KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI, GHANA

Evaluation of Road Users' Satisfaction of George Walker Bush Highway, Ghana

by

Sheila Akakpo (BSc. Civil Engineering)

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DECLARATION

I hereby declare that this submission is my own work towards the MPhil Construction Management degree and that, to the best of my knowledge, it contains no material previously published by another person, nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

AKAKPO, SHEILA (PG 1741514)
(STUDENT'S NAME & ID)

…….
SIGNATURE

…….
DATE

CERTIFIED BY:
PROF. JOSHUA AYARKWA
(SUPERVISOR'S NAME)

……
SIGNATURE

……
DATE

CERTIFIED BY:
DR. THEOPHILLUS ADJEI-KUMI
(HEAD OF DEPARTMENT)

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SIGNATURE

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ABSTRACT

The road infrastructure network in Ghana has received a massive growth over the years. Despite the efforts by the Government of Ghana to improve road infrastructure and services, road related problems still occur every now and then. There is growing recognition, of the need to understand road user needs and concerns to deliver quality road services effectively and efficiently. The statement of the problem gives an indication that there are road users' satisfaction challenges on the George Walker Bush Highway in spite of the huge project investment made by the Government of Ghana and the Millennium Challenge Cooperation. Thus, the aim of the research is to evaluate the level of satisfaction of road users with the George Walker Bush (GWB) Highway. Questionnaire surveys was conducted on motorists and pedestrians. The views of both motorists and pedestrians with respect to the technical and functional service quality dimensions were assessed with a modified SERVQUAL instrument. Several implications regarding the satisfaction of road users of the GWB-highway were drawn from the findings of the research. The scores for all the quality dimensions measured indicated negative gaps which imply the expectations of road users of the GWBhighway exceeded their initial perceptions with the quality dimensions. The overall satisfaction rates show that pedestrians were averagely more satisfied with the service dimensions measured than motorists with an average mean scores of 3.87 and 2.94 respectively. The results of the regression analysis, show that road surface conditions and pedestrians' safety are the significant service quality dimensions that influence the satisfaction of road users. The findings of this study have empirically affirmed that, the service quality dimensions that influence the satisfaction of road users cannot be ignored or underrated in road infrastructure delivery. It further informs the road agencies and operators of the need to give due attention to satisfaction of road users during design and construction stages.

Keywords: road users' satisfaction, road agencies, road infrastructure, service quality dimensions

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LIST OF ABBREVIATIONS

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BRRI	Building and Road Research Institute
ERTRAC	-European Road Transport Research Advisory Council
GDP	-Gross Domestic Product
GHA	-Ghana Highway Authority
GIPC	-Ghana Investment Promotion Centre
GPRS	-Growth and Poverty Reduction Strategy
GWB	-George Walker Bush
IR	-Inter-Regional
ISO	-International Organization for Standardization
KPI	-Key Performance Indicator
MCC	-Millennium Challenge Cooperation
MRH	-Ministry of Roads and Highways
MsCIP	-Mississippi Coastal Improvement Plan
N	-National
NRSC	-National Road Safety Commission
OECE	-Organization for Economic Co-operation and Development
PMBOK	-Project Management Body of Knowledge
R	-Region
RUSS	-Road User Satisfaction Survey
SERVQUAL	-Service Quality
SPSS	-Statistical Package for Social Sciences
WHO	-World Health Organization

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DEDICATION

This Thesis is dedicated to Ing. Sitsofe David Addo and the Loving Memory of my Father Mr. George Stephenson Akakpo for the inspirations, support, understanding and immense contribution to the attainment of this goal. Thank you for making this dream a reality. God richly bless you.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The key drive for every road system is accessibility and mobility, therefore, the vision of any road transport system is to bridge the gap between road user needs and satisfaction (Organization for Economic Co-operation and Development, OECD, 2001). The road transport system constitutes one of the key indicators of every national development, thus, facilitating the movement of people, goods and services for diverse purposes (Buertey and Asare, 2014). The road infrastructure forms the backbone on which a society is built. In Ghana, it forms an essential part of the Ghana Shared Growth and Development Agenda aimed at addressing infrastructure and human settlement challenges (Road Infrastructure Development Annual Report, 2011). According to the Ghana Investment Promotion Centre Report (2009), road transport in Ghana accounts for 94% and 97% of freights and passenger traffics respectively. Development in the road network has served as an important indicator for socioeconomic growth throughout history. However, meeting the needs and expectations of road users for an improved road infrastructure delivery is still a growing concern for many governments and road agencies.

There is a traditional view that, the achievements of road sectors are mainly determined by the efficiency and fulfillment of the agencies' targeted goals as well as the quality of products and services they offer (OECD, 2001). Nowadays, developing and maintaining road infrastructure as well as delivering the required quality by meeting set standards has become a critical part of everyday life. Subsequently, the focus of road agencies has been shifted more towards the need to provide adequate satisfaction to road users and other beneficiaries of road infrastructural developments than emphasizing solely on the product. Robinson *et al.* (1998) stated that, customer

perceptions and concerns must define the goals of the road industry, especially, since the fulfillment of customer satisfaction is an essential prerequisite for quality assessment which forms part of the ISO 9001:2008 standards.

This study focused on assessing the satisfaction levels of road users of the George Walker Bush Highway. Utilizing the right instruments for the required needs of the road sector as long as road users' satisfaction is concerned, can provide a significant deal of input for the road sector improvement as well as an enhanced service and product delivery system. Preliminary investigations conducted in 2015 with the Ghana Highway Authority indicates that, unlike the road sectors in developed countries, road users' satisfaction is still a new concept in developing countries, especially, in Ghana. Thus, the focus of this research was to bring to light how road users' expectations and perceptions are formed and evaluated.

1.2 PROBLEM STATEMENT

The original two lane single carriageway of the Tetteh Quarshie-Mallam Junction Highway was often congested and lacked the operational capacity to carry such magnitudes of national, trans-national and urban traffic as expected, thereby imposing huge socio-economic constraints on the country. In an attempt to remedy these bottlenecks, funds were sourced from the Millennium Challenge Cooperation to upgrade the 14 Km stretch of the Highway Network at an overall cost of US $55.7 million (Densu *et al*., 2013). Although the highway has improved the movement of goods and services significantly, travels are still impaired heavily, with road user satisfaction challenges. Accident data available indicates that, barely five years after the highway was commissioned and opened to traffic, road carnages have claimed the lives and properties of many road users. It is estimated that between 2010 and 2014, a total of 1,416 cases of accidents were recorded on the George Walker Bush Highway,

resulting in 149 deaths, 203 injuries that were hospitalized, 278 injuries that were nonhospitalized and 786 that involved damages only (National Road Safety Commission, NRSC, 2014). These devastating trends have caused huge socio-economic stress on affected families, communities and the country at large, thus, raising the concerns of many advocates such as the media, safety experts, local and international researchers

(Densu *et al.,* 2013). Statistics available at the National Road Safety Commission (2007), indicates that Ghana loses over $165 million annually, signifying 1.6% of the country's Gross Domestic Product to road traffic accidents as cited by (Building and Road Research Institute, BRRI, 2006). The high statistical figures are national concern that has called for the need for this study to be undertaken.

1.3 AIM

The aim of the study is to evaluate the level of satisfaction of road users with the George Walker Bush Highway.

1.4 OBJECTIVES

The objectives of the study were:

i. To identify the significant service quality dimensions that influence the satisfaction of road users. ii. To assess road users' expectation and perception of service quality provided by

the road designers.

iii. To assess road users' satisfaction level of the service quality of the GWB-Highway.

1.5 JUSTIFICATION OF RESEARCH

The primary objective of every highway journey is for road users to arrive at their destinations safely. However, this is not the case of many users who travel on the George Walker Bush Highway. The challenges experienced by road users with the highway has resulted in the loss of lives and properties through road accidents which are heavily dwindling down on the nation's scares labor force. Thereby, causing a decline in the country's Gross Domestic Products (GDP). These trends have rendered the country to lose huge sums of money, which could have been channeled to other sectors of the economy. It is estimated that the economic loss due to road traffic accidents is equivalent to 1.6% of Ghana's Gross Domestic Product (Building and Road Research Institute, 2006). The statement of the problem gives indications to the fact that there are road user satisfaction challenges on the George Walker Bush Highway in spite of the huge project investment made by the Government of Ghana and the Millennium Challenge Cooperation. All over the world, huge sums of money are spent on the construction and rehabilitation of road infrastructure and its related facilities. It would be prudent, however, for road agencies to determine if their efforts have yielded or are yielding the intended benefits to the users.

Ideally, satisfaction is determined based on the way consumers or end users sees a product or a service and how they feel about it (Rust *et al*., 1996). It is assumed that the perceptions of road users toward road services or road infrastructure are different. This is mainly based on the fact that the background and cultural settings differ significantly with every road user hence their perceptions about services and the road infrastructure delivered by the road providers differs. Nonetheless, to critically identify and understand the needs and expectations of the customers or end users are essential

either than that the product and service providers will only make assumptions which could result to dissatisfaction (Tschohl, 1996).

Thus, the road agencies ought to identify and understand the elements of the road infrastructure that provides satisfaction to users and those that cause dissatisfaction to them. This enables the road providers to draw effective intervention programs for improving existing and future road infrastructure projects. Atkinson *et al.* (1997) points out that, the success of construction project performance is achieved when the needs and expectations of all stakeholders are met. Thus, this research brings to light the elements of the highway that call for improvement in the users' perspectives in ensuring maximum performance of the highway. The outcomes of this research is expected to bring awareness and improve existing knowledge by evaluating the satisfaction levels of road users of the George Walker Bush Highway and how lessons learned could enhance future designs.

1.6 RESEARCH DESIGN AND METHODOLOGY

Cooper and Schindler (2003), indicated that concluding on the most appropriate methodology in any research development is the next most critical stage after establishing the research questions and the review of literature. The methodology further informs the researcher on the most suitable strategies and techniques to be employed in the study. However, considering the aim and objectives of this study, quantitative research methodology was considered most appropriate research approach for the study. Literature on satisfaction of road users were critically and extensively reviewed. This gave a broader understanding on trends, definitions and features related to road user satisfaction. This led to the identification and adaption of a theoretical framework for the study. A survey was utilized to provide a numeric description of the opinions of road users of the George Walker Bush highway through primary data

collection strategy. The study also adopted postpositivism worldview as the main philosophical stance for the research drawing on the view that correlation analysis lean in the direction of the postpositivism worldview (Liu, 2009; Xie, 2002). The relationship among dependent and independent variables were determined with the use of factor analysis.

