 1998). Because of the numerous advantages of public transport, government in third world countries are becoming aware that for developing countries to be more productive, improving public transport should be one of the most pressing items on their agenda. In countries where public transport is provided, the need to make their operations functional in order to satisfy the mobility needs of the people also becomes pertinent. This relates to provision and sustenance of effective services and the planning of public transport operations.

2.12 Urban Mass Transit Situation in Nigeria

Urban transport problems remain one of the most nagging problems in urban transportations today. All over the world, attempts have been made to tackle the problems. Cities are centers of economic, social, cultural and intellectual activities. These activities result in the drift of the population from rural to urban centers and these congregations have caused cities to expand without control in many areas, causing congestion, environmental and social problems. In Nigeria, many scholars have carried out studies on urban transport problems all aimed at proffering solutions. These include Adedamila (1977); Adenle (1977); Olayemi (1977); Ogunsaya (1984, 1993); Aderamo (1998). Many of these scholars who worked on urban transport problems in Nigeria have identified congestion as the most serious. Cities are locations having a high level of accommodation and concentration of economic activities and are complex spatial structures that are supported by transport systems (Rodrigue, 2009). The larger the city the greater its complexity and the potential for disruptions if this complexity is not effectively managed. The most important urban transport problems take place when transport systems for a variety of reasons cannot satisfy the numerous requirements of urban mobility. Urban productivity is highly dependent on the efficiency of its transport system to move labor, consumers and freight between multiple origins and destinations. All these result in congestion and environmental problems. Among the most notable urban transport problems are traffic , longer commuting; public transport inadequacy, environmental impacts ,energy consumption, accident and safety. The public owned transport operations in the few states where they exist are inefficient and the private sector operators of Para-transit transportsystem are substandard and disorganized.

2.13 Performance Evaluation of the Urban Mass Transit

Performance evaluation of mass transit services connotes the determination through monitoring of the degree to which the objectives, for which the mass transit system was set up, are being achieved. Performance evaluation aims at the assessment of the impact on the socio-economic environment or how well the stated objectives have been achieved (Ogunsanya, 1989). Performance evaluation is an assessment of the benefits accruing from mass transit system. Such benefits can be examined at two levels: the disaggregate level and the aggregate level (Ogunsanya, 1989). At the disaggregate level, the objective is to examine various elements of the mass transit system for their performance. In the case of the bus system this level of analysis examines the level of performance of the route, the vehicle and operation of the system itself. It is a continuous evaluation process while the mass transit services are being implemented. At the aggregate level the objective is the assessment of the overall impact of the mass transit services on the socio-economic environment. It aims at assessing the cost, vis-a-vis the benefit that may accrue from the system.

The importance of monitoring and performance evaluation of bus operations was stressed by ogunsanya. He believes adequate understanding of the system would provide objective justification for government assistance in terms of funds or road maintenance. He sees operation as the main concern of the management of a transport system, the factors of which include the management of vehicles and routes. These when effectively handled according to him, will ensure hitch-free and economic running of the buses, thus creating a good atmosphere for reliability and safety. On monitoring, he observes that developing countries where the rate of changes can be high, constant monitoring of route performance and demand pattern is essential' for the agency to, respond accordingly. That if the route performance and demand pattern is low,

the agency should reduce the number of buses that follow the route and vice versa. To determine the performance of the various elements of the bus transit system at the disaggregate level, requires that basic variables related to the elements be obtained. The conventional variables used in developed environment for measuring the level of performance assume the homogeneity of service and therefore not feasible in assessing performance as it relates to customer satisfaction. In the developing environment, such measures suffer from serious aggregation and do not indicate the cause for poor performance (Ogunsanya, 1989). It is therefore deemed necessary to identify indicators that deal with different service issues as it affects the user of these services.

2.14 Historical Background of the Niger State Urban Mass Transit

Owing to the global economic recession of the 1980's and the subsequent introduction of the Structural Adjustment Programme (SAP) by the Nigerian government, the cost of producing vehicles spare parts and fuel rose astronomically to the extent that many car owners abandoned their cars and the demand for public transport increased. There was a rapid decline in the acquisition of new vehicles and the few buses that were available could not cope with the situation. Meanwhile, the operation of government owned public transport ,railways and internal waterways were almost at a halt while the Nigerian Airways grappled in total darkness, or put simply, at the verge of collapse" (Barret, 1992).. This situation of the Nigerian Transport sector led to the creation of Federal Urban Mass Transit Agency (FUMTA) in 1988. The crisis of the transport sector of Nigeria was not only peculiar to the federal government alone, the state governments were also equally affected by this trend. It was in line with this trend that the Niger State Transport Authority (NSTA) was established.

2.15 Objectives of the Urban Mass Transit Program

The main objectives of the Urban Mass Transit Program introduced in 1988 were (i) to moderate the national urban transit system (ii) to alleviate the problems of urban commuters and the general masses and (iii) to lay the foundation for organized mass transit in Nigeria. The introduction of this program served to reduce the overriding gap between the increasing public transport demand and the decreasing supply in the transport market. To date, almost all states in Nigeria and the Federal Capital, Abuja have benefited from the Federal Urban-Mass Transit Program. Although, the existing level of service provided by most state transport corporation is not completely satisfactory, the mass transit service has gone a long way to alleviate the transportation problems of urban dwellers in Nigeria. But for effective services to be provided and sustained by the mass transit establishments, careful planning for their operations is necessary.

2.16 Operating Characteristics of Niger State Urban Mass Transit

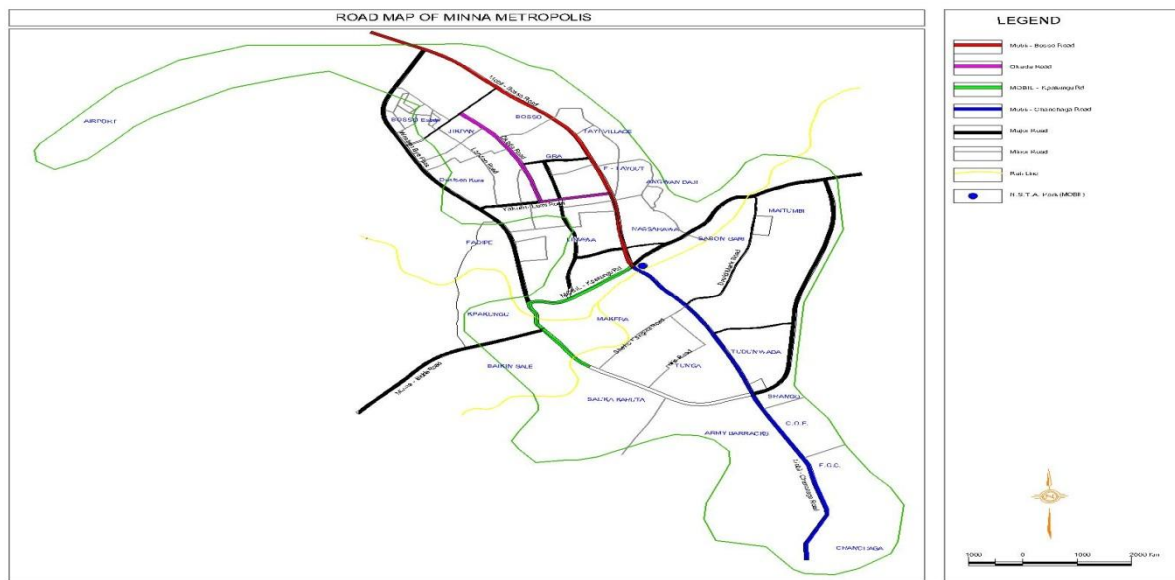
Distinct from the other commercial transport vehicles in Minna metropolis (taxi, and tricycles), which have registration plates that are white with red letters; N.S.T.A vehicles operating in Minna have special registration plates that are white background with green letters. The number plates are alphanumeric. The first three and the last two letters are alphabets while the middle is three numerals. The first three alphabets represents the local government or licensing office where the vehicles were registered. The vehicles used are fourteen seater minibus of a Toyota Hiace and forty four seater buses of Mercedes models. All vehicles are painted blue and white colors. The Niger State transport Authority is funded through the Federal Urban Mass Transit Agency (FUMTA) now defunct, revenue generated by the authority through its operations and through the State government subvention. From inception, the state government was the

source of funds of the authority. They made provision for the purchase of new buses and payment of salaries for the staff of NSTA. FUMTA however, provided buses and spare parts to the authority on loan basis which are paid with interest.

2.17 Routes Operated By the N.S.T.A

The N.S.T.A operates four routes within Minna city service and operates 11hoursevery day of the week from 7am to 6pm. The N.S.T.A operates four routes within Minna from 7am to 6pm.The routes served within Minna includes: Route (1) which runs from NSTA garage (Mobil) to Maikunkele and serves those to and From Central Market to Bosso, Tudun-Fulani and Maikunkele. Route (2) runs from NSTA garage (Mobil) to Chanchaga and serves those to and from Tunga, Shango to Chanchaga.Route (3) runs from NSTA garage (Mobil) to Kpakungu and serves those to and from Hospital road, state secretariat, high court and Kpangungu. While a route (4) run from NSTA garage (Mobil) to BossoLow-cost (okada) and this serves those to and From Kwangila, Airport quarters, Commissioners quarters Okada road and BossoLowcost.

Figure 1 Routes used by the N.S.T.A



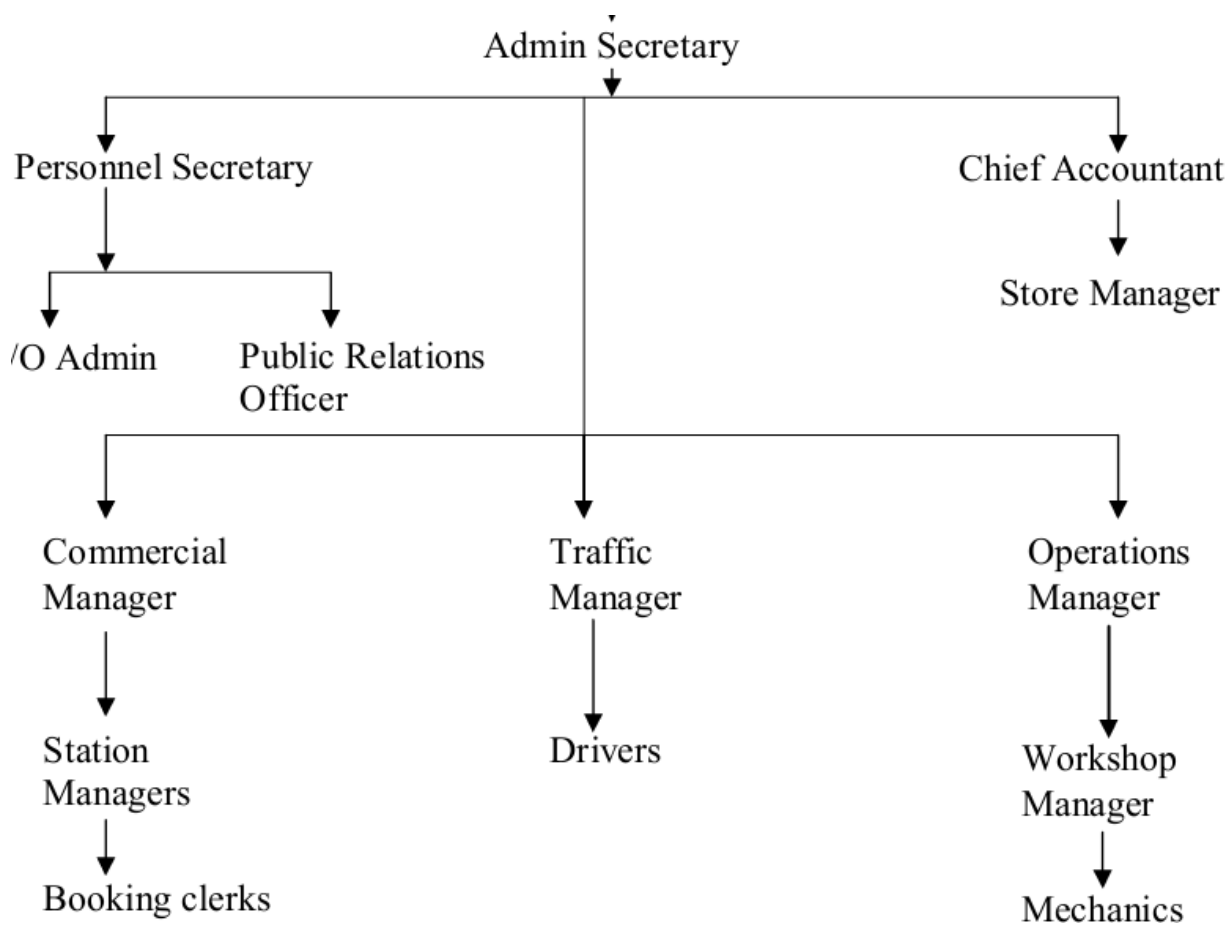
Source: Google map

2.18 The Organizational Structure of the N.S.T.A

The N.S.T.A has departmental structures headed by a Sole Administrator, appointed by the state government and he acts as the Chief Executive of the authority. He initiates policies for the operations of the authority and by the Administration Secretary who ensures the execution of such policies and in charge of the policy direction of the day-to-day running of the authority.

Niger State Transport Authority (NSTA) operates the following department : Administration department ,Account department , Operation department , Audit department and Traffic department

Figure 2 Organizational Chart of Niger State Transport Authority



2.19 Other Services Offered By the Niger State Transport Authority

the authority provides charter services to schools and organizations on request for conveying passengers to excursions, festivals, etc. an example is the charter of the bus by Federal Government College, Minna to transport students to and from school. The charter service however attracts different fares, depending on the bus to be used. The request for the charter is however made directly to the office of the Sole Administrator. Niger State Transport Authority also has an in house workshop with mechanics that handle the repairs of the authority's vehicles. The personnel in the workshop have experience in overhauling, mechanical, electrical and panel beating. Thus, most repairs of the vehicles are done at the workshop.

2.20 Bus Rapid Transit (BRT); A Solution to Urban Mass Transit Problems

The foregoing indicates that there is an urgent need to make improvements in public transport to address the different service attributes that contribute to the performance. Wright (2004) asserts that BRT attempts to address each of the above-identified deficiencies in current services by providing a rapid, high quality, safe and secure transit option. Actually, in this day in age, the BRT concept is becoming increasingly utilized by cities looking for cost-effective transit solutions (Wright, 2004). BRT is growing in popularity throughout the world, notably in Asia, Europe and South America, in contrast to other forms of mass transit (such as light and heavy rail) mainly due to its cost-effectiveness (Hensher, 2006; Levinson et al, 2002) . According to Wright (2004: 1), BRT can best be defined as “a mass transit system using exclusive right of way lanes that mimic the rapidity and performance of metro systems but utilize bus technology rather than rail vehicle technology.” A more detailed definition from the BRT Implementation Guidelines is: BRT is a flexible, high

performance rapid transit mode that combines a variety of physical, operating and system elements into a permanently integrated system with a quality image and unique identity (Levinson et al, 2003 cited in Diaz et al, 2004 and Diaz, 2009).

There is uncertainty among elected officials and even some transit professionals about what BRT is and how it differs from conventional bus services and systems. While this question is difficult to answer, in part because the options available for each BRT element are so extensive that there are an infinite variety of integrated BRT systems (Diaz et al, 2004; Diaz, 2009), it can be said with much confidence that BRT is far more than just a bus (Hensher, 2006; Wright, 2004). Wright (2004) ascertains that BRT has little in common with standard bus services and systems. Under its current definition, BRT is “a systematically coordinated service, fully integrated with other modes in a community” (Grava, 2003: 384). Unlike conventional bus services and systems which rely on fairly standard equipment and operating procedures, BRT involves Rolling stock of improved design, Expanded physical facilities, including possibly preferential or exclusive lanes; Upgraded operational procedures, ranging from fare collection to traffic signals; and Advanced information and control methods, relying mostly on intelligent transportation systems (ITS) (Grava, 2003). These BRT programs and actions are all different and are tailor-made for each situation and are aimed at providing faster, more reliable and convenient bus services than those provided by conventional bus operations. The services provided by conventional buses are too often unattractive, unreliable, time consuming, inaccessible, inconvenient, crowded, dirty, and unsafe (Grava, 2003; TCRP Report 63 cited in Diaz, 2009; Wright, 2004; VMC, 2006).

Possibly, the most fundamental difference between BRT and conventional bus services (and other transit modes) is BRT’s central focus on the customer. BRT systems

are designed around the customer-based needs of speed, comfort, convenience, cost, and safety rather than around a specific technology. The quality of customer service is directly related to customer satisfaction. Accordingly, BRT is generally defined as a high-quality, customer-oriented transit that delivers fast, comfortable and cost-effective urban mobility. All in all, BRT is really just a collection of best practice traits from a range of mass transit options (Wright, 2004; VMC, 2006). For instance, BRT combines the quality of rail transit and the flexibility of buses (Diaz, 2003; Thomas, 2001 cited in Levinson et al, 2002).

2.21 BRT System Performance around the Globe

BRT system performance can be assessed based on the experience of at least 40 systems across the United States and the world. The experience suggests that there are concrete improvements to travel time, reliability, and capacity as well as perceptions of improvements in safety and security and image and identity (Diaz et al, 2004; Diaz, 2009).

2.22 Travel Time and Speed.

With regard to total BRT travel times, BRT projects with more exclusive running ways generally experienced the greatest travel time savings compared to the local bus route. Exclusive transit way projects operated at speeds (including stops) between 32 and 48 kilometres per hour (i.e., a travel time rate between 1 to 2 minutes per kilometre), with even higher speeds demonstrated along the portions of the routes in exclusive sections. Arterial BRT projects in mixed-flow traffic or designated lanes operated at between 19 and 29 kilometres per hour (i.e., between 2 and 3.5 minutes per kilometre). Demonstration of low dwell times per passenger is most evident where there are high passenger loads, pre-paid fare collection systems, and all-door level boarding (such as in many of the Latin American systems) (Diaz et al, 2004; Diaz, 2009).

2.23 Reliability

Performance in reliability also demonstrated a similar pattern as travel times. As expected, systems with more exclusive transit ways demonstrated the most reliability and the least schedule variability and bunching. The ability to track reliability changes has been limited by the fact that most transit agencies do not regularly measure this performance attribute. New automated vehicle location systems may, however, allow for the objective and conclusive measurement of reliability (Diaz et al, 2004; Diaz, 2009).

2.24 Image and Identity

Most BRT systems in the United States and internationally are successfully marketed as distinct brands of service through a combination of high quality service attributes and explicit use of branding devices. Performance in achieving a distinct brand identity for BRT has been measured by in-depth passenger surveys. The more successful BRT systems have been able to achieve a distinct identity and position in the respective regions family of transit services. BRT passengers generally had higher customer satisfaction and rated service quality higher for BRT systems than for their parallel local transit services (Diaz et al, 2004; Diaz, 2009).

2.25 Safety and Security

Data measuring the difference in safety and security of BRT systems as compared with the rest of the respective regions transit system are rarely collected. Therefore drawing conclusions about the ability of BRT elements in promoting safety and security is premature. Data from Pittsburgh, however, suggest that BRT operations on exclusive transit ways have significantly fewer accidents per unit (vehicle mile or vehicle hour) of service than conventional local transit operations in mixed traffic. Customer perceptions of “personal

safety” or security reveal that customers perceive BRT systems to be safer than the rest of the transit system (Diaz et al, 2004; Diaz, 2009).

2.26 Capacity

For virtually all BRT systems implemented in the United States, capacity has not been an issue. To date, none of them have been operated at their maximum capacity. On all systems, there is significant room to expand operated capacity by operating larger vehicles, higher frequencies, or both. International cases, especially in Latin America and Asia, demonstrate abilities to host significant loads of passengers with faster travel times and reliability (Diaz et al, 2004; Diaz, 2009).

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

The methodology for this research was developed based on the need to assess the performance outcome of the N.S.T.A as it relates to customer satisfaction. The methodology identified types and sources of data required; sampling technique, procedures, Method of data analysis as well as instrument of data collection.

3.2 Data required and sources

The required data for this study complied with the set objectives. For the purpose of achieving the objectives of this study, both primary and secondary data was obtained. This includes questionnaire administration, oral interviews, and physical surveys to gain insight into the operational characteristics and challenges of the Niger State Transport Authority. Secondary data was also used, and included available records and published materials. Such as progress reports, publication on the historical background of the agency, textbooks, journals, news papers, magazines, unpublished research materials as well as the internet.