1.7 STRUCTURE OF FINAL REPORT

This research comprises of five chapters that has been structured to present a detailed account on how the aim and objectives set for this study were achieved. Chapter 1; presents the introduction and background of the study. The chapter also identifies the problem statement, research hypotheses, aim and objectives as well provides justification for the study and establishes the research methodology applicable. Chapter 2; presents survey on existing body of literature relating to the research topic understudy, preferably from referenced academic articles, reports and customer satisfaction management books. This chapter also provides basic assumptions and definitions of terms and key concepts as applied to the research topic as well as the discussion on the theoretical and conceptual framework adopted for the study.

Chapter 3; discusses the research methodology. It identifies the research approaches, sampling techniques and data collection methods that were utilized. Analytical techniques used and discussions on the reliability and validity of the research were also considered in this chapter. Chapter 4; presents the summary of the main findings of the research, analyses and interpretation of the research results that were acquired from the data obtained from the field. Chapter 5; represents the concluding chapter of the study. It includes future research prospects, conclusion and recommendations made during the course of the research.

1.8 SUMMARY

The statement of the problem of this study gives an indication to the fact that there are road user satisfaction challenges on the George Walker Bush highway in spite of the huge project investment made by the Government of Ghana and the Millennium Challenge Cooperation. Drawing on this assertion the aim and objectives as well as the study methodology were established for the study. This chapter also discussed further the research hypotheses as well as the justification of research. The next chapter presents the relevant literature for the research.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Over the years, there has been a consistent emphasis on the need to prove that public institutions provide value for money by delivering services and products that meets customer needs and expectations (Ramdas *et al.,* 2012). In the road sector for instance, road authorities conduct regular user satisfaction surveys mainly to evaluate user awareness and their satisfaction with the various aspects related to the management of road infrastructure. The surveys also serve as a measure used by road agencies in assessing their performance. This chapter presents a review of literature on customer satisfaction search, definitions, features and perceptions that underlie the study. It also outlines the relevant theories and models that lead to the measurement of satisfaction among road users. The theoretical inferences of the literature review accounted for the development of a suitable conceptual framework and the methodology design for this study.

2.2 NATURE OF ROAD NETWORK IN GHANA

Road infrastructure serves as the pivot for national development and in Ghana it forms part of the government's policy in ensuring that road transportation serves as a means to attain the goals set under the Growth and Poverty Reduction Strategy (GPRS III), as well as in attaining the middle income status by 2020 (MRH Annual Report, 2011). Earlier studies have shown that road transportation constitute the leading carrier of freights and passengers in Ghana. It has been estimated that road transport accounts for 94% of freights and about 97% of passengers, thus, creating the opportunities for people to access various economic and social resource centers (Ghana Investment Promotion Centre Annual Report, 2009).

The Ghana Highway Authority (GHA) under the Ministry of Roads and Highways is tasked with the responsibility for the planning, development, maintenance and administration of highway network in Ghana. The overall stretch of highway network across the country as of 2013 is about 14,536 km (Ghana Highway Authority Annual Report, 2014). The highways in Ghana have been categorized as National Roads, Regional Roads and Inter-Regional Roads (GHA Annual Report, 2014). The National roads are indicated with the prefix N, which link the National and Regional capitals. The National road is of strategic importance thus, linking the main arterial roads to neighbouring countries. The National roads are mainly designed for safer high-speed operations (GHA Annual Report, 2014). Inter-Regional roads are indicated with the letter IR. They are of inter-regional importance; thus providing an inter-regional coherence while the Regional roads prefix with R links the district capitals and major industrials such as, trade and tourist centers among others (GHA Annual Report, 2014). The functional and administrative classification of roads is essential for road management and policy operations. These classifications are important for the purposes of the allocation of jurisdictional responsibility, system planning, allocation of funds, and evaluation of road space needs, road designs, access management as well as in identifying road user needs and expectations (European Road Transport Research Advisory Council, ERTRAC, 2010).

2.2.1 Background Study of George Walker Bush-Highway

George Walker Bush Highway (N1) is a 14 kilometer National route that begins at Tetteh-Quarshie interchange and ends at Mallam Junction. A National road that connects the Southern settlements of the country, from Aflao (Ghana-Togo border) to Elubo (Ghana-Cote d'ivoire border). The strategic location of the road network makes it a vital link between the fast growing areas in the Greater Accra Metropolis through to the Tema Seaport and Kotoka International Airport, and to the final destinations of

most agricultural produce branded for exportation (Millennium Challenge Cooperation, 2012). The stretch of the road functions as a highway through urban settlements, thus serving a multiple purpose functions. The road network is an asphaltic three lane dual carriageway with features such as 2 no. two lane service roads, interchange, six footbridges, three bus bays, twenty-three minor junctions, bicycle lanes and two transport terminals (Ministry of Roads and Highways, 2013). The improvement of the highway has enhanced the socio-economic development of the country significantly. These benefits according to the Ministry of Roads and Highways (2013) includes the following;

- the highway serves as an important National route, Regional and Principal distributor that enhances trans-regional trades.
- the highway serves as a vital export link from Kotoka International Airport, Tema and Tarkoradi Harbours as well as to other business centers of the country.
- the socio-economic activities along the road networks have also developed significantly with rapid development of commercial, residential and social amenities, and businesses.

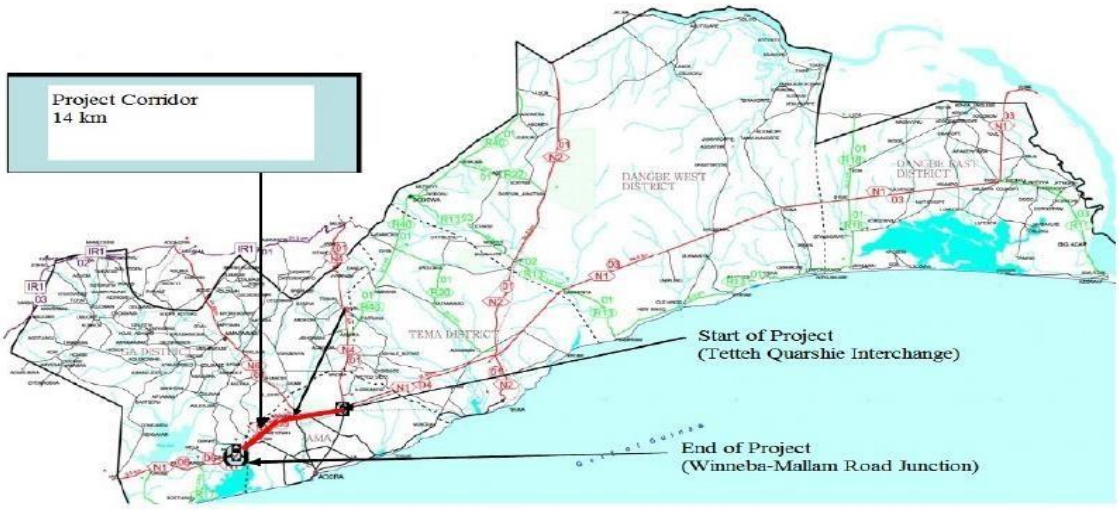

Figure 2.1: The Road Map of Greater Accra Region (Densu *et al.,* 2013)

2.2.2 Actual Customers of the Road Sector

In order for institutions to measure appropriately the satisfaction of their customers, it will be essential to identify exactly those who constitute their customer-based. Generally, a customer is referred to as an individual or group of people who request for a service or a product in an exchange for a fee, however, this perception does not hold entirely with all organizations especially the government institutions (Lodenius, 2011).

The road sector is made up of different customer-based with diverse needs thus, the benefits of quality road infrastructure cannot solely be narrowed to the road users (Lodenius, 2011). In recent times, many road agencies have extended their network operations role by placing considerable emphases on the needs of consumers and infrastructural stakeholders (Hartmann and Hietbrink, 2013). According to Freeman (2010), infrastructural stakeholders are persons or groups capable of influencing or who are being influenced by the performance of infrastructure developments. Parties involved in road projects are usually referred to as stakeholders mainly because of the "stake" they have in the outcome of projects. Schwartz (2006) categorizes these people into the following key groups:

i. Sponsors; individuals and institutions in charge of financing the road agencies' programs (government, donor funded agencies).
ii. Locals; people affected by road project activities (e.g. metropolitan authorities, local transportation agency officials).
iii. Media; correspondents and journalists who share with the public activities of road agencies' operations.
iv. Businesses; those who depend on the road infrastructure as well as other related facilities for the movement of goods, services and commuters.

v. Road industry; those whose occupations are being influenced by road works (staffs, consultants, contractors of the road sector, consultants, researchers).

vi. Activists; individuals and groups who have specific perceptions on how road funds should be disbursed vii. Taxpayers; persons who pays taxes to support government actions (citizens) viii. Facility users; the end users of facilities delivered by the road agencies. These users are sub-grouped into the following:

- Modal constituents (motorists, cyclists, pedestrians)
- Functional constituents (travelers)
- Special populations (physically challenged, aged and children)

The modal constituents are mainly interested in comparative investments in modal solutions, while functional constituents regard time-of-day travels that are accessed as important topics (Schwartz, 2006). The basic reason for community involvement is to determine the opinions of all customers, however, the challenge is that no customer or stakeholder perspectives exist. In the past, the attention of infrastructure providers were simply centered on the satisfaction of clients and other parties partaking in construction projects at the expense of the end users and stakeholders who might be affected by these projects (Hartmann and Hietbrink, 2013). On the contrarily, a widely held assertion underpinning previous studies indicate that the expectations of end users must be achieved, so as to attain an overall satisfaction (Lai and Pang, 2010; Manowong and Ogunlana, 2010; Bourne and Walker, 2006). In identifying satisfaction as a measure of project achievement, it can be said that meeting the expectations and essential needs of the end users and other stakeholders will provide the platform for the projections of successful projects, while the reverse can cause the failure of the projects (Atkin and Skitmore, 2008; Olander, 2006; Chinyio *et al.,* 1998). Researchers in the past have also made attempts to identify the expectations and needs of end users about project and service attributes delivered in construction industries

and the level to which these expectations and needs were attained (Lai and Pang, 2010; Ling and Chong, 2005; Kärnä, 2004; Siu *et al*., 2001; Al-Momani, 2000).

The beneficiaries mostly taken into consideration in the assessment of service and product quality in the road sector have been identified by (Garnhamn *et al.*, 1999) as follows;

- the road users
- external beneficiaries
- the road owners
- the road managers who are tasked with the responsibility of operating and maintaining the road

2.2.3 Categorization of Road Users

The focus of this study is mainly on the road users who travel on the George Walker Bush Highway and for this purpose these groups have been categorized as main road users (motorists) and vulnerable road users (pedestrians). The views of these groups of road users toward the service quality dimensions with respect to the highway were assessed. The vulnerable road users are predominantly pedestrians who are mostly exposed to greater risk, generally because they are unprotected by a vehicle shell. In low and middle income countries for instance, the behavior and mix of traffic characterized with vehicular speeds have accounted for more precarious clashes among the various road user groups (World Health Organization, WHO, 2011). Statistics have shown that vulnerable road users particularly pedestrians contribute to the larger fraction of road traffic deaths in low-income and middle-income countries than in high-income countries. According to the WHO (2011), the mixture of traffic with the various road user groups and the degree of accidents in the low-income and middle-income counties vary considerably from those in high-income countries.