Table: 3.1 Data requirement, description and sources

DATA TYPE	DATA REQUIRED	DATA DESCRIPTION	SOURCE
Primary	Opinions of service	User level of satisfaction with services Such as Service reliability,Cleanliness of bus, Bus crowding, service frequenciese.t.c	Responses from Users of N.S.T.A servicesthrough the use of questionnaire
	Agency on hand information	Schedule data, system maps, service design standard, accident and incident records, fleet data, complaint records e.t.c	Agency operators throughoralinterviews, surveys and fieldwork documentation
	Performance parameters	Service data such as route characteristics, comfort, customer care information, safety and security e.t.c	Public Transit research institute manual and previous research conducted in this field
secondary	Literature review	Concepts of customer satisfaction and performance evaluation in public transport, urban mass transit and the B.R.T	Published and unpublished literature from libraries and the internet. Review articles and editorials through digests and summaries
	Map of Minna metropolis.	Details of settlements in order to provide idea on number of houses used as sample frame and to show areas the routes are entailed	Google earthimagery applications (internet data base) through the count of roof tops and route identification

Source: field survey (2014)

3.3 Sample frame and size

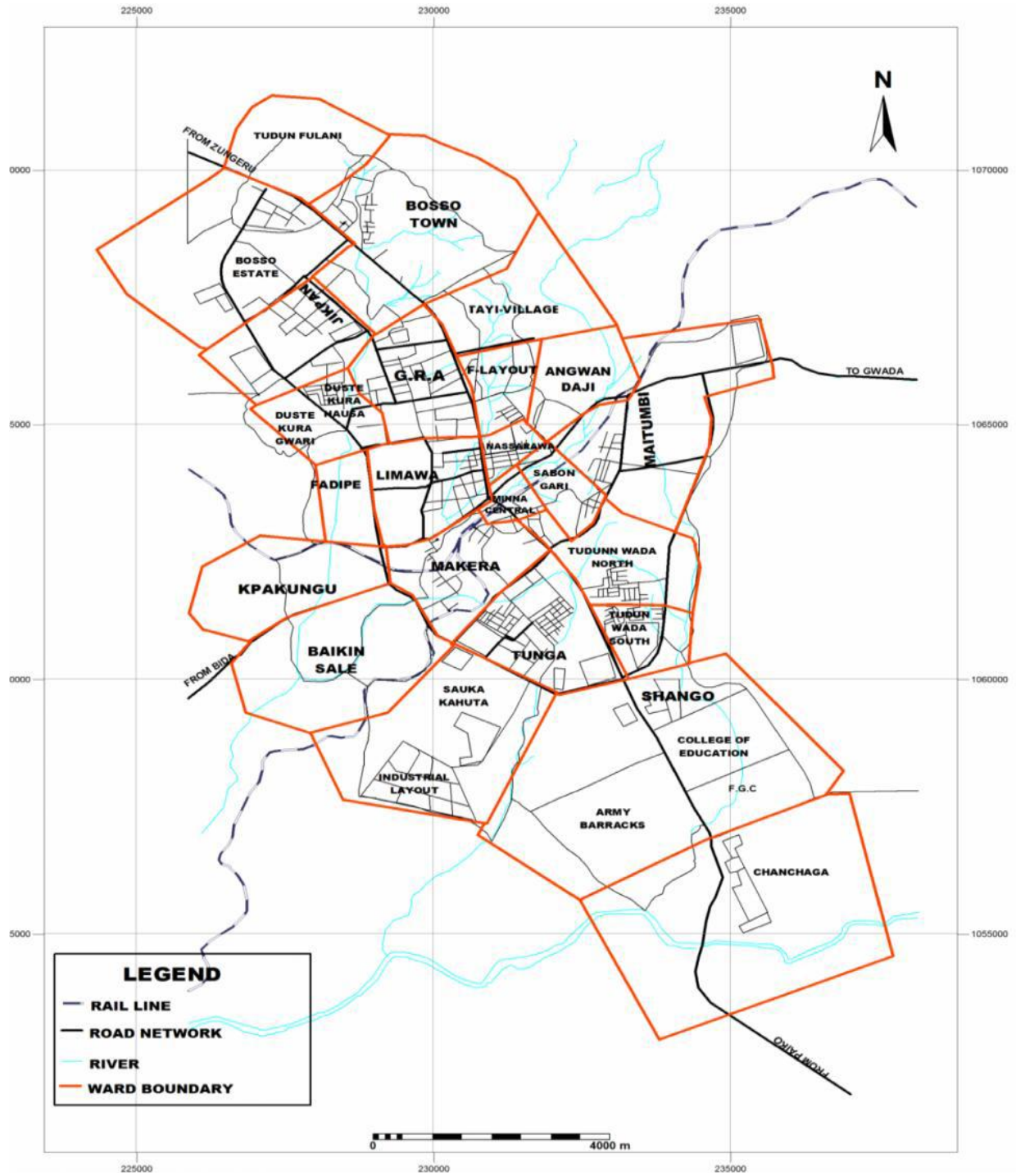
The sample frame for this study consists of housing units within wards of Minna Metropolis. With the use of satellite imagery, Minna metropolis was defined in an up to date map (fig 11). The delineated areas that constitute Minna metropolis was marked and divided into wards which were further stratified into blocks. These blocks were numbered serially and dwelling units identified by counting the roof top of houses within them. The number of dwelling units identified in Minna is about 53,930 and the sample size was taken as 0.4% of 53930 which gave a total of 216 samples. Household surveys were used instead of onboard bus surveys. This is due to the challenges passengers face when asked to complete administered questionnaire under less than ideal conditions onboard. While response rates tend to be high onboard, item non-response could also be high due to a number of factors. These include literacy problems, language and cultural barriers and the short length of time passengers are on the bus.

Table 3.2 Wards and details

Wards	Number of houses	Blocks	Number of Houses
Minna	6037	SabonGari	3920
		Makera	2117
Kpakungu	13487	Kpakungu	3346
		Baikin sale	8499
		Fadipe	1642
Dutsankura	5436	Dutsankura	2446
		G.R.A	1170
		jikpan	1820
SaukaKahuta	9242	SaukaKahuta	9242
Bosso	8644	Tudun Fulani	2450
		Bosso Estate	655
		Bosso Town	5539
Chanchaga	4377	Chanchaga	2542
		Shango	1835
Tunga	6707	Tunga	4772
		Tudun Wada	1935
Total	53930	Minna Metropolis	53930

Source: Google Satellite Imagery

Fig11 physical location of wards in Minna metropolis



3.3 Data collection procedure

Using systematic sampling technique, questionnaire was administered on the first household chosen at random within each block and subsequent households were selected at an interval of two houses. Respondents from each house were selected to participate if they had attained the age of 18 years and uses bus services provided by the N.S.T.A. Where people in a particular house do not use the services, the sample was revisited and distributed to other houses within the strata. The proportion of questionnaire accorded each ward in relation to the number of houses entailed is presented in table 3.3 below

Table 3.3 Household questionnaire administration

Wards	Number of houses	No. of samples
Minna	6037	24
Kpakungu	13487	54
Dutsankura	5436	22
SaukaKahuta	9242	37
Bosso	8644	35
Chanchaga	8644	35
Tunga	6707	27
Total	53930	216

Source: Field survey (2014)

3.31 procedures

Data concerning the operating characteristics of the travel vehicles was collected through a series of surveys in the NSTA terminal, including observation of the arrival and departure times of vehicles. Vehicle, arrival and departure times, and number of passengers carried, were monitored within the hours of travel and was recorded. The length of observation was specifically designed to get a sufficient number of cycle times. From the data collected during the survey, detailed observation of the service attributes was made and the operating characteristic of the vehicles were understood. This involved the use of checklist to assess service elements and also travelling through the transit system and observing qualitative attributes which were difficult to measure. This way it allowed user opinion to be compare with what was observed.

Table 3.4 Parameters observed under physical survey

SERVICE DATA	ATTRIBUTE OF SERVICE ASPECT
Route characteristics	Service frequency , Schedule adherence
Service reliability	Regularity, variation in dwelling time
Comfort	Bus crowding, Availability of shelter at stops
Cleanliness	Cleanliness of bus interior and exterior
Customer care information	Availability of displayed information on stops , Personnel helpfulness' Personnel appearance,
Safety and security	Safety , Security against crimes on bus

Source: Field survey (2014)

The questions related to the respondents' opinions about Niger State Transport services and the satisfaction data were collected. The respondents from each household were informed about the purpose of the study which was to obtain information about satisfaction with the state transport authority. Information was elicited on the quality of service and their satisfaction with the services rendered by the state transport agency. The respondents stated whether they agree or disagree with different statements about the public transport attributes. A total number of two hundred and sixteen questionnaires were administered and a total of two hundred and two was accepted duly completed by respondents. The interview technique was also employed in the study. This provided opportunity to interview the agency management team whose views on service performance was very essential. The operators whose job it is to coordinate the day to day operations of transport service were interviewed. These interviews provided useful additional information on challenges faced by operators with regards to the provision of transit service.

3.4 Method of data analysis

Data analysis was undertaken using descriptive statistics tools such as frequency tables, simple percentages, highest mean score, in analyzing and interpreting the data collected. Several service attributes measures were obtained from respondents and were used in the study. In addition, overall satisfaction was also used as a measure. The service indicators were calculated by the average of the satisfaction rates expressed by the sample of users about transit service aspects according to a scale from 2 to 10. Performance indicators were also assessed based on the parameters in the Public Transit research institute manual and previous research conducted in this field. As for the qualitative attributes, the researcher described the condition of indicator as

verified. To evaluate the N.S.T.A service quality, users provided information about 8 service attributes. They expressed a rating of satisfaction on each attribute on a scale from 2 to 10. In addition a rating of overall service satisfaction was requested.

The service attributes describe the main aspects characterizing bus services such as service frequency, service reliability, bus crowdedness, shelter, cleanliness, bus maintenance safety and personnel, (Table 4.1). The frequency values are the number of times respondents mentioned a variable as their answers or options. This made it possible to obtain the mean scores and standard deviations of the frequency counts of the response values. A first evaluation of transit service quality is effected here by analyzing the rate of satisfaction by means of the calculation of the average satisfaction (Table 4.1). Adding all the ratings (strongly agree =10 + agree = 8 + undecided = 6 + disagree= 4 + strongly disagree= 2] which gave a total of 30 points for overall satisfaction and for each of the specific service quality attributes that affect passenger satisfaction. By summing the nominal values and dividing by the total number of scaling variables, the cut-off point gives a mean of 6. Thus, any mean above 6 indicates passenger satisfaction and below 6 indicates passenger dissatisfaction with service quality attributes and overall satisfaction of the public bus transport system. A mean of exactly 6 shows undecided on satisfaction level.

CHAPTER FOUR

4.0 RESEARCH FINDINGS

Introduction

This chapter presents the outcomes of the performance analysis of the Niger State Transport authority. The first part presents the performance assessment according to nine service attributes. Part two discusses the ranking of routes and part three, the explanation of the results and implications of findings.