Similarly, the main road users are the group of that compromises mainly of motorized traffic. These group of road users are usually protected with vehicular shell.

2.2.4 Understanding Road Users' Needs and Expectations

The Expectations of customers are usually described as the confidence they have in a specific product or service delivery which also acts as criterion or point of reference based on which performance is assessed (Zeithaml and Bitner, 1996). Studies have shown that customers hold diverse views of expectations about a product or service performance (Zeithaml and Bitner, 2003). In order that road agencies can provide more efficient and safer road network systems, the needs and expectations of road users must be considered in transport policy making processes (European Road Transport Research Advisory Council, ERTRAC, 2010). Walker and Baker (2000) also added that, understanding the nature of expectations and needs of road users can influence the utmost satisfaction levels of the road users. The road users are not only direct beneficiaries of road infrastructure projects but also, individuals that can be affected by the planning, design, construction or maintenance operations which are usually determined by transportation decision makers (ERTRAC, 2010).

Expectations have been perceived as two basic concepts (Yi, 1991). One aspect deals more on global perspective mainly institutional perspective and the other dwelling more on a process internal to the customer. The expectation at this point is the combination of beliefs about the levels of attributes influenced or offered by the product or service. Subsequently, studies have identified that expectations are usually classified into two components; the level of performance expected and the likelihood of receiving that level of performance. Likewise customer dissatisfaction is experienced when the expectations exceed the performance (Wisniewski, 2001). The overall performance of an organization is determined by analyzing the gaps between

customer expectation and the organizational performance (Czarnecki, 1998). The extent of customer satisfaction is attained by determining the gap between customers' expectations and customers' experiences. This implies that customers would always match their experiences with the expectations they have about an organization. Therefore customers tend to be overwhelmed with services or products once their expectations about the services or products have been met. The importance of attaining customer satisfaction can no longer be underrated as many organizations have made it their utmost priority through well designed frameworks (Bergman *et al.,* 1994). According to Figure 2.2, the customer satisfaction equation can be illustrated as follows;

- Understanding customers; in order to achieve customer satisfaction, there is the need first and foremost to understand the customers especially their needs and expectations.
- Customer service techniques; this involves the strategies adopted by the service providers in delivering the desire services to customers.
- Customer focused staff; this consist of enthusiastic staff that are assigned to provide the required services to customers
- Customer focused systems; these are the customer driven systems put in place to provide satisfaction to customers.

In relation to the road industry, understanding the road users especially their needs and expectations as well as adopting strategies that would be used to provide adequate satisfaction to road users are considered most relevant in road users' satisfaction studies. There is also the need to ensure that the employees at the road agencies more especially those at the decision making levels consider road users largely in their decision making processes. The satisfaction of road users can also be influenced by systems that are designed to focus mainly on ensuring the satisfaction of road users. A

summary of the significant features that contribute to the satisfaction of customers has been provided in Figure 2.2.

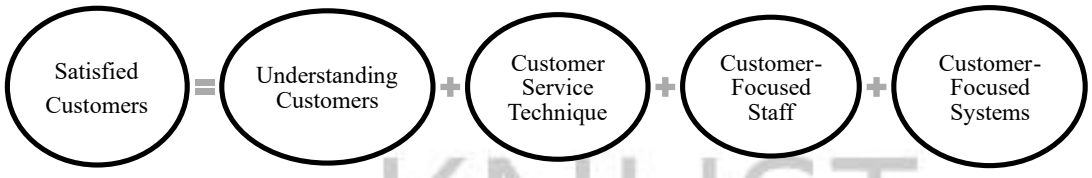

Figure 2.2: Summary of customer satisfaction equation (Redrawn from Craig *et al.,* 1993)

Lodenius (2011), indicates that the extent of satisfaction levels are greatly influenced by the expectations of customers, thus, it has become important to be familiar with how the expectations are established. Generally, many establishments have the ability to influence the expectations of customers toward achievement of optimum satisfaction. Sörenqvist (2000), have identified the following as the significant factors that influence the expectation of customers:

- image and reputation
- marketing and publicity
- prior experience
- importance and awareness
- information from others
- the amount of the product or service

Lotti (1994), added that the features of the customer, such as socio-demographic features (gender, age, habitation, marital status, educational and income levels) are factors likely to influence their expectations about a service or a product. Nonetheless, several customer satisfaction researchers have queried the considerations and attention placed on customer's expectation. The expectations of customers might be imprecise,

unrealistic or inappropriate, as a result, the needs and expectations of customers must be thoroughly determined (Öster, 2008; Matzler *et al.,* 1998).

2.2.5 Perceptions of Road Infrastructure Conditions

According to Ramdas *et al.* (2012), roads are used as a means of getting somewhere; thus, their functionality must be assumed 'fit for purpose'. Ramdas *et al.* (2012), stated that the purpose of every journey is by far more important than just the quality of the road surface, nonetheless, road users make their route decisions based on the surface conditions unless the conditions are exceptionally poor. The ultimate responsibility of most road agencies is to provide mobility and accessibility, by ensuring that road users reach their desired destinations with utmost comfort within reasonable time, at a reasonable cost and with reasonable choices (Transportation Association of Canada, 2006). Perceptions are formed through customers' evaluation of the quality of service and product delivered and their level of satisfaction towards the service or product delivered to them (Zeithaml and Bitner, 2003). Zeithaml and Bitner (2003) argues, that since perceptions may change over time, it will be prudent for businesses and institutions to consistently evaluate customer perceptions.

Generally, there has been a significant growth in the provision of road infrastructure in Ghana. The increase of good road was by 1,009.03 km representing 15.54% from 6,490.1 km in 2013 to 7,499.13 km in 2014 (GHA Annual Report, 2014). The increase in fair roads was by 1,416.49km representing 33.16% from 4,271.4 km in 2013 to 5,687.89 km in 2014 (GHA Annual Report, 2014). There has been a drastic reduction in the length of poor roads by 513.7 km representing 28.92% from 1,776.5 km in 2013 to 1,262.80 in 2014 (GHA Annual Report, 2014). The road network classification are mostly based on surface category which consists of paved surfaces (Asphaltic

Concrete, Rigid Portland Cement Concrete or Bituminous Surface Treated) and Unpaved (Gravel Surfaced and Earth Surfaced) (GHA Annual Report, 2014).The composition of the truck road network by surface category is as shown in Table 2.1

Table 2.1: Composition of Trunk Road Surface in Ghana

Condition Description Surface							
Fair		**Poor**	**Total Type**	**Km**	**%**	**Km**	**Good %**
Km	**%**	**Km**					
Rigid	0.0	0.0	38.6	100.0	0.0	0.0	38.6
Asphalt	1,346.3	61.2	853.3	38.8	0.0	0.0	2,199.6
Surface Treated	3,753.2	63.7	1881.3	31.9	257.3	4.4	5,891.8
Gravel	2,399.6	38.0	2,914.7	46.1	1,005.5	15.9	6,319.8
Total	**7,499.1**	**51.9**	**5,687.9**	**39.4**	**1,262.8**	**8.7**	**14,449.8**

Source: GHA Road Maintenance Division, 2014

Consequently, the improvement in the quality of road infrastructure is assumed to have positive impacts on road users' perceptions just as any other product or service on customers. This forms the basis for this research; to assess if the newly constructed George Walker Bush Highway fulfills this purpose.

2.3 Customer Satisfaction

The significance of the customers who are also referred in this study as road users and their perception towards the highway infrastructure network (i.e. the George Walker Bush Highway) that was constructed by the Millennium Challenge Cooperation (MCC) under the supervision of the Ghana Highway Authority have been discussed further in this section.

2.3.1 Key Definitions of Customer Satisfaction

The definitions of customer satisfaction are diverse and according to Rope *et al.* (1994); to really provide the definition of satisfaction have shown to be challenging and inconsistent due to its numerous diversity. The theories of customer satisfaction has drawn the attention of many academicians and experts for many years in line with the fact that, customers are the principal means of an organization's incomes without the occurrence of the consensual definition of concepts.

Churchill and Surprenant (1982), defined customer satisfaction as the result of the buying and consumption ensuing from buyers' assessment of the rewards and costs of the purchase in relation to the anticipated consequence. Rust and Oliver (1994) and Woodruff *et al.* (1991) also stated that customer satisfaction is an emotional or feeling reaction. Customer satisfaction can also be expressed as the collective effect of perception, evaluation and psychological reactions to the consumption experienced with a product or service (Yi, 1990). The satisfaction of customers can also be described as the general sentiments a customer displayed toward a product or services after they have obtained and used it (Oliver, 1991). Hunt (1991) has also defined satisfaction of customers as the feeling customers express when they are treated properly after purchasing a product or service.

Customer satisfaction as applied in construction has been defined as the ability to understand, manage and influence needs so as to meet or exceed the expectations of customers in accordance with specifications and fitness for use (PMBOK, 1996). Pinto and Rouhiainen (2001) also referred to customer satisfaction as the satisfaction attained when a project successfully meets the needs of its prospective consumers. In a summary, customer satisfaction can be perceived as the fulfilment experienced by customers when products and services they acquire perform its functions as expected. It can also be assumed from literature that, perceptions of customer groups are not the

same thus, they vary from one customer group to the other. As a result, the definitions of customer satisfaction must be linked mainly to how these perceptions are formed among the various groups of customers.

2.3.2 Customer Satisfaction in Construction Context

The main purpose for measuring satisfaction is to collect data regarding either providing feedback on what customers want to be improved or to determine how well an institution is performing regarding the knowledge-based on customers' outmost needs (Vavra, 1997). It has also been established that the most effective and efficient success measure is the "benefits to the customer" as it forms a typical part of all the other dimensions (Lipovestsky *et al.,* 1997). Measurements provide a strong stance for companies and organizations to provide an awareness of the demands as well as the needs of the customers. Similarly, customer satisfaction measurement identifies the concerns that are required to be enhanced and make known the issues that can influence and provide an effective relationship between the organization and its customers.

Thus, businesses and institutions that consistently evaluate customer satisfaction indicate how much they care about their customers and their willingness to improve on their products or services. The measurement of customer satisfaction involves a continuous process with measured and received feedback constituting the basis for ongoing work. The assessment of level of satisfaction can as well be determined based on the priority of each of the parameters to the customers. Most importantly, the basic issues to concentrate on when evaluating customers' needs and opinions are the existing services of the organization, the level of deficiencies the services have and the kind of services that are still misplaced (Krivobokova, 2009; Sandholm, 2000).