4.1 PERFORMANCE OF NSTA BY SERVICE ATTRIBUTES

4.11 Service Frequency

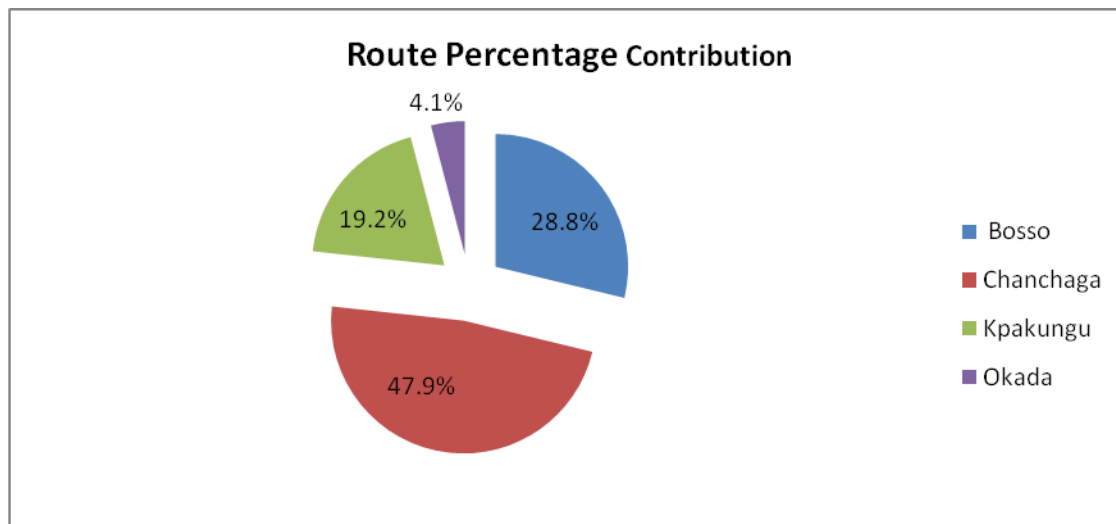
Service frequency refers to the number of runs implemented by the N.S.T.A. along the four routes surveyed. The primary finding is that runs along all the routes are inconsistent (see table 4.1). The average number of runs estimated for all the routes is 6 compared with 11 runs expected suggesting that service frequency is poor. The inconsistency by individual routes is further shown in table 4.1. The average runs for all routes range between 1 and 11 (table 4.1). It was observed that in Chanchaga (route 2) for instance, a positive deviation of 6.1% exists while in the other routes, a negative deviation of between -90.9% to -36.4% exists (table 4.1). That is, it can be deduced that the best route in terms of compliance with schedule is Chanchaga route (2) while the worst is Okada route (4). The prevalence of negative deviations implies that actual frequency is less than the expected frequency in most of the routes and it indicates poor quality in the frequency of bus service. The poor performance observed with this service attribute reflects the inadequacy of buses available for the service. As observed at the field, there is an average of one bus per route as against three required. Delays from time wastage by drivers is another equally important factor.

Table 4.1 Service frequency performance measure

ROUTES	Route1 (Bosso)	Percentage deviation	Route2 (chanchaga)	Percentage deviation	Route3 (kpakungu)	Percentage deviation	Route4 (Okada)	Percentage deviation
Number of buses	1		1		1		1	
Expected run per day	11	-	11	-	11	-	11	-
Day1 Actual run per day	5	-54.5%	13	18.2%	4	-63.6%	0	-100%
Day2 Actual run per day	9	-18.2%	10	-9.1%	5	-54.5%	3	-72.7%
Day3 Actual run per day	7	-36.4%	12	9.1%	5	-54.5%	0	-100%
Average	7(runs)	-36.4%	11(runs)	6.1%	4(runs)	-57.5%	1(run)	-90.9%

Source: Field survey (2014)

Fig 1: Route Percentage Contribution



Source: Field survey (2014)

The user satisfaction data obtained revealed that “service frequency” had a mean score of 6.4points (table 4.2), suggesting that most of the respondents (52.4%) indicated being reasonably satisfied with the level of service frequency of buses.

Table 4.2 User satisfaction with service frequency

Service variables	Strongly agree		agree		undecided		Disagree		Strongly disagree		mean	Std deviation
	N	%	N	%	N	%	N	%	N	%		
Service frequency is adequate	34	16.8	72	35.6	37	18.3	20	10	39	19.3	6.4	2.96

Source: Field survey (2014)

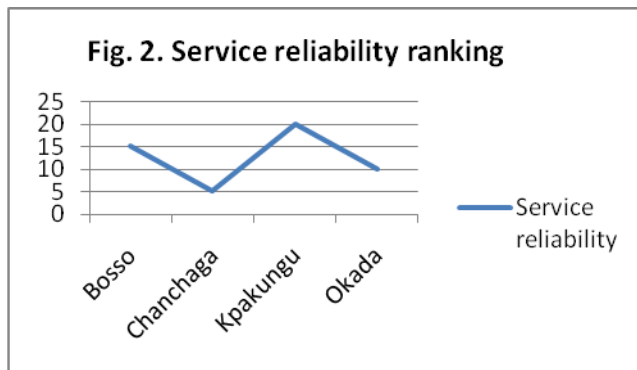
4.12 Service Reliability

Reliability is the ability of the transit system to limit the variation in the transit service journey time by maintaining consistent travel time. The result in Table 4.3 reveals inconsistency in running time and poor headway which are an indication of poor performance. An average deviation of +7minutes was observed across the routes compared to the acceptable schedule considered as the runs that are up to 1 minute early and up to 5 minutes late. The result from table 4.2 indicates that kpakungu route (route 3) is the most reliable with a deviation of an average of +5 minutes (having the lowest deviation) while chanchaga (route 2) is the least reliable with an average deviation of +9 minutes. The data in (table 4.3) has also shown that the difference between the actual run and the schedule runs in all the routes is positive, confirming that buses in all the routes have spent more time than allotted.

Table 4.3 Total journey time in minutes

Routes	Route1(Bosso)	Route2(Chanchaga)	Route3(Kpakungu)	Route4(Okada)
Expected run time	(30 min)	(35 min)	(15 min)	(25min)
Actual journey time average (min)	37 min	44 min	20 min	33 min
On time deviation	+7min	+9min	+5min	+8min

Source: Field survey (2014)



The user satisfaction rating is shown in Table4.4.It indicates that “service reliability” is above average with a mean score of 7.1 points (table 4.7). This implies that most users (56.9%) were fairly satisfied with the quality of service. Results obtained however are not a reflection of the poor performance of service reliability determined in the technical assessment. Observation reveals poor performance of the service whenbench marked with what is expected. That is, requiring that runs are at least a minute early and not more than five minutes late.

Table 4.4 User satisfaction with service reliability

Service variables	Strongly agree		agree		undecided		Disagree		Strongly disagree		mean	Std deviation
	N	%	N	%	N	%	N	%	N	%		
Service reliability	72	35.6	43	21.3	39	19.3	19	9.4	29	14.4	7.1	3.25

Source: Field survey (2014)

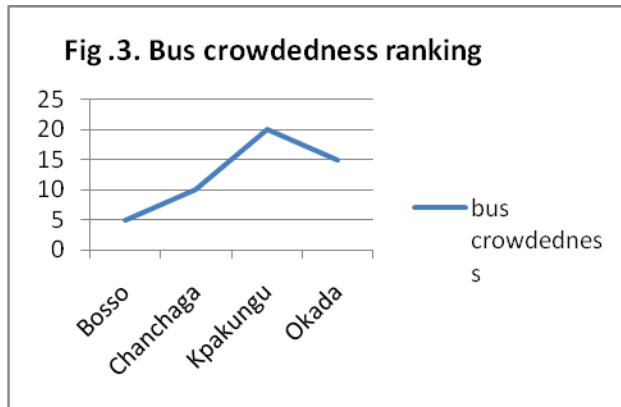
4.13 Bus Crowding

Crowding relates to a high density of passengers onboard the vehicles. The assessment of this parameter was done through occupancy rate measures, which is defined as the difference between the actual number of passengers inside a bus to the number of seats available (Tyrinopoulos and Aifadopoulou, 2008). The result obtained from this analysis is shown in table 4.5. It demonstrates extreme lack of capacity onboard the N.S.T.A vehicles during peak periods. Most of the buses on the routes are overcrowded with up to 20 excess passengers estimated across the four routes surveyed. This is contrary to the N.S.T.A policy of no excess passenger and implies that published schedules are not been adhered to. Data in table 4.5 indicates that Bosso route (route 1) is the worst route for this service category with 33 excess passengers, while Okada route (route 4) is the best route with no excess passengers. The number of actual passengers across all routes is way over what is expected and is an indication of poor performance.

Table 4.5: Bus crowding

Vehicle capacity	Bosso(44seater)	Chanchaga(44seater)	Kpakungu(14seater)	Okada(44seater)
Expected passengers	44	44	14	44
Number of seated passengers	49	46	14	44
Number of standing passengers	29	31	Nil	15
Total passengers	78	77	14	59
Excess	34	33	Nil	15

Source: Field survey (2014)



The poor performance during peak periods is shown by the user satisfaction score of 5.9 points. Majority of respondents (44.1 %) claimed dissatisfaction with the service attribute and about 16.8% were undecided (table 4.6). This clearly indicates from both the technical assessment and the respondent's expectation that crowdedness is a problem with the services of the N.S.T.A.

Table 4.6 User satisfaction with bus crowding

Service variables	Strongly agree		agree		undecided		Disagree		Strongly disagree		mean	Std deviation
	N	%	N	%	N	%	N	%	N	%		
bus crowdedness	45	22.3	34	16.8	34	16.8	50	24.8	39	19.3	5.9	3.13

Source: Field survey (2014)



Plate: 1 depicting bus crowdedness

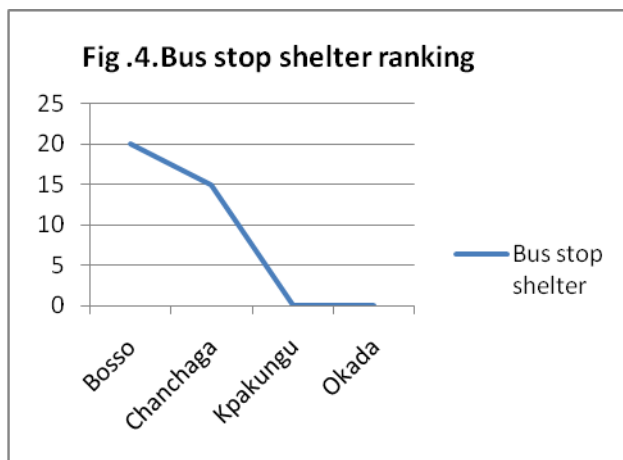
4.14 Availability of Shelter at Bus Stops

Shelter provides customers not only with protection from the weather, but also serve as an identity for the transit agency. In assessing the performance of bus stop shelter provision, the number of stops with shelter to those without is counted. Lack of shelter at bus stops where they are required, indicate poor performance on the part of the Agency (Transportation Research Board, 2003a). Data shown in table 4.6 reveal that the number of available shelters is far from what is required. A total of 37 bus stops were observed across all the four routes surveyed, with only 3 shelters provided. This is grossly inadequate compared to what is required .Bosso route is the best route with a total of 2 shelters while Kpakungu (routes 3) and Okada (route4) are the worst routes with no shelter at all.The number of shelters required for all the routes range from 10 to 6 and indicates the lack of attention paid to this service aspect.

Table 4.7 Distribution of bus stop shelter

	Route1	Route2	Route3	Route4
Number of bus stops	12	11	6	8
Number of shelters	2	1	Nil	Nil
Number of shelters required	10	10	6	8

Source: Field survey (2014)



The user satisfaction results confirm the technical findings of a poor score at 3.7 points (table 4.8). Majority of the respondents about 76.7% either strongly disagreed or disagreed that bus stops have enough shelters while 17.3% respondents were undecided.