In the road and transport sector for instance, customer satisfaction measurement has become one of the effective approaches used to understand road users who frequently make use of the road network. According to O'Conner (1999), the road and transport agencies have become more involved with the public through various project stakeholder involvements, meetings and educational programs. This is partially to understand stakeholder needs and expectations for better project implementations. Customer centered initiatives have extended into other areas of road and transportation services since the formation of the National Quality Initiative in 1992, thus to promote quality road and transportation systems basically by evaluating the performance of critical infrastructure elements (Tuggle, 1994). This has accounted for an improvement in the standards and overall conditions of the road infrastructure over the years.

The opinions and expectations of customers concerning a service have consistently improved with regards to the integration of new information that has led to the update of existing knowledge about the provider. Aaker (1991) modified two beliefs-updating processes to evaluate customer dissatisfaction with grievance management. Woodruff *et al.* (1983) maintained that expectations are standards centered on the understanding with a product and service. Distinct opinions have been formed against six categories of expectations; ideal (Miller, 1977), desired (Spreng and Olshavsky, 1993; Zeithaml *et al.,* 1993); equitable and ideal outcomes (Tse and Wilton, 1988), values (Westbrook and Reilly, 1983), acceptability (Zeithaml *et al.,* 1993; Miller, 1977), and a should-be (Boulding *et al.,* 1993). Six diverse customer satisfaction models have been characterized based on these expectations. However, present studies have agreed on all six models as justifiable, knowing that customers hold diverse expectations concurrently (Spreng *et al.,* 1996). In addition, the consumption of a service or product creates a degree of perceived quality that depends greatly on the level of expectations (Oliver, 1980). Thus, if the perceived performance falls below anticipated

performance, assimilation will transpire, whereas perceived performance will be modified upward to match expectations. Also, if perceived performance falls below expectations then, contrast will occur, and the gap in the perceived performance will be overrated (Vavra, 1997). The nature of a product or service likewise represents an essential part in influencing customer satisfaction.

Research has revealed that customer satisfaction functions center around two significant elements namely; service quality expectations and perception. There have been on-going debates among researchers concerning the distinction among service quality and customer satisfaction. The discussions in literature proposes that service quality and customer satisfaction are theoretically distinctive though relatively closed constructs. Satisfaction has been classified as an antecedent of service quality (Kärnä, 2009). Ojasalo (1999) links service quality with the words evaluation and opinion and satisfaction with the word feeling. Customer satisfaction can be experienced at a specific encounter level or at an entire level of satisfaction or dissatisfaction with a discrete service encountered.

2.3.3 Performance Measurement

Over the years, the challenge of whether or not project success can be measured has been debated and dealt with considerably by many researchers and according to De Wit (1988), measuring success can be complex due to its dependency on the stakeholders' diverse points of view as well as its time dependency. De Wit (1988) believed the perception that, the success of a project cannot be entirely measured. Nonetheless, De Wit (1988), emphasized that it is possible and valuable to appraise construction projects at the post-completion stage. According to Parfitt and Sanvido (1993), project success definitions depend widely on the type of industry, project team, and individuals' point of views which are mostly centered on the basic idea of the

overall achievement of project objectives and expectations. De Wit (1988) stated that a project success can be described as the total achievement made when a project meets the required technical performance specification as well as the satisfaction obtained among the key staff of the organization, project team members and users or clientele of the project. Liu and Walker (1998) described project success at two distinct phases. The first phase defines the achievement of project objectives, thus time, budget, quality specification, safety and environmental sustainability. The second phase defines the satisfaction of the project to its beneficiaries.

Currently, the traditional triple constraints towards customer focus in the construction sector have been improved. Most often, the success of projects is determined by the level of accomplishment of project goals, expressed in terms of duration, cost and quality. A study by Chan and Chan (2004) provides the key performance indicators for determining project achievements. Research by Chan and Chan (2004) made reference to both traditional "hard" measures as well as 'softer' objective measures. According to Chan and Chan (2004), the quality, functionality, end user's satisfaction, client's satisfaction, design team's satisfaction, as well as the construction team's satisfaction can be referred to as subjective measures which is in contrast to objective measures such as project duration, unit costs and net present value. These performance pointers provide broader perception on the achievements of projects. This research work focuses mainly on the beneficiaries, that is, road users of road infrastructure projects with specific reference to the George Walker Bush highway.

2.3.3.1 Project Success Components

Pinto and Slevan (1994), argues that a project can only be described as fruitful when the project meets the needs of its prospective consumers. Pinto and Slevan (1994), stated that the measure of successful project is mainly based on its effectiveness and

efficiency. The efficiency measures refer to a resilient managerial and internal organizational structure which is characterized by the objectives set under the project thus, its adherence to time, budget and quality. Project success has been categorized into two main constituents, namely project management success and project product success (Baccarini, 1999). The differentiations between the two components according to Baccarini (1999) are as follows;

2.3.3.1.1 Project Product Success

Pinkerton (2003) indicates that there is a close connection between the outcomes of project management and project product success, however, the fundamental relationship surrounding these two elements is regarded inefficient. This implies that overtime and / or over budgeted projects can be considered project management failures although the outcome of the project can be a success (Pinkerton, 2003; Baccarini, 1999). This component of project success primarily focuses on the impacts the project has on its end users. Despite the fact that, project product success can be separable from project management success, their optimistic results are inseparably connected. Pinkerton (2003), argues that unsuccessful venture will definitely result in unsuccessful project.

2.3.3.1.2 Project Management Components

On the other hand, project management success involves mainly the project management process which places much emphasis on the project accomplishment with respect to project cost, duration and quality. Therefore the degree of the 'efficiency of project execution' is mainly based on these three dimensions (Pinkerton, 2003). The three dimensions; time, budget and specifications have been mentioned in several project management success definitions (see. Thomsett, 2003; Globerson and Zwikael, 2002; Redmil, 1997; Blaney, 1989; Duncan, 1987). According to Schwalbe (2004) and

Baccarini (1999), to actually indicate a more comprehensive understanding of project management success, the quality of the management process and stakeholders satisfaction must be well-thought-of.

2.3.4 Features of Customer satisfaction in Construction Industry

Customer satisfaction as applied in the construction industry can be established as the level to which a physical facility and a construction process are encountered. Kärnä, (2009) has emphasized the need to focus on the essence of understanding, assessing and managing the expectations of clients and stakeholders so as to meet the project goals. Barret (2000) has indicated that end users of construction projects are deemed to be satisfied when their expectations about the quality of construction projects are fulfilled. Barret (2000) has also placed emphasis on the significance of ensuring corporate relationships among project stakeholders so as to attain quality. Furthermore, the client's participation has been proven to have significant consequences on the outcome of the construction projects. The client has an important role in ensuring that project outcomes benefit all beneficiaries and stakeholders. The relationship between project interaction and performance indicators has been extensively understudied by (Pocock *et al.*, 1996). Pocock *et al.* (1996) observed that projects with minimum collaboration among project stakeholders stands the chance of recording huge variations in terms of cost, scope and time while projects with maximum collaborations account for a more effective and consistent performance outcomes and achievements.

In addition, customer relations are non-recurrent and dynamic in the construction industries. The contractor's customer relations have been characterized into two distinct dimensions. The physical outputs of construction projects are usually produced

by the contractor and then utilized by the end users in addition to the diverse service processes the contractors offer to the parties requesting for the project. Generally, the supply systems of a construction project become extremely challenging due to the differential nature between the owner and users of facilities. Usually, organizations create systems based on which they can maximize their profit margins as a result of upgrading the management of project operations as well as delivering quality product and service packages to the project beneficiaries. Kärnä (2009) maintains that customer chain in construction are mainly constituted by the user, the client, the designer(s), main contractor and the subcontractors. Similarly, Pekkanen (2005) argues that the construction project is a multilevel entity with various participants from both the client and contractor side tasked with diverse responsibilities.

One of the fundamental features of service is the fact that customers to some level partake in the service's production process (Gronroos, 2000). In relation to construction activities, the customer participates in different aspects of the construction processes based on the form of operations. Notwithstanding, the arguments in literature concerning the significance of collaboration in the construction industry, the importance of contractor's service offered in the construction industry cannot be valued much except the customers (the client, end users and other stakeholders) get involved in the construction processes (Yasamis *et al*., 2002; Torbica and Stroh, 2001).

2.3.5 Utilization of Customer Satisfaction Feedback in Construction

Generally, the collection of feedback and the evaluation of the overall customer satisfaction in the construction industries are mainly done after the project has been completed. However, customer feedback tools can be utilized at all levels, for instance, in creating strategic techniques such as customer relationship management and

benchmarking (Kärnä, 2009). The customer feedback data can be useful in resolving customer grievances as well as scrutinizing critical issues. Additionally, operational studies and overall satisfaction analyses are discrete concepts that are useful in establishing an organizational-customer feedback system. Several customer feedback systems have been predetermined to flop in advance even before operations (Barnes, 2003). Thus, feedback system is a vital measure of an organization's communication system without which no establishment can excel (Kärnä, 2009). There is the tendency for any organization to make error and most likely the errors recur without any efficient feedback system. An organization could receive feedback occasionally within the organization as well as from customers, nonetheless, it is essential to establish an effective means to collect feedback (Kärnä, 2009). Feedback is essential for acquiring knowledge within construction industries at the project level as well as at the organizational level. Feedback received on time can help to avert difficulties from emerging as well enable rapid responses in finding solutions to problems. An organization can anticipate the chances in the business environment and trends of complaints among their customers through a well operative feedback system. Thus ensuring well-designed communication networks at the company level as well as the communication skills at the various levels in construction industries cannot be understated although, this has proven to be challenging as a result of the nature of the construction industry.

According to Kärnä (2009), in adopting project feedback system as a mode for learning in the construction industry, it is essential to group the learning process into four dimensions; individual learning, construction team learning, organizational learning and relationship learning. Kärnä (2009), stressed that the feedback information system and the learning aspects differ in all four dimensions, for example, at the individual level; the goal of learning is to improve professional proficiency, at the construction

team level; this is useful in enlarging the teams' internal co-existence, at the company level also; the learning process is useful for the growth of organizational competency and finally at relationship level; it is useful to boost coordination as well as customer satisfaction.

2.3.6 Public Involvement in Infrastructure Developments

Contrary to the operations of some industries, the construction industry stands the chance of experiencing a greater influence from the delivery of end products. In relation to some industries, the products and services produced are usually utilized and do not have the tendency to last longer, nonetheless, the effect of construction can be felt by everyone for a much longer time (Takim and Akintoye, 2002). The construction industry has the capacity to transform the societies and surroundings where they are being undertaken (Moodley and Preece, 1996). Thus, there is the need for the societies and the construction industries to share in the potential benefits of a close corporation so that completed projects can be utilized adequately and effectively.

The road construction like any other infrastructure involves unique phases. The road is mainly to serve people in the community by aiding movements from one destination to another. Therefore, in order that road infrastructure are utilized appropriately the community and the general public must be involved throughout the pre-construction and post-construction phases. According to Moodley and Preece (1996) the involvement of the community or the general public can be possible through the following ways;

- Commitment through representatives
- Participating in the identification and definition of user needs
- Sharing of ideas and requirements
- Participation in decision making processes

The importance of public involvement in project development is enormous, example in 2006, the American Department of Defense requested the Army Corps of Engineers to develop the Mississippi Coastal Improvement Plan (MsCIP) for strengthening the Mississippi Gulf Coast counter to storms such as Hurricane Katrina (Burde, 2008). However, instead of performing the activities by themselves, the MsCIP team engaged the general public in the development of the plan. The team gathered valuable feedback from the public through the extraction of ideas and opinions that was used to develop construction proposals. Bergeron (2007) as cited by Burde (2008) indicates that the discernible nature of the process contributed to the involvement of the public in the initiative through to the support of the projects delivered by the MsCIP team. Figure 2.3 demonstrates a generic approach adopted by the New Jersey Department of Transportation for the construction sections of their roads. Every single attribute satisfies a public concern or needs.

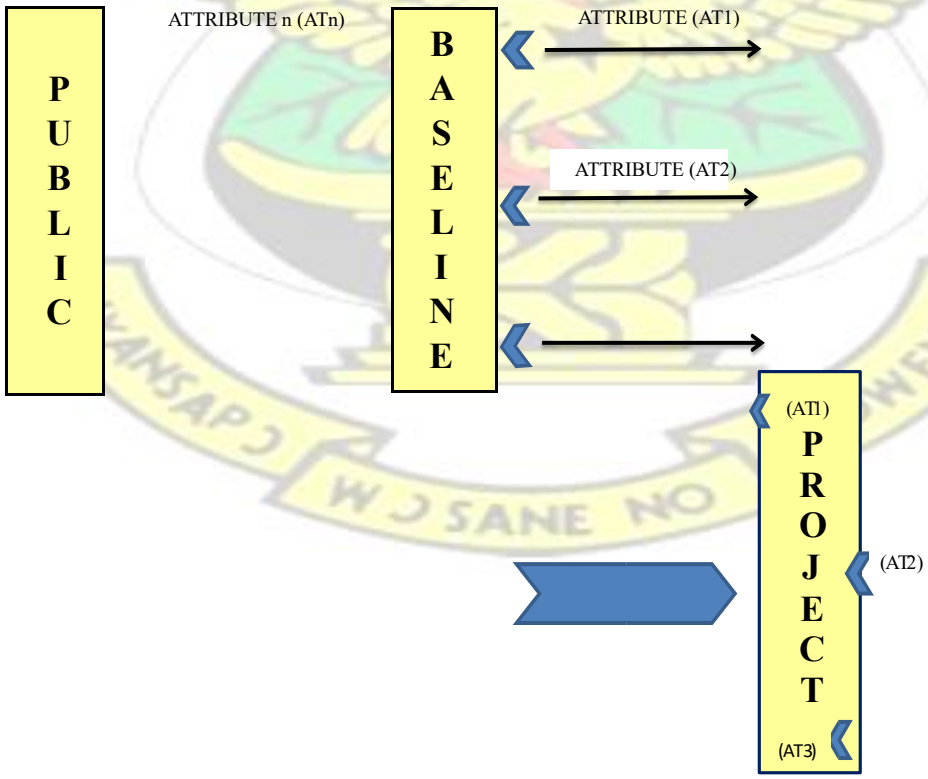

Figure 2.3: Public involvement in Context-Sensitive Design (Burde, 2008)

Through effective public hearings and community representatives, project teams can acquire relevant information on how the public perceives the impact of projects on the communities. The needs and concerns are usually converted into attributes of the projects (Burde, 2008). These attributes are then identified in the final designs to assists road administrators and agencies to evaluate the impact of the projects from the user's perspective.

2.3.7 Customer Satisfaction Measurement Processes

Measurement of customer satisfaction is an essential step in boosting customer service or product satisfaction. Several related studies have revealed this approach is exceptionally essential for both product development as well as organizational improvement support. The processes involved in measuring customer satisfaction may depend largely on the organizations or companies offering the services or products. The measurement process is also important in providing a better knowledge of the customers so as to improve the ability to provide an enhanced services and products to these customers. A typical measurement process proposed by most customer-based researches is as follows;

- identification and reflection of organization's customers and the service or product to offer
- collecting prior data on customers
- assessing customer's understanding
- analysis of customers' data as well as establishing customers' perceptions establishing achievable strategies and making known the planned strategies

- instituting strategies to enhance the service (King County Strategic Plan, 2010). A summary of customer satisfaction measurement and improvement processes is provided in Figure 2.4.

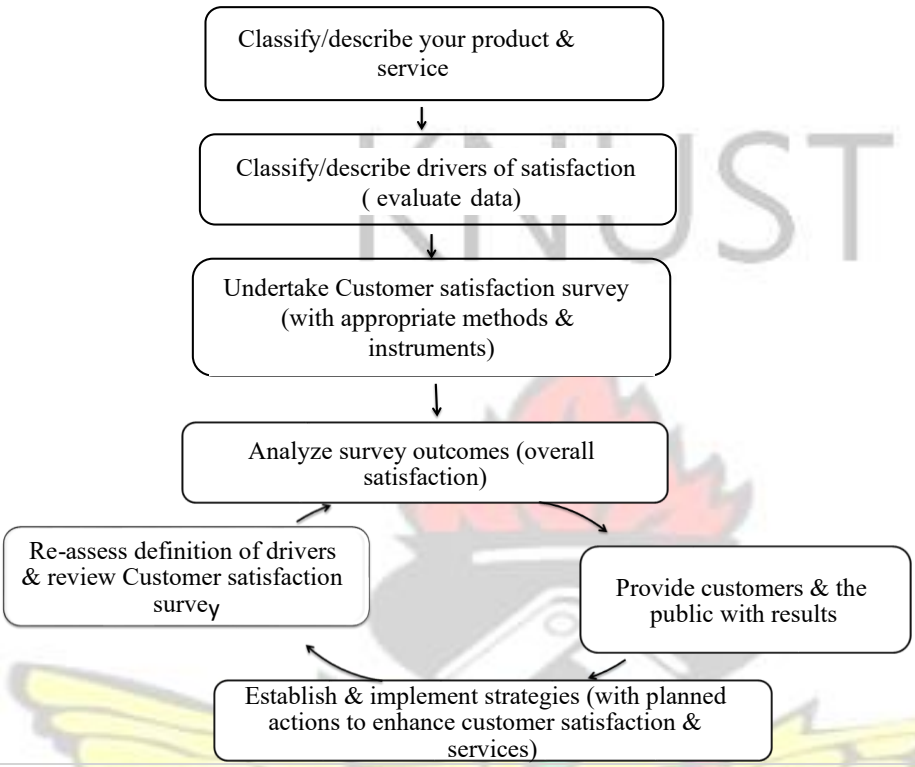

Figure 2.4: A typical example of Measurement and Improvement Processes (King County Strategic Plan, 2010)

Nowadays, the measurements of customer satisfaction have served as an important part of research for various organizations and businesses. Lodenius (2011) indicates that if the measurement does not echo the ambitions and objectives of the institution, then, it can be considered insignificance, hence, does not contribute to any improvement of works and services. Notwithstanding, the organization needs to define their long-term objectives as well as develop them so it can be assessed and adhere to by the sponsors and parties involved (Czarnecki, 1998). The road industry like any other business ventures can also develop or adopt measurement processes that seeks to provide the desired satisfaction to road users. The measurement and improvement processes provided in figure 2.4 above

gives a clear outline of activities and implementation strategies that can be modified to enhance the satisfaction of road users.

2.3.8 Importance of Customer Satisfaction Measurement

Measurement is an essential requirement particularly in controlling a product or service quality (Morrison, 1994). Therefore, it is important to indicate that a business or an institution cannot progress or transform what it has not measured. Lord William Thomson Kelvin (1824-1907) in his quote stated that "if you cannot measure it, you cannot improve it". Over the years, customer-related researchers have adapted standardized procedures to understand market and business operations as well as developed new expertise to listen and establish data to inform and understand each individual customer so that engagement can be tailed to each person (Gordon, 2000). Gordon (2000) outlined some of the tools companies use to listen to customers as;

- Call center conversations
- Customer complaints
- Customer councils
- Customer feedback to staffs
- Customer focus groups
- Customer assessments
- Feedback or comments on website
- Online communication
- Suggestion cards
- Social media

The advantages of customer satisfaction are mainly related with an increased in customer loyalty, future sales, as well as constructive vocal interruption (Molinani *et al.,* 2008; Jones and Sasser, 1995; Cronin and Taylor, 1992). Researchers within the

business fraternity have done extensive studies in the area of customer satisfaction measurement. According to the various studies and publications, almost all the researchers have come to a conclusive agreement that satisfying the needs and expectations of customers can lead to tremendous benefits for service or product providers. Their thoughts are outlined below;

i. Customer satisfaction leads to durable consumer associations that have been established to be cost-effective for organizations (Storbacka *et al.,* 1994) ii. Fulfilled consumers can accept the increased prices of service or product

(Fornell, 1992) iii. Emerson and Grimm (1999) and Lin and Jones (1997) stated that Customer satisfaction can also be used to ascertain the key strength and weakness in product or services operations with critical emphasis on improved systems and strategies. Smart organizations over the years have used customer satisfaction as a measurement tool to determine their level of performance and acceptance among their customers and business partners.

iv. Depending also on the business outlook, customer satisfaction might as well be employed to assess the degree of customer loyalty that is essential for long – term profits (Gronholdt *et al.,* 2000).

v. McColl-Kenedy and Schneider (2000), indicates that evaluating customer satisfaction cannot be assumed as a complete unbiased action, but rather an intervention. Studies has also shown that customers' opinions regarding the measurement of satisfaction are likely to be influenced by the evaluation procedures.

vi. Customer satisfaction is fundamental to customer segmentation

(Athanassopoulos, 2000).

vii. Customer satisfaction measurement can allow the service or product provider to match the achievement of its business entities at different time periods and locations (Jones and Sasser, 1995).

viii. Customer satisfaction measurement can be beneficial in measuring the efficiency of efforts to reform components of the product and service delivery operations (Chase and Bowen, 1991).

The measurement of customer satisfaction can also provide the opportunity for organizations and institutions to learn extensively about their customers. The need to understand customers cannot be underrated mainly within the road industry. The nature of the road infrastructure is such that users of the facility makes use of it more frequently than they do to other products and services. Generally, the improvement in standards and the overall conditions of road infrastructure has accounted for the high expectations among road users (Lodenius, 2011). This has resulted in the high demand for the evaluation of the road infrastructure conditions and quality as well as the needs and perceptions of road users (OECD, 2001).