Table 4.8 User satisfaction with bus stop shelter

Service variables	Strongly agree		agree		undecided		Disagree		Strongly disagree		mean	Std deviation
	N	%	N	%	N	%	N	%	N	%		
bus crowdedness	45	22.3	34	16.8	34	16.8	50	24.8	39	19.3	5.9	3.13

Source: Field survey (2014)

4.15 Cleanliness of Bus

cleanliness refers to the physical condition of vehicles and specifically includes the removal of graffiti, cleanliness of the bus interior and exterior. During the survey period, all buses in the four routes were found to be littered after the closing hours. Waste materials observed include debris, food scraps, plastic bottles, papers and water sachets. Table 4.9 indicates that Cleaning services were observed every morning before vehicles are refueled. This is in line with the N.S.T.A's recommended daily cleaning schedule and once per month comprehensive cleaning service policy. The cleaning services are usually done by the conductors before the driver's arrival. Cleaning involves sweeping the floor, cleaning the seats, grab railing and windows. However trash receptacles and information dissuading littering and graffiti were not made available onboard which is an indication of poor performance. Interviews with the drivers revealed that comprehensive cleaning of buses is maintained.

Table 4.9 Cleanliness check

Routes	Route1	Route2	Route3	Route4
Daily cleaning service	Observed	observed	observed	observed
Availability of trash receptacle	None	None	None	None
Information	Nil	Nil	Nil	Nil

Source: Field survey (2014)

The user satisfaction result indicates that respondents rated “cleanliness” to be above average with a score of 7.15 points (table 4.7). This shows that majority of respondents (62.4%) are fairly satisfied with the condition of Buses which may be due to the daily cleaning executed before operation begins.

Table 4.11 User satisfaction with bus cleanliness

Service variables	Strongly agree		agree		undecided		Disagree		Strongly disagree		mean	Std deviation
	N	%	N	%	N	%	N	%	N	%		
Bus cleanliness	48	23.8	78	38.6	39	19.3	17	8.4	20	9.9	7.15	2.77

Source: Field survey (2014)

4.16 Safety Performance

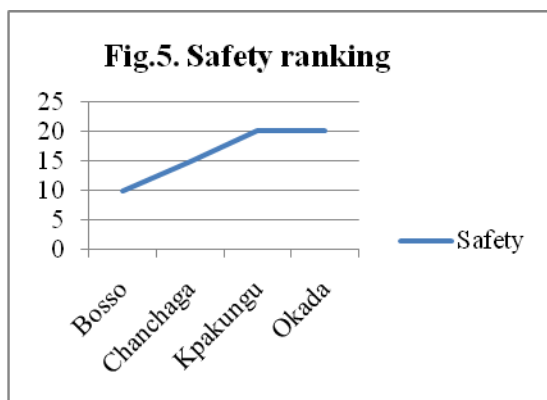
Safety is defined as the condition to which risks of harm arising out of the Agency’s decisions and operations are managed to acceptable levels. The survey data in table 4.12 reveal that safety consciousness is lacking within the N.S.T.A. No fire extinguishers were available onboard the buses across the four routes observed, which is contrary to the N.S.T.A’s recommendation of one can per bus. Most Straphangers on the grab rail onboard the vehicles were either broken or nearly so. Okada (route 4) has the highest number of broken hangers while Chanchaga (route 2) has the least damaged hangers with just two. This could constitute potential harm to standing passengers. Torn chairs were observed in the bus assigned to Okada (route 3) and in some cases

the iron frame were exposed which could be harmful to users during impact. It was also observed from the survey across the four routes that passengers are confined in sometimes crowded and uncomfortable situation which does cause discomfort and insecurity. An incidence was also observed of a driver in route (1) who was making a call while driving. No incident of fatalities was recorded during the survey period across the four routes covered.

Table 4.12 Safety check

Routes	Route1	Route2	Route3	Route4
Unsafe acts by drivers	Making calls while driving	Nil	Nil	Nil
Incidence of fatality	Nil	Nil	Nil	Nil
Potential harmful object	Six broken straphangers	Four broken Straphangers	Torn seats(exposed iron bar)	Seven broken straphangers
Potentially harmful practice	Overcrowding	Overcrowding	Nil	Overcrowding
Fire extinguishers	Nil	Nil	Nil	Nil

Source: *Field survey (2014)*



Users generally scored these service attribute high at 8.21points (table 4.7). This indicates very high satisfaction on the part of the transit users. This could be attributed to the lack of any incidence of injury as a result of the actions of the operators. Generally about 84.6% of respondents feel safe onboard the N.S.T.A.

Table 4.13 User satisfaction with bus safety

Service variables	Strongly agree		agree		undecided		Disagree		Strongly disagree		mean	Std deviation
	N	%	N	%	N	%	N	%	N	%		
Bus safety	92	46	78	38.6	8	4	11	5.4	13	6	8.21	2.64

Source: Field survey (2014)



Plate: 2 broken strap hangers onboard

Plate: 3 damaged seat onboard

4.17 Personnel Helpfulness

This involve the knowledge and courtesy of employees and their ability to inspire trust and confidence. The expectation generally is that transit staff are present, appropriately uniformed, and performing the customer care duties required of their role. These include availability of customer information displays, having facilities for announcement and ensuring sale of ticket is orderly .Data shown in table 4.6 reveal that no announcement was available atstations.Onboard,

announcements were observed only prior to bus stops by the conductors across the four routes surveyed, but often the announcements lack clarity and users have to reecho it themselves. No staff was seen wearing uniforms around the station or onboard, even though they are expected to wear a blue uniform for proper identification. No information targeting the users was observed in the station, at stops or onboard. This indicates poor performance in personnel service quality. The conductors issue users with ticket after payment.

Table 4.14 Personnel check

CHECKS	OBSRVATION
Personnel uniform	No staff was observed wearing uniforms
Information display	No information targeting the users was observed
Tickets issued by conductor	Tickets are given after payment always

Source: Field survey (2014)

In contradiction of the technical assessment result, users generally scored “Personnel helpfulness” highly at 7.6 point which implies moderate satisfaction (table 4.15). About 65.9% of respondents indicated satisfaction with the service attribute while 16.8% were undecided.

Table 4.15 User satisfaction with personnel service

Service variables	Strongly agree		agree		undecided		Disagree		Strongly disagree		mean	Std deviation
	N	%	N	%	N	%	N	%	N	%		
Personnel helpfulness	85	42.1	48	23.8	34	16.8	14	6.9	21	10.4	7.6	3.12

Source: Field survey (2014)

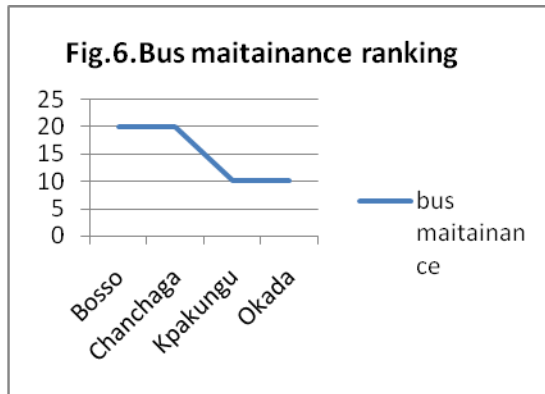
4.18 Bus Maintenance

The criteria on Bus maintenance require observation of the ease with which Buses are driven, their condition and appearance. The survey result shown in table 4.16 reveals that all the drivers observed across the routes seem to be driving with ease except the one along Kpakungu route (route 3) who was having difficulty operating the gear. Table 4.16 also reveals that all buses along the surveyed routes are looking relatively new except the 14 seater bus on route 3. This bus is old looking and has most of its chairs damaged. Table 4.16 further indicates the incidence of break downs in route (4) during the survey period. Interviews with transit operators reveal that vehicles are generally serviceable and in good condition and that all vehicles of the agency are due for service once every month. They further reveal that they ensure that the people undertaking the servicing, maintenance and repairs of buses are appropriately trained and have a trade certificate or license for the work they are performing. An in house maintenance workshop was also observed and workers were observed servicing vehicles.

Table 4.16 Bus check

Routes	Route1	Route2	Route3	Route4
Bus appearance	Relatively new	Relatively new	Old looking	Relatively new
Mechanical condition	Good condition	Good condition	Good condition	Bad
Driver check	Driving with ease	Driving with ease	Driving with difficulty	Driving with ease

Source: *Field survey (2014)*



Results shown in table 4.17, indicates that a high majority of respondents (73.3 %) are satisfied with the service attribute “maintenance”. A very good performance score of 8.1 points was accorded it by the respondents. This could be attributed to the relative newness of buses along most of the routes.

Table 4.17 User satisfaction with bus maintenance

Service variables	Strongly agree		agree		undecided		Disagree		Strongly disagree		mean	Std deviation
	N	%	N	%	N	%	N	%	N	%		
Bus maintenance	102	50.5	46	22.8	26	12.9	18	8.9	10	4.9	8.1	2.86

Source: *Field survey (2014)*

4.19 Cumulative User Satisfaction Results of NSTA Services.

As part of the study, respondents were asked to rate overall satisfaction with the transit service using the statement “overall, am satisfied with the services of the Niger state transport service” or otherwise. The result indicate that over all, the transit service performed poorly with a below average score of 5.2 as against an acceptable score of 6.0.the survey of user satisfaction by parameter is further shown in table 4.18. It can be noted that only two attributes had an unsatisfactory average score, because the users assign them a mean score rate lower than the sufficiency measure of 6.0. The attributesreferred here are availability of shelter at stops and the bus crowdedness attribute. The attributes with the highest satisfaction mean scores are safety, bus maintenance and cleanliness. Regarding the variability of user satisfaction, the judgments on perceived quality are not very homogeneous. The standard deviations of the satisfaction rates of

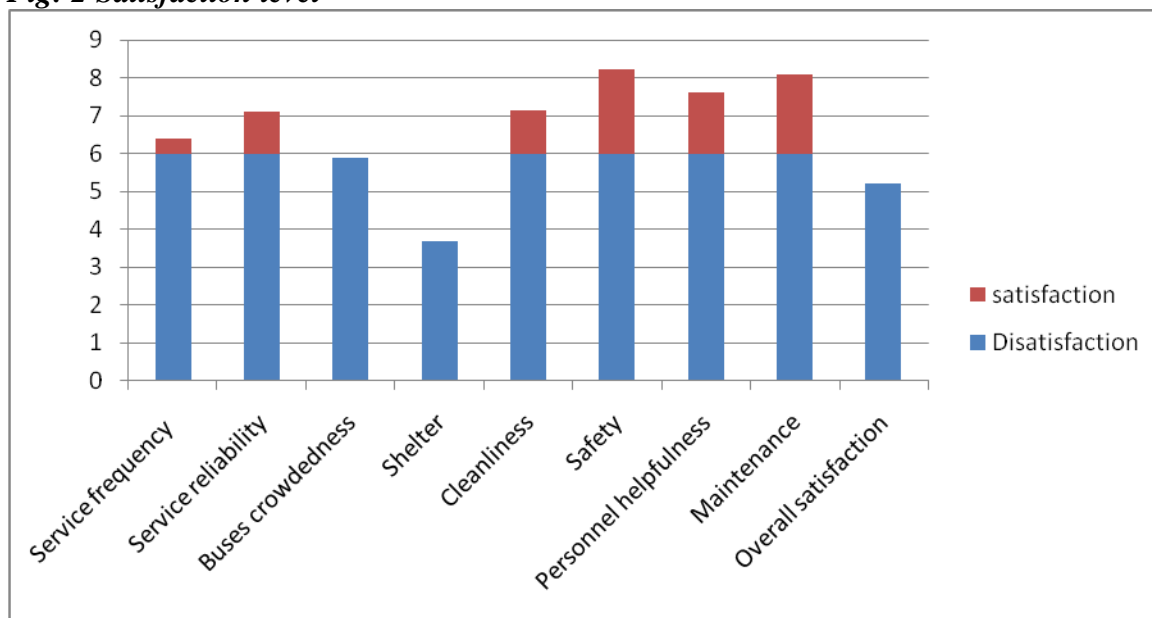
the service attributes vary from 1.79 to 3.25(average value of 2.52). This implies that user judgment is influenced by different factors.