2.3.9 Physical Environment

The physical environment consists of the space that customers are surrounded with when consuming the service/product. This implies that for a meal, the physical environment will be the restaurant and for a journey the physical environment shall be the road infrastructure the road users travel on. According to Zeithaml (2000), the physical environment comprises of the ambient conditions; spatial layout and functionality; and signs, symbols, and artifacts. Subsequently, the satisfaction of road users is mainly influenced by several of these physical features/evidences. According to Himachal Pradesh Public Works Department (2007), parking facilities and public toilets are the most relevant issues that can affect the satisfaction of respondents sampled. A similar study conducted by Wardhana *et al.* (2011) indicates that road

infrastructure is a significant feature that affects satisfaction of road users on the two national roads in Saga, Japan. Socio-demographics, experience of road conditions, travel purpose, tip frequency, and driving habits were the main influential factors identified by Ettema *et al.* (2013). Ettema *et al.,* 2013 reveals that the design of highways mostly affects satisfaction of most drivers. A survey conducted by the Karnataka State Highway Improvement Project (2004), also reveals that the average scores of satisfaction of respondents were highest on quality of road surface and road signs and their least satisfaction were on air and noise pollution.

This gives an indication that, the expectations of most road users are mainly formed based on the physical features/evidence of the road infrastructure. According to Suanmali *et al.* (2015), expectation is a criterion that customers use in evaluating service providers or service quality. The study of road users' satisfaction of GWBhighway has combined the physical features/evidence identified in previous researches together with new features that fit the characteristics of the highway understudy.

2.5 DEVELOPMENT OF THEORETICAL AND CONCEPTUAL FRAMEWORK

This chapter presents the theoretical and conceptual framework within which the study was undertaken. The theories underpinning the study are thoroughly and clearly discussed in this chapter. The key philosophical consideration upon which the conceptual framework was founded are also presented. Three of the five service quality dimensions developed in the SERVQUAL model were adopted and conceptualized into the framework. The three service quality dimensions adopted are; Responsiveness, Reliability and Assurance. The remaining two service quality dimensions; Tangibility and Empathy were excluded since they did not reflect the

purpose of the study. The modification of the quality dimensions included the addition of new features to reflect the road infrastructure services.

2.5.1 The Theoretical Framework

This refers to the set of assumptions, philosophies, conceptions and models that provide the foundations to the themes identified in the study and as well establish their relationships (Creswell, 2009; Maxwell, 2004; Robson, 2002). The theoretical framework considered in this study dwells on the SERVQUAL and the Service Quality Gap instruments. Even though, these instruments are mainly utilized in the service industries, the research seeks to modify its application in the construction industries especially the road sector. The framework was modified to reflect the features of the road infrastructural service dimensions. The SERVQUAL and Service Quality Gap instruments have been discussed further in this chapter.

2.5.1.1 The SERVQUAL Model

Earlier studies have shown that, the model mostly used for evaluating satisfaction of customers and service quality is the SERVQUAL model. The model was developed by Parasuraman et al. (1988) to measure the satisfaction among customers (Parasuraman *et al.,* 1994; 1988). According to the SERVQUAL model, the customer's expectations constitute the standard pertaining to which the consumer appraises the experience on the services received. Accordingly, the customer is fulfilled when the experience exceeds the standard and displeased when their experiences of service quality fall below the standard. The central focus of the model is to define service quality gaps by evaluating both perceptions and expectations of customers (Lotti, 1994). Consequently, researches such as (Ramsaran-Fowdar, 2007; Buttle, 1996) have criticized the functionality of SERVQUAL model both on theoretical and operational grounds. Nonetheless, excessive emphasis has been placed on interaction at the expense of other service dimensions (Cronin and Taylor, 1992). The main challenges mentioned in most studies are the

applicability of the five SERVQUAL dimensions to the various service settings. However, similar studies undertaken by other researchers could not provide a theoretical backing for the fivedimensional tool as was established by Parasuraman *et al*. (1994) in their development of SERVQUAL (Ramsaran-Fowdar, 2007). Similarly, the SERVQUAL model has

received criticism for the addition of expectations as a construct in evaluating service quality (Boulding *et al.,* 1993). The disapproval commonly identified in most researches are based on the inconsistent relationship between satisfactions and perceived service quality (Duffy and Ketchard, 1998). However, a different model (SERVPERF) was later established with regards to the findings that service quality cannot solely be centered on expectations but can be directly evaluated by simple performance-based measurement of service quality (Cronin and Taylor, 1994). The SERVQUAL model is centered on five dimensions of service:

- Tangibility; this refers to the physical features related with the service encounter (Mohsin and Ryan, 2005). Churchill and Peter (1998) indicates that customers look for quality in the machinery, facilities and communication used to provide the service or product.
- Reliability; the ability of the service provider to deliver precise as well as reliable services; constantly carrying out the service appropriately (Bitner and Zeithaml, 2003; Kotler *et al.,* 1999). Churchill and Peter (1998) added that customers desire consistent and reliable performance.
- Responsiveness; an organization's preparedness to support its consumers by offering quick and efficient service performance (Kotler *et al.,* 1999; Bitner and Zeithaml, 2003). Additionally, customers expect to see the willingness and preparedness of service/product providers to perform (Churchill and Peter, 1998).

- Assurance; this refers to the different characteristics that provide confidence to consumers. Assurance indicates the understanding and consideration of employees and their ability to ensure trust and confidence (Bitner and Zeithaml, 2003; Kotler *et al.* 1999).
- Empathy; an organization's willingness to offer each consumer with personal service (Halil and Kashif, 2005). Kotler *et al*. (1999), Bitner and Zeithaml (2003) added that companies and organizations must provide care and individualized devotion to the customer.

2.5.1.2 Service Quality Gap Model

The service quality gap model has been described as an extension of the SERVQUAL model that consists of seven main gaps in the service quality theory (Parasuraman *et al*., 1985). The service quality gap model incorporates the opinions of customerorganization relationship. It is centered on fundamental study among several service providers in the service industries. In relation to the service quality gap model, this study focuses more on the perception gap (Gap 5) which comprises of the gap between road users' perception and expectation of the George Walker Bush highway. Figure
2.5 shows the service quality gap model.

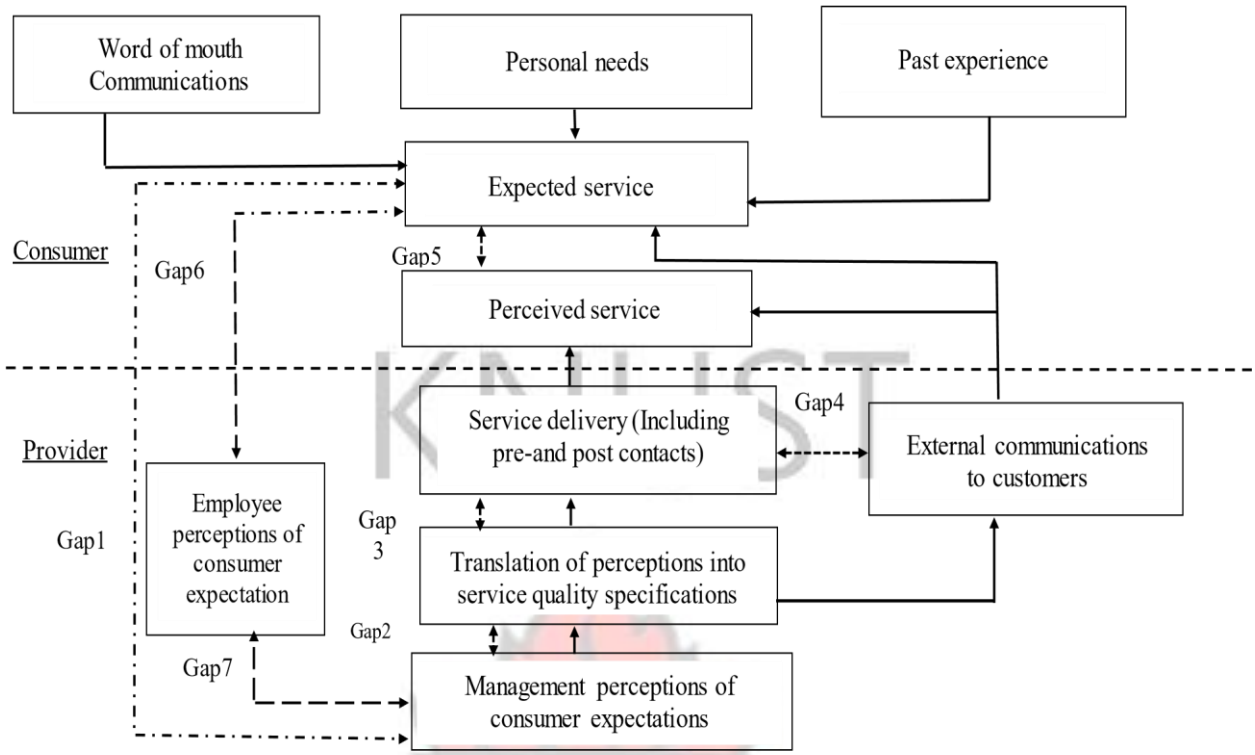

Figure 2.5: Service Quality Gap Model (Parasuraman et al., 1988)

The service quality gap model identified seven significant inconsistencies or gaps involving management opinions of service quality, and responsibilities attached to offering services to customers. Gap 1, Gap 2, Gap 3, Gap 4, Gap 6 and Gap 7 are considered as functions of how service is delivered, while Gap 5 relates to the customer, thus regarded as the exact assessment of service quality. Subsequently, prior researches in service quality have identified Gap 5 as one of the Gaps mainly influenced by the SERVQUAL methodology which basically indicate the differences that exist among customer expectations of service quality and customer perceptions of the institution's performance. The Gap model does not only provide a rigorous description of the significant factors of the Gaps but also outlines the key indicators for each gap. A summary of the generic breakdown of these indicators are provided in Table 2.2.

Table 2.2: Key Factors in the GAP Model Gaps	Key Indicators (drivers)
Gap 1	Insufficient market study orientation Deficiency in upward communication Inadequate relationship focus
Gap 2	Deficiency in customer focused ethics Lack of service management Poor service strategy
Gap 3	Lack of human resource strategies Failure to match supply and demand Customers not fulfilling roles
Gap 4	Inefficient management of customer expectations Overpromising Insufficient horizontal communications

Source: (Zeithaml *et al*., 1990)

This extent of awareness permits useful exploration of the significant factors contributing to a perception gap at a practical level. The quality of a service perceived by customers will vary depending on the approach adopted by organizations in delivering and promoting those service (Gronroos, 1982). The service quality model by Gronroos (1982) proposes that the quality of service perceived by customers may be categorized into technical quality and functional quality dimensions. The technical quality refers to the fundamental condition for an absolutely perceived total quality, whereas, the functional quality presents a competitive edge (Gummesson and Gronroos, 1987).