Table 4.18 User satisfaction rating of the N.S.T.A service

Service variables	Strongly agree		agree		undecided		Disagree		Strongly disagree		mean	Std deviation
	N	%	N	%	N	%	N	%	N	%		
Service frequency is adequate	34	16.8	72	35.6	37	18.3	20	10	39	19.3	6.4	2.96
Service is always reliable	72	35.6	43	21.3	39	19.3	19	9.4	29	14.4	7.1	3.25
The buses are not crowded	45	22.3	34	16.8	34	16.8	50	24.8	39	19.3	5.9	3.13
Bus stops have enough shelters	-	-	12	6	35	17.3	64	31.7	91	45	3.7	1.79
Buses are always clean	48	23.8	78	38.6	39	19.3	17	8.4	20	9.9	7.15	2.77
it's very safe to travel with N.S.T.A.	92	46	78	38.6	8	4	11	5.4	13	6	8.21	2.64
Personnel are very helpful	85	42.1	48	23.8	34	16.8	14	6.9	21	10.4	7.6	3.12
Buses are well maintained	102	50.5	46	22.8	26	12.9	18	8.9	10	4.9	8.1	2.86
Overall, am satisfied with the services of the Niger state transport service.	24	11.9	39	19.3	50	24.8	45	22.2	44	21.8	5.2	2.79

Source: Author (2014)

Fig: 2 Satisfaction level

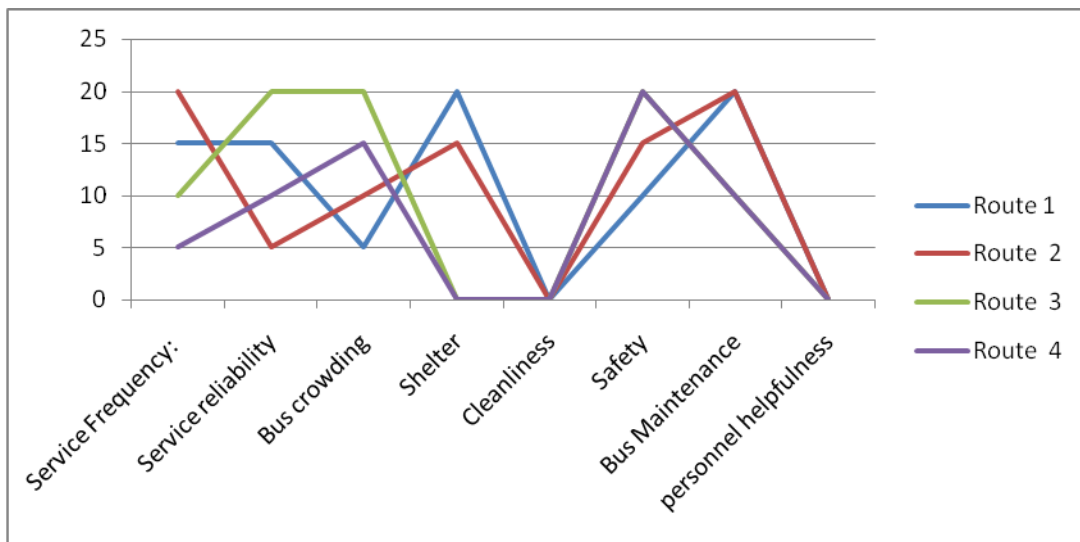


Source: field survey (2014)

4.20 Performance Ranking Of Routes by Technical Assessment

The aggregate line graph compares the performance of all the bus routes based on their technical assessment records in each of the service attributes. It can be seen from figure 7 that Kpakungu (route 3) has enjoyed an upward trend in service reliability and crowdedness to become the best route in the overall aggregate despite falling short in other service areas. The figure below shows a decline in performance as regards the service attribute cleanliness and shelter for all the routes. The figure shows that Okada (route 4) is the worst route in the overall ranking and has done well in safety and poorly in service frequency and shelter.

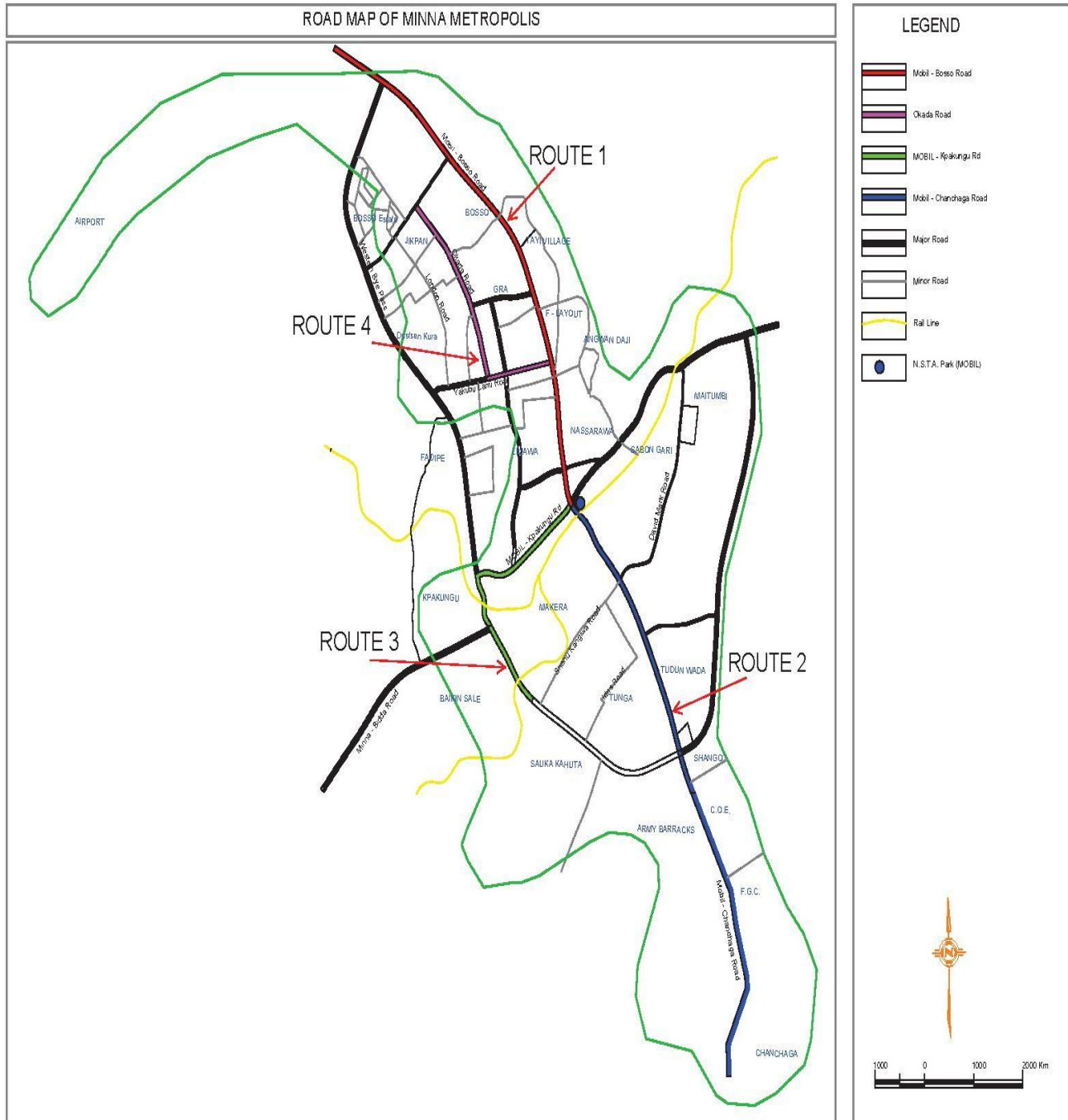
Fig.7 Cumulative performance of routes



Source: Field survey (2014)

Fig.8 shows the various routes from the city center where the NSTA station is located and the surrounding settlements served. Chanchaga route 2 is depicted in blue colour, Bosso route 1 in red, Okada route 4 in pink and Kpakungu route 3 in green.

Fig.8 Routes used by the N.S.T.A



Source: Google satellite imagery

4.3 DETERMINANTS OF SERVICE PERFORMANCE

4.31 Service Frequency

The poor performance on service frequency suggests that more vehicles are required to maintain a high demand capacity during peak periods. The buses were observed to operate at low speed and most of the time at large headways usually above 20 minutes, which is largely due to the indiscipline of the drivers and consequently infrequent number of runs. The fair performance observed in chanchaga (route 2), which has 47.9% of the total run could be attributed to the high demand of service along this route. The buses are not as frequent as they ought to be and this has impacted negatively on waiting time and crowding. It was also observed that drivers are not focused on keeping headways regular and it is common for the buses to be on one end of the route while passengers are available on another.

The drivers were observed to operate runs way over what is expected this suggests lack of adherence to schedule and the possibility of the excess fares ending up in private hands. The poor performance in route (4), which has the least contribution with 4.1% could be attributed to the low demand in the route coupled with frequent breakdowns and incessant delays of the bus attached to the route. Broken down vehicles meant for the service were also observed around the work shop awaiting repair. Interview with the operators reveal that the inability of the agency to meet up with the target run per day is due to the insufficient number of available buses operating and the high number of buses awaiting spare parts.

The N.S.T.A will require at least three buses in each of the routes to meet the typical transit agency headway of ten minutes or less based on the observed time estimate. The user satisfaction rating result also shows the importance of this service aspect with substantial number of the respondents not being satisfied with the frequency of the service. The poor performance

assessment indicates the need for a better service because of the importance users attached to the service aspect. This is in accordance with the finding of the study conducted by UK Department for transport (2003) regarding customer need in public transport. High frequency of service and fares that offer value for money are revealed as important needs of UK public transport users. This indicates that for the N.S.T.A to meet up with its expected run, strict schedule adherence will have to be a priority.

4.32 Service Reliability

The poor performance recorded with this service could be attributed to the excessive dwell time of the buses in the routes; indiscipline on the part of the drivers and also the lack of schedule adherence. The survey established that a single bus was observed on each of the four routes implying that users of the service will have to wait a full running time if they are to miss a bus. High deviation from the expected journey time of the routes was also noticed and can be attributed to dwelling time experienced in the routes, especially in Bosso (route 1) and Chanchaga (route 2) where service time is more during peak periods. The old state of the bus in Kpakungu (route 3) and the frequent break down observed in Okada (route 4) also has a contributory effect. The positive values implies that the vehicles spent more time than were allotted, with Chanchaga and Okada routes showing high deviation of +9 and +8 minutes respectively. This is no surprise considering the traffic activity in route (2) and the breakdown recorded in route (4). Results indicate that route (3) has the least deviation of the routes and could be attributed to the small capacity of the bus on the route. The result of the user satisfaction rating demonstrates the importance users attached to the consistency of this service aspect rather than the quality of it.

Despite the poor performance observed in the field, the service attribute still gets an above average rating from the user assessment results. This is in line with the study of (Abkowitz, 1978) which found that passengers would consider the bus reliable because it operates in a predictable manner. This is in contrast to the study proposed by Eboli and Mazzulla (2010)

,which confirmed that service reliability is one of the most important service aspect for the users of public transport .

Mechanical failure was observed to also affect the amount of time passengers had to wait at the transit stop for vehicle to arrive as was observed with the bus in Okada (route 4).The lack of schedule adherence on the part of operators has affected the total running time in most of the routes and it indicates poor quality of bus services. The average satisfaction rating by the respondents suggest acceptance of the situation in the absence of a better alternative .The variance in total journey time was observed to be due to the variation in dwelling time of buses at the bus stop. The lack of consistency in time spent at stops has affected the total run time. On each of the observed run buses spend unnecessary time stopped, at the last bus stops. It was observed that unnecessary time is spent at the extreme ends of the route where buses turn around (last stop). It was observed in Bosso route, that about 6minutes was spent at F.u.t Gate in the run observed. About 4minutes 12seconds was used in chanchaga bus stop of chanchaga route. The same situation was observed in Barikin Sale and Bosso Estate bus stop of Kpakungu and Okada road respectively.

In some cases, the vehicles were dispatched even with empty seats, because some of the passengers have waited too long and were threatening to get off the bus. The driver always tries to fill up these empty seats on the way and as a result, the buses had to stop at places other than the bus stops in order to persuade potential customers to come onboard. Sometimes Large crowds of passengers are already waiting for the bus at certain stops and it takes a long time for these crowds to board the bus since they have to use only the front entrance after paying for

tickets. This creates significant delays for bus riders already on board when the bus stops. Table

4.8 shows significant variation in bus dwell time.

Table 4.8 Dwelling time at the bus stop

Name of bus stop(Route1)	Time spent at bus stop	Name of bus stop(Route2)	Time spent at bus stop(min)	Name of bus stop(Route3)	Time spent at bus stop	Name of bus stop(Route4)	Time spent at bus stop
					-		-
Mobil	-	Mobil		Mobil	-	Mobil	-
Ap Filling Station	-	Tunga market	17s	KaterenGwari	15s	Gov't House	-
Stadium Junction	-	Top Medical	15s	Old Secretariat	19s	Okada Junction	17s
GssFada	-	Abdul Salam	2:10s	Ap Filling Station	2:20s	HabibuShuaibu Plaza	49s
Gwari Motors	35s	City gate	20s	Kpakungu Round About	14s	Adamawa Junction	-
Chiromawa Estate	-	Trade fair	10s	Morris Junction	12s	HayanGwari Junction	-
Bahago Secondary School Junction	31s	C.O.E	2:12s	Barkin Sale Junction	1:15s	Scorpion House	-
Kontangora Plaza	20s	Barrack	35s	Morris Junction	11s	GidanMatasa	56s
Mypa Junction	53s	TunganGoro	10s	Kpakungu Round About	10s	Bosso Estate	45s
Bosso Market	1:5s	Mechanic	11s	Ap Filling Station	55s	GidanMatasa	-
FUT Gate	6:7s	Alade	20s	Old Secretariat	20s	Scorpion House	51s
Bosso Market	56s	Chanchaga	4:12s	KaterenGwari	-	HayanGwari Junction	-
Mypa Junction	-	Alade		Mobil	-	Adamawa Junction	46s
Kontangora Plaza	-	Mechanic	1:50s	-	-	HabibuShuaibu Plaza	49s
Bahago Secondary School Junction	32s	TunganGoro	-	-	-	Okada Junction	25s
Chiromawa Estate	-	Barrack	-	-	-	Gov't House	48s
Gwari Motors	1:10s	C.o.e	3:35s	-	-	Mobil	-
GssFada	50s	Trade fair	10s	-	-	-	
Stadium Junction		City gate		-	-	-	
Ap Filling Station	50s	Abdul Salam	19s	-	-	-	
Mobil	-	Top Medical	-	-	-	-	
-	-	Tunga market	-	-	-	-	
-	-	Mobil	-	-	-	-	

Source: Field survey (2014)



Plate: 4 Excessive dwelling last stop

4.33 Bus crowding

The poor performance on this attribute indicates that insufficient capacity was found to impact transit service availability in the N.S.T.A., with vehicles loaded in excess of the number for which they are designed to carry. This indicates that crowdedness contribute greatly to user dissatisfaction in the N.S.T.A as was confirmed in Edvardsson (1998) who found that driver incompetence and crowdedness were important factors causing dissatisfaction in public transport. This is also in accordance with Stradling (2007) who has pointed out that overcrowded vehicles are perceived as uncomfortable. The field survey reveals that crowding is not a onetime incident with the N.S.T.A bus service, as the buses are most times overcrowded even before they arrive at the stop. This pattern repeats itself every peak hours during the period of survey and reduces the effective service frequency for these passengers from what is expected in the schedule, as they are forced to wait a whole run for the same vehicle or find another means of making their trip. This trend was observed in all the routes surveyed except in kpakungu (route 3), which is largely to the lack of standing space on the bus. The crowdedness is as a result of the inadequate number of buses on the routes. Incidence of more than a person per seat was also observed in route (1) and route (2), this suggests the lack of discipline on the part of the drivers and their inability to follow published schedule.

The survey shows that transit operations were slow as it takes more time for passengers to get on and off the bus which consequently implies that passengers waiting to board experienced increasing waiting time. In few instances the drivers try to add more passengers onboard even when the vehicle capacity is overstretched which shows that acceptable levels depend only on the customers' impacted. As the number of passengers increase, a threshold is reached at which not everyone is able to find a grab rail and some users had to hold onto the seats. In turn, this makes it difficult for the movement of other passengers that need to board or alight from the vehicle.

4.34 Bus stop Shelter

The very poor performance from the user satisfaction rating of the service attribute reflects what was observed in the field and is contrary to the findings in Iseki and Taylor (2008) who found that stop and station-area amenities were ranked as the least important by the users. It was observed that only three shelters were built in all of the roads to serve as cover for users during harsh weather conditions. This is not ideal for service operated above agency schedule waiting time. It was observed in two of the routes that no shelter was built at all. This implies that users will have to wait for the buses without the comfort of shelter.

The numbers of Shelters provided in the bus stops are grossly inadequate and offer poor protection in cases of harsh weather condition. Bus stops and shelters have not been given due consideration. Some of the stops that have a pole mounted flag are either damaged or not well located. Shelters provide customers not only with protection from the weather, but also, through careful design, they provide an identity. This is a very big problem especially since the transit agency offers the service of a bus per route. Shelter for waiting users should be a priority considering the infrequent nature of the runs observed. Interview with the transit operators reveal that plans are underway to increase the number of shelters in all the routes.



Plate: 5 shelter without passenger information Bosso route (Mobil stop)
Plate: 6 worn-out pole flag (Mobil bus stop)



Plate: 7 stop located from the road (Chanchaga route)

4.35 Cleanliness of Buses

The poor performance from the survey could be attributed to the lack of waste collection container or information on how waste is to be managed. This is an indicator of poor performance in all the routes observed. Onboard observation of vehicles reveals unpleasant smell on board the vehicles including littering and graffiti. The lack of trash receptacles on board and within the terminal may have encouraged the discriminate littering of the buses and station. There is also no information targeted at dissuading users from littering and graffiti, suggesting to

passengers a lack of attention to these visible aspects of transit service. Some of the times the passengers had to call for the attention of the operators to wipe off moisture or dirt from the seats. The sewerage around the station is blocked with all sort of materials and the entire station is characterized by filth.

4.36 Transit Safety

Contrary to the customer satisfaction rating for this attribute, interview with the drivers reveal the lack of emergency preparedness and response in the event of accident or disaster. In measuring safety performance, consideration was given to Incidence of fatality resulting from operators. Check was also done for factors which cause or are likely to cause harm either through the attitude of transit agency employees or the presence of potentially harmful objects onboard and the degree to which these inherent risks are managed.

Safety measures and priorities appear not to be clearly communicated and understood .No single fire extinguisher was found onboard the vehiclesand suggest that the Process of hazard identification and risk management within the N.S.T.A is poor. There seems to be no mechanism for reporting potentially harmful situation and no procedures for risk management in cases of fire outbreak or accident. According to the drivers the damaged chairs have been in that state for quite a while: which suggest that Safety inspections and monitoring is not common either. Although only an incident was observed of a driver making call while driving, it shows the lack of discipline on the part of operators and the disregard for safety

4.37 Personnel Helpfulness

The poor performance recorded from this service aspect is a reflection of what was observed on the field. It was observed that tickets queues were longer during peak periods with only one personnel attending every time. The N.S.T.A bus station is shared with other modes and it's very

difficult to identify their staff from those of others. Observation also shows that the station is not free from litter and there is no significant presence of personnel in the N.S.T.A terminal in Mobil (station) where the trips are supposed to be coordinated.

In the case of a loss or damage, users will find it difficult to report to the management. Observation also shows that the agency lacks procedures for addressing user complaints and checking Staff behavior. The drivers and conductors do not show courtesy in their approach and are not dressed in a manner that show responsiveness. There is also no conscious effort to enlighten the users through the placement of information that target them at the bus stop, in the terminal or onboard the vehicles.

4.38 Bus Maintenance

The impressive rating from the user satisfaction survey reflects the fact that most of the N.S.T.A buses are relatively new looking. The body structure, control systems appears to be in good shape. The incidence of broken down vehicle in route (4) during survey suggest that regular maintenance is poor and the high number of those awaiting repair at the workshop demonstrates the lack of will in meeting up with schedule and the need for a backup plan .

A transit vehicle that breaks down while in service, could impact passengers' travel time for that trip and their overall sense of system reliability. The presence of damaged chairs and broken grab hangers suggests that attention are not been paid to services that are customer satisfaction oriented but on agency operations only. Theinterviews with the operators also reveal that services are not only dependent on the workshop staffs but on the decision of administrative officer. Long journey buses are given priority over the short distance once at the workshops while those in need of spare parts are parked pending the decision of the operation manager.