2.6 DISCUSSION ON THE CONCEPTUAL FRAMEWORK

The research centers mainly on the gap 5 of the Parasuraman *et al.* (1988) model, which was modified to assess the perception and expectation of road users. Parasuraman *et al.* (1988) proposes that the lesser the gap between the expected service and perceived service, the greater the satisfaction levels of service obtained. The conceptual framework for the purpose of this study adopted only three (3) of the dimensions developed by Parasuraman *et al.* (1988) in the SERVQUAL model. The two service dimensions, Tangibility and Empathy were excluded because their functionality cannot be applicable to this study. The three (3) dimensions; Responsiveness, Assurance and Reliability represent the functional service quality dimensions provided by the road agency. The technical dimensions on the other hand, comprised of the physical features of the road infrastructure. According to Taylor and Baker (1994), the service quality dimensions differ from one institution to the other. Therefore, there is the need to incorporate new features based on generic and suitability of the service industries under consideration. The conceptual framework postulate that the *technical* and *functional service quality dimensions* have a significant influence on the overall satisfaction of road users. Based on this assumption, a conceptual framework was developed by adopting and modifying the SERVQUAL and the Gap Service Quality instruments. The conceptual framework is illustrated in Figure 2.6.

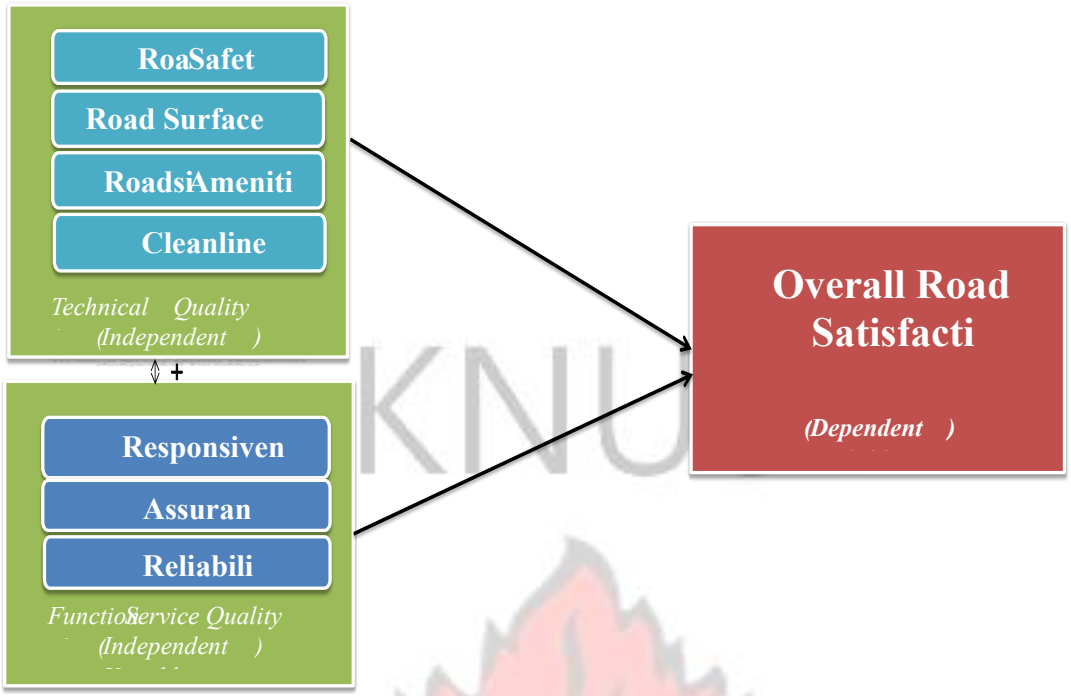

Figure 2.6: Conceptual Framework

The research framework proposes that there is significant relationship between the technical service quality dimensions and the overall satisfaction of road users. The framework also proposes that there is a significant relationship between the functional service quality dimensions and the overall satisfaction of road users. The SERVQUAL and Gap Service Quality models were adapted in the current research to reflect the attributes of the road agencies offering the road services and features of the road infrastructure as the service/product been delivered. These modifications are necessary particularly in affirming the validity as well as the reliability of the instruments (Parasuraman *et al.,* 1988). The modifications are also important because unlike the road sector, the SERVQUAL and Gap Service Quality are mainly applicable in the service industries such as the Hotels Management (Saleh and Ryan, 1991), Restaurants Operations (Lee and Hing, 1995), Banks (Babakus and Glynn, 1992), Telecommunication Providers (Tyran and Ross, 2006; Sureschander *et al.,* 2002; Hoffman and Bateson, 2001; Stafford *et al.,* 1998) Properties (Zarita, 2006 and Seiler, 2004), Railway service (Lim and Low, 1998) among others. Therefore, the

modification was made to include road infrastructure features such as road safety, road surface condition, roadside amenities and cleanliness in order to reflect the nature of the road agencies. Tables 2.3 and 2.4 below give the definitions of new features of functional quality and technical quality constructs used in evaluating motorists of GWB-highway.

Table 2.3: Functional Constructs and Service Dimensions used in the study

Functional	Service Quality Dimensions Construct
Responsiveness	Willingness to address road users' needs
	Promptness in addressing road users' concerns
Assurance	Experienced staff at the road agency
Considerate staff at the road agency	
Reliability	Ability to implement planned road services consistently
	Ability to perform promised road services accurately

Table 2.4: Technical Constructs and Service Quality Dimensions used in the study

Technical	Service Quality Dimensions Construct
Road Safety	Street lights
	Traffic Control Device
	Traffic Barriers
	Road Signage
Road Surface Condition	Non-defective road surface
	Free flow of runoffs
	Noise pollution
	Air pollution
Roadside Amenities	Parking Areas & Bus Stops
	Drainage Structures
	Landscaping Maintenance

	Service Lanes Accessibility to Social Facilities
Cleanliness	Road surface Drains, Culverts etc. Footbridges Parking Areas & Bus Stops

2.7 RESEARCH HYPOTHESES

Drawing on the relevant literature of the study, the following hypotheses are developed to evaluate the performance of the GWB-Highway in the perspective of the road users. The hypotheses of the study are as follows:

Hypothesis 1

H_0: There is no significant relationship between road safety and road user satisfaction

H_1: There is a significant relationship between road safety and road user satisfaction

Hypothesis 2

H_0: There is no significant relationship between road surface condition and road user satisfaction

H_1: There is a significant relationship between road surface condition and road user satisfaction

Hypothesis 3

H_0: There is no significant relationship between roadside amenities and road user satisfaction

H_1: There is a significant relationship between roadside amenities and road user satisfaction

Hypothesis 4

H_0: There is no significant relationship between cleanliness and road user satisfaction

H_1: There is a significant relationship between cleanliness and road user satisfaction.

Hypothesis 5

H_0: There is no significant relationship between responsiveness and road user satisfaction

H_1: There is a significant relationship between responsiveness and road user satisfaction

Hypothesis 6

H_0: There is no significant relationship between assurance and road user satisfaction

H_1: There is a significant relationship between assurance and road user satisfaction

Hypothesis 7

H_0: There is no significant relationship between reliability and road user satisfaction

H_1: There is a significant relationship between reliability and road user satisfaction

2.8 SUMMARY OF RELATED STUDIES AND GAPS IN KNOWLEDGE

Following Creswell (2009), a review of related studies enables a researcher to identify the methodologies employed and findings of other related studies. This informs the researcher on the on-going dialogue in literature, the gaps to fill and extension of existing knowledge (Cooper and Schindler 2006; Marshall and Rossman, 2006). Against the background discussions in literature, it was clear that there were grey areas to be explored in the customer satisfaction studies, especially, the dimensions that influence the satisfaction of road users. A summary of related studies and gaps in knowledge is presented in Table 2.5.

2.9 GAPS IN KNOWLEDGE AND THE WAY FORWARD

Studies conducted by Suanmali *et al.* (2013), Ettema *et al*. (2013), Wardhana *et al.* (2011) and Basri (2008) have revealed insightful discussions on the identification and assessment of factors that influence the satisfaction of road users. The assessment of service quality dimensions are noticeably applied in the service industries, to this end, there is the general gap of lack of extensive researches on the satisfaction studies of

road users. Based on this assumption, the research topic was further explored in an effort to bridge the knowledge gap identified.

2.10 SUMMARY

This chapter presented a review on road users' satisfaction and its inherent features. It also outlined the theoretical and conceptual framework underpinning the research. The conceptual framework was based on two distinctive service quality models; the SERVQUAL and the Service Quality Gap model. The SERVQUAL model has five service quality dimensions based on which customers' satisfactions are measured whereas the Service Quality Gap model consist of seven main gaps in the service quality concepts. The features of these models were modified to reflect the characteristics of the road services and the road infrastructure. The next chapter presents the research methodology and techniques considered suitable to achieve the aim and objectives set for the study.

Author	Study Area	Gaps in Knowledge
Densu *et al.* (2013)	The researchers assessed the compliance of pedestrians and motorists towards the safety regulations of the GWB-highway (N1). In their findings, road user behavior was identified to be the significant contribution to road safety of the N1 highway.	Their findings focused solely on the safety aspects of road users. Subsequently, the study did not give account of how other features of the road affect road users.
Lodenius (2011)	The author focused his work on assessing international practices used by 8 road authorities in different countries. Their findings showed that many more Organizations are employing CSM as an indicator of their performance.	Although the study highlighted the need for developing feedback systems, it was thus, silenced on what actually constitute the satisfaction of road users.
Whigham (2009)	The author focused his research on assessing the satisfaction level of road users with UK Highway Agency's Services. The study identified road maintenance, congestion and road signage as some of the essential indicators for evaluating satisfaction of road users.	The findings were solely based on the technical dimensions services. Thus, there was the need to investigate how the operational functions of the road agencies influence the satisfaction of road users.

Source: Author's summary from literature

Table 2.5: A Summary of the Review of Related Studies and Gaps in Knowledge

CHAPTER THREE

MATERIALS AND METHODS

3.1 INTRODUCTION

In addressing research objectives and questions, researchers must adopt suitable research design and methodology that can assist in reducing the complexity of the research (Marczyk *et al.,* 2005). This chapter provides details of how the research was designed and implemented to achieve the research objectives

3.2 RESEARCH DESIGN

This constitute the strategies and techniques that extend from general perspectives to comprehensive approaches used for gathering and analyzing the research data (Creswell, 2009). The design for this study is presented in three (3) sections. Section 3.2.1 presents the philosophical consideration of the study whiles section 3.2.2 presents the strategy of inquiry employed. Section 3.2.3 outlines the research methods utilized in the collection of data, analysis and interpretation of results. The development of an appropriate research design and strategy for this study was essential because it provided a firm foundation in addressing the objectives and aim of the research. Figure 3.1 presents a framework for the research design.