TABLE 4.9 Findings on the determination of service performance

Service Attributes	Findings	Implications
Service frequency	Inadequate buses and indiscipline on the part of drivers	High waiting time and infrequent runs
Service reliability	Lack of schedule adherence	Deviation in expected journey time
Bus crowding	Insufficient capacity	Overcrowded buses
Bus stop shelter	Number of shelters grossly inadequate	Passengers use alternative modes instead of waiting for buses
Cleanliness of bus	No waste collection containers onboard	Unpleasant smell, littering and graffiti
Transit safety	Potentially harmful objects onboard	Potentially harmful
Personnel helpfulness	Personnel not uniformed	Difficult to identify personnel
Bus maintenance	Most buses have new look	This provides good image for the agency

CHAPTER FIVE

RECOMMENDATIONS

5.10 Summary of Findings

The overall perception of users to the operation of The Niger State Mass transit shows that services provided by the intra-urban mass transit operators are poor and inefficient. Some service attribute were rated lower than others such as crowdedness and availability of shelter that got very poor rating from respondents. Safety and bus maintenance were rated highly suggesting that users feel safe onboard the buses even though, observation shows that the situation on ground is not what it ought to be. Overall however the services received a poor performance rating implying that the expectations of users are not been met. Apparently, the demand on the transit system outweighs the capacity of existing transport facilities. To upgrade and acquire the much needed facility for effective operation is a major problem occasioned by the limited income of the transit operators. However, efficient and effective transport system is critical for sustainable development of the agency and in other to persuade potential users. One of the challenges of this study has to do with the attitude of the agency staffs who were always trying to withhold information by treating any question with suspicion. Another challenge is the absence of operational records that would have allowed for comparison and trend establishment so as to know the direction of progress.

Table 4.10 Summaries of results

Service Attributes	Findings	points	Recommendations
Service frequency	Fair performance	6.4	Provision of more buses
Service reliability	Good performance	7.1	Pre-boarding fare payment substituted for onboard payment
Bus crowding	Poor performance	5.9	Standing passenger level be restricted to the number of strap hangers in the vehicles
Bus stop shelter	Poor performance	3.7	Shelters and benches should be provided at stops to provide protection from sun and rain
Cleanliness of bus	Good performance	7.15	At least two trash bin should be made available onboard both at the front and behind the bus
Transit safety	Good performance	8.21	Safety and occupational health and safety laws and regulation be applied within the N.S.T.A transit service
Personnel helpfulness	Good performance	7.6	Operators must provide the medium for customer who has complaints to convey their complaint easily
Bus maintenance	Good performance	8.1	Regular maintenance service and inspection program for all buses used to provide services
Overall	Poor performance	5.2	Adopt bus rapid transit

5.20 RECOMMENDATIONS

Based on the observations discussed above, specific problems were identified that are responsible for the poor service associated with the N.S.T.A. The recommended actions are targeted at each major problem. In combination, these actions can produce significant improvements in the transit service experienced.

5.2.1 Service Frequency

The agency operators need to partner with the state administration in the provision of more buses for intra-city transport services so as to increase bus service frequency and reduce passenger waiting time. In the mean time schedule adherence should be encouraged to discourage the excessive dwelling time in the routes so as to allow the vehicle go more runs. The transit operators should exert Effort into the repair of the vehicles that are broken down to reduce the long headway to a bearable minimum.

5.2.2 Service Reliability

The long dwell times at some bus stops due to large waiting passengers create significant Delays for bus riders already on board when the bus stops. Buses spend between 56 and 65 seconds at these stops compared with 15 to 35 seconds at other stops. The current Pre-boarding fare payment at bus stops which implies passengers paying their fares before boarding the bus should be substituted for onboard payment. When a bus arrives, passengers can board much more quickly because they do not need to stop at the onboard fare box. Passengers should be allowed to board through both the rear and front doors of the bus, which would also speed up boarding. Dwell times will be reduced very substantially. When pre-boarding fare payment is no more operational, customers will line up and board in the usual manner and pay fares on the bus. Based on observations of the time spent for pre-board fare payment, it is estimated that on-boarding fare payment would reduce the time that the bus spends at these locations to 15 to 35

seconds, comparable to the time spent at most other bus stops on the route. Also the drivers should be made to understand the importance of meeting up with schedule time by operating the buses according to the schedule of operation plan and to also put a stop to the unnecessary time spent at the last bus stops in the routes irrespective of the passengers onboard. Once this is done the bus would spend only 15 to 35 seconds at the stop, comparable to the time spent at most other busy stops. In the future however the agency might want to solve the problem of traffic congestion and dwelling resulting from drivers' indiscipline by changing into transit system that uses exclusive right of way lanes.

5.2.3 Bus Crowding

Comfort is a huge passenger priority and, as a result, basic standards for bus passenger comfort must be established and monitored by the N.S.T.A to ensure that the operators abide by them. The number of passengers that the buses are supposed to carry is based on the number of seats on the buses. Therefore it is important that the transit operators put a stop to overcrowding. The drivers should be made to understand that when there is not enough room to provide a seating place for each passenger, the bus becomes overcrowded. In the mean time in the absence of adequate number of buses, the standing passenger level could be restricted to the number of strap hangers in the vehicles to allow for more passengers on board without necessarily causing discomfort to seated passengers.

5.2.4 Availability of Shelter at Stops

Shelters and benches should be provided at bus stops to provide protection from sun and rain for waiting passengers. Bus Stop Shelter should be equipped with the seat for passenger who will be waiting for the arriving bus. The agency should provide information for all routes inside the bus stop including customer service number. A well covered trash bin should also be placed within

easy reach of the passenger and in the locked condition so that it cannot be moved in order to dissuade littering.

5.2.5 Cleanliness of Bus

The operators should implement a cleaning program that ensures buses are cleaned on a regular basis. The cleaning program must include, at a minimum frequent general cleaning and at least once every seven days of detailed cleaning as opposed to the once every month . At least two Trash bin should be made available onboard both at the front and behind the bus. Information should be provided targeting the users to dissuade them from littering .There should be nomination of persons in positions responsible for monitoring the conduct of cleaning of vehicles. A cautious effort should be made to disinfect the seats, seat covers, handrail, and any device or equipment that comes in direct contact with the human body at least once every week.

5.2.6 Transit Safety

Best practices must be adopted in terms of Service Standard for the training of bus drivers as regards user safety. The Operators must ensure that drivers are trained in relevant public safety and occupational health and safety laws and regulations applied within the N.S.T.A transit service. They must also ensure that drivers are trained to manage any incident capable of causing the death or bodily injury to a person. The drivers should be made aware of their responsibilities under the regulations. They must ensure the fire extinguishers are available onboard.

5.2.7 Personnel Helpfulness

The personnel of the agency need to be given orientation on the importance of wearing the uniform so as to make it easy for passengers to identify them and consequently encourage responsiveness on the part of the staffs .The N.S.T.A operators must provide the medium for customer who has complaints to convey their complaint easily. They should provide customer service call number which can be viewed inside the bus, in the bus stop or other places around the terminal where passengers can have easy access . There should be staffs and users monitoring to assess the quality of service and to identify areas for improvement .The agency operators should Compare the performance of the agency to that of other organizations and aim for the highest standards. They should record expressions of dissatisfaction and introduce improvements to the services where appropriate. Service operators must make information on fares, timetables and route maps widely available to the public on a continuous basis including information concerning the disturbance in the bus service as a result of any improvement or upgrade.

5.2.8 Bus Maintenance

The N.S.T.A operators must implement a regular maintenance service and inspection program for all buses used to provide services. They should ensure compliance with the vehicles manufacturers' standards for the buses. The program should include ensuring appropriate facilities are available for the service, repair and maintenance of buses. They should also ensure that the people undertaking the servicing, maintenance and repairs of buses are appropriately trained and have a trade certificate or license for the work they are performing .

5.30 GENERAL RECOMMENDATION

The foregoing indicates that there is an urgent need to make improvements in public transport to address the different service attributes that contribute to the performance. Wright (2004) asserts that BRT attempts to address each of the above-identified deficiencies in current services by providing a rapid, high quality, safe and secure transit option. BRT as a mass transit system using exclusive right of way lanes is a flexible, high performance rapid transit mode that combines a variety of physical, operating and system elements into a permanently integrated system with a quality image and unique identity. BRT system performance can be assessed based on the experience of at least 40 systems across the United States and the world. The experience suggests that there are concrete improvements to travel time, reliability, and capacity as well as perceptions of improvements in safety and security and image and identity.

5.31 Travel Time and Speed.

With regard to total BRT travel times, BRT projects with more exclusive running ways generally experienced the greatest travel time savings compared to the local bus route. Exclusive transit way projects operated at speeds (including stops) between 32 and 48 kilometres per hour (i.e., a travel time rate between 1 to 2 minutes per kilometre), with even higher speeds demonstrated along the portions of the routes in exclusive sections. Arterial BRT projects in mixed-flow traffic or designated lanes operated at between 19 and 29 kilometres per hour (i.e., between 2 and 3.5 minutes per kilometre). Demonstration of low dwell times per passenger is most evident where there are high passenger loads, pre-paid fare collection systems, and all-door level boarding.

5.32 Reliability

Performance in reliability also demonstrated a similar pattern as travel times. As expected, systems with more exclusive transit ways demonstrated the most reliability and the least schedule variability and bunching. The ability to track reliability changes has been limited by the fact that most transit agencies do not regularly measure this performance attribute. New automated vehicle location systems may, however, allow for the objective and conclusive measurement of reliability.

5.33 Image and Identity

Most BRT systems in the United States and internationally are successfully marketed as distinct brands of service through a combination of high quality service attributes and explicit use of branding devices. Performance in achieving a distinct brand identity for BRT has been measured by in-depth passenger surveys. The more successful BRT systems have been able to achieve a distinct identity and position in the respective regions family of transit services. BRT passengers generally had higher customer satisfaction and rated service quality higher for BRT systems than for their parallel local transit services .

5.34 Safety and Security

Data measuring the difference in safety and security of BRT systems as compared with the rest of the respective regions transit system are rarely collected. Therefore drawing conclusions about the ability of BRT elements in promoting safety and security is premature. Data from Pittsburgh, however, suggest that BRT operations on exclusive transit ways have significantly fewer accidents per unit (vehicle mile or vehicle hour) of service than conventional local transit operations in mixed traffic. Customer perceptions of “personal

safety” or security reveal that customers perceive BRT systems to be safer than the rest of the transit system.

5.35 Capacity

For virtually all BRT systems implemented in the United States, capacity has not been an issue. To date, none of them have been operated at their maximum capacity. On all systems, there is significant room to expand operated capacity by operating larger vehicles, higher frequencies, or both. International cases, especially in Latin America and Asia, demonstrate abilities to host significant loads of passengers with faster travel times and reliability (Diaz et al, 2004; Diaz, 2009).

5.4 Future Research

The result of this study demonstrated that there are other factors that influence customer satisfaction judgment. In future research, it is important to investigate the importance users attach to the consistency of service rather than the quality of it. It will also be of importance to the service operators to investigate what constitute satisfaction for users of the service. In-depth interviews and brain storming that involves higher number respondent could help to create more relevant customer satisfaction measurement.

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