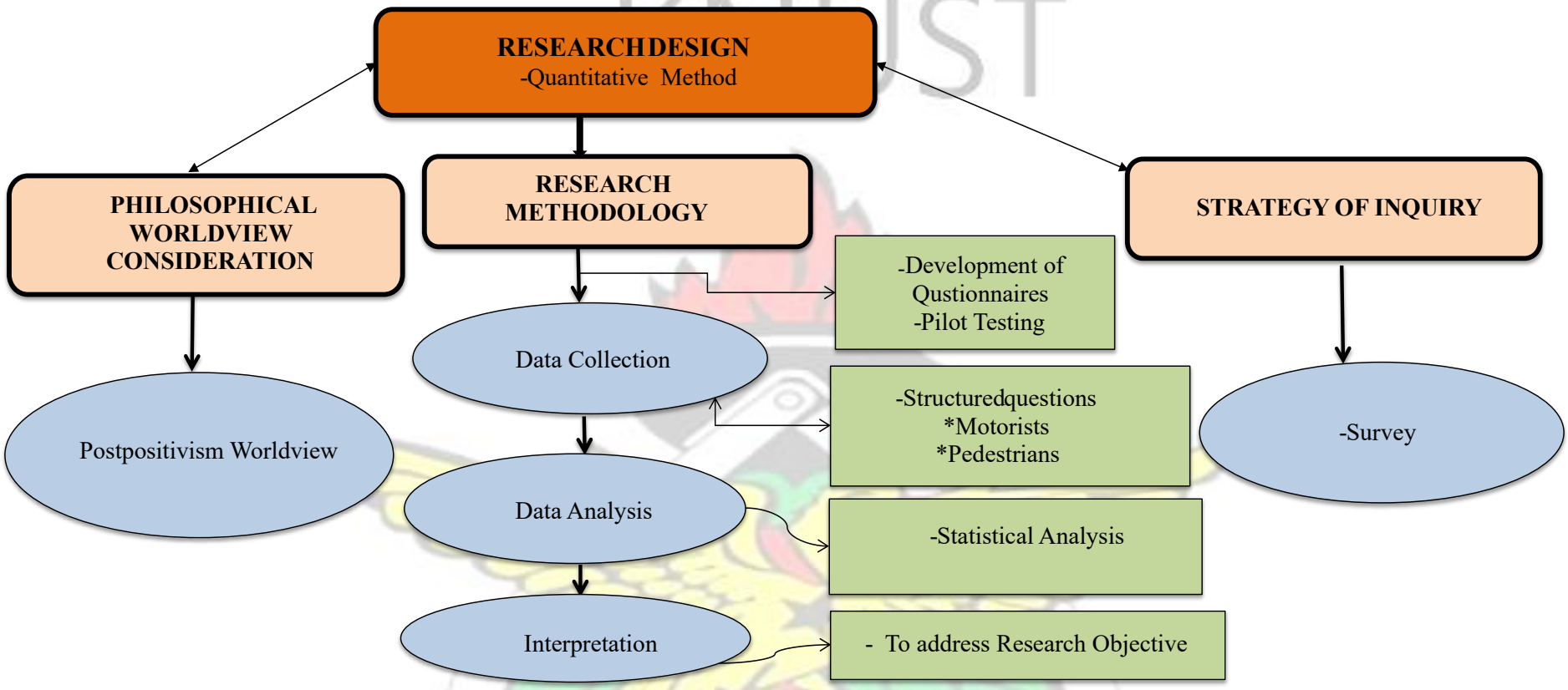

Figure 3.1: A Framework for the Research Design
Source: Author's own design

3.2.1 Philosophical Worldview Consideration of the Research

There are several forms of philosophical ideas that influence the practice of researches. Creswell (2009) identified and grouped these philosophical ideas into four (4) distinct worldviews; Postpositivism, Constructivism, Advocacy and Pragmatism. Guba (1990), described the worldviews as an established principles that guide an action. The worldview are also known as paradigms (Lincoln and Guba, 2000; Mertens, 1998); epistemologies or ontologies methodology (Crotty, 1998).

However, given the aim and objectives of this study, the postpositivism worldview has been considered most appropriate. Postpositivism adopts observable techniques in examining causal relationships that leads to hypothesis and theory testing (Creswell, 2009; Yin, 2009). Thus, the problems considered by postpositivists demand the need to ascertain and evaluate the possibilities that affect results, as identified in experiments (Creswell, 2009). According to Creswell (2009), the understanding that advances from a postpositivist lens is centered on the critical observation and assessment of unprejudiced reality that occurs in the universe. Postpositivism approach starts with adoption of a concept, the collection of data that would support or disproves the concept, and subsequently makes the required modifications before other tests are carried out (Creswell, 2009). Drawing on this perspective, the research philosophy can be assumed to follow a systematic approach of exploring and resolving research questions.

3.2.2 Strategy of Inquiry

The strategies of inquiry consist of the categories of quantitative, qualitative and mixed methods designs that outline detailed guideline for techniques in a research design (Creswell, 2009). Whiles some researchers may term it *approaches to inquiry*

(Creswell, 2007) others had referred to it as *research methodologies* (Mertens, 1998). Creswell classified the strategies of inquiry into three (3) general strategies; Quantitative methods, Qualitative methods and Mixed methods. Based on the worldview consideration of this study, quantitative strategy has been considered the appropriate research methodology. A survey was employed to provide a numeric description of the opinions of road users of the George Walker Bush highway. This included cross-sectional study that involved the use of questionnaires for the collection of data from respondents.

3.2.3 Research Methods

This includes the specific methods employed in the collection of the research data, analysis and interpretation of results. A pre-determined closed-ended questionnaire were developed and utilized for soliciting responses from road users who were involved in the study. The analysis and interpretation of the research results were done with the use of statistical tools. The research methods employed in achieving the objectives of the study included the following steps;

3.2.3.1 Pilot Survey

A pilot survey was conducted among 30 road users from the various user groups. The pilot survey was essential to ensure that the methodology and research instruments adopted in the main survey were appropriate for the current study. The outcome of the pilot survey enabled the researcher to modify and restructure the research questionnaires to meet the research objectives.

According to Suanmali *et al*. (2015), expectation forms a criterion upon which customers evaluate service and product quality, thus, it will be essential to develop a questionnaire that would solicit the opinions of road users and as well obtain an

understanding of road users' expectations. The respondents were made up of two main groups; the motorists and pedestrians. The questionnaires were designed with the aim of addressing the objectives formulated for the study. The questions were set with simple and clear wording for the easy understanding of the respondents.

A Five-Point Likert Scale was adopted with five (5) representing the highest score. The format for the Five-point Likert Scale adopted in this study is as follows:

- **Satisfaction**

1. Very dissatisfied
2. Dissatisfied
3. Neither satisfied nor dissatisfied
4. Satisfied
5. Very satisfied

- **Importance**

1. Not Important
2. Slightly Important
3. Moderately Important
4. Very Important
5. Extremely Important

Question formats and measuring scales were modified from a pre-validated questionnaire used by the Marketing and Development Research Associates (2007), Lodenius (2011), and Suanmali *et al.* (2015). According to Creswell (2013) a barrowed research instrument was advantageous because it had known validity. The respondents eligible to partake in the motorist survey must be 18 years or above and have travelled on the George Walker Bush highway before and after the re-construction of the

highway whereas the respondents eligible to undertake the pedestrian survey shall consist of people up to 15years or above and must have used the highway before and after re-construction. The questionnaires for the motorists and pedestrians are attached in Appendix 2.

3.2.3.2 Data Collection Technique

Generally, there are several procedures used by researchers in collecting research data, a typical instrument used in this study was a pre-determined closed-ended questionnaire. The collection of data remains one of the essential steps in conducting a meaningful research. Following Creswell (2009) and Yin (2009), the achievement in data collection can be determined by features such as the establishment of appropriate and potential respondents, formation and definition of a suitable sampling frame, the technique and approach of conducting fieldwork as well as how the data collected is received, edited, coded and analyzed. Azmy (2012), Lui (2009) and Xie (2002) point out that, the understanding of these factors can ensure the validity and the reliability of the data collection process. There is no doubt that the quality of research outcomes are mainly dependent on the quality of data collected and thus, efforts must be made to improve the validity and reliability of the data collected (Creswell, 2009; Oppenheim, 2003).

3.2.3.3 Identification of Road Users and Target Groups

The road users for the purpose of this research study have been classified into two main groups;

- Motorized Traffic, which are classified as main road users
- Non-Motorized Traffic, which are classified as vulnerable road users

According to the Highway Network Master Plan (2000), traffic is classified by vehicular type as indicated in Table 3.1. The pedestrians' classification is also

shown in Table 3.2. The definitions for the various road users considered in this study has been provided in Table 3.3.

Table 3.1: Vehicular Classification

No.	Vehicle Type
1	Saloon
2	Taxis
3	Pick Up/4 WD Veh.
4	Small Buses
5	Large Buses
6	Light Truck (1 axle)
7	Heavy Truck (between 2 to 3 axle)
8	Trailer (greater than 4 axle)
9	Others (Motor)

Source: Highway Network Master Plan, 2000

Table 3.2: Pedestrian Classification

No.	Pedestrian Type
1	Children (less than 15 years)
2	Adults (between 15 to 60 years)
3	Elderly (greater than 60 years)

Source: Ghana Highway Authority, 2015

Table [1].3: Definition of road user groups considered in this study User Group Definition

Pedestrians	Includes hawkers and any person crossing the highway
Saloon Car Drivers	Drivers of private cars
Taxi Drivers	Drivers of commercial cars etc.
Pick-up Drivers	Drivers of private pick- ups
Bus/'trotro' Drivers	Drivers of private or commercial minibuses, etc.
Truck Drivers	Drivers of commercial (large & small) vehicles
Trailer Drivers	Drivers of commercial (large & small) vehicles

Source: GHA, 2015

The road users considered in this study consist of a mix of motorists of commercial and non-commercial vehicles as well as pedestrians. The motorists and pedestrians were classified based on the Ghana Highway Authority's classification for motorized

[1] .2.3.4 Determination of Sample Technique

The focus of this research is the road users who use the George Walker Bush highway. Quota convenient sampling technique was employed in this study where it makes a clear provision for representative based on the vehicular and pedestrian classification by assuming they have an equal chance of being selected for the sample. Following Saunders *et al.* (2009), quota sampling is centered on the idea that the sample will represent the population, as the variability in the sample for various quota variables is the same as that in the population. Quota sampling can therefore be considered a type of stratified sample in which selection of cases within strata is entirely non-random (Barnett, 1991). In addition, quota sampling does not require a sampling frame, thus, one of the appropriate techniques to use if a sampling frame is unobtainable (Saunders

and non-motorized road users. Thus, Table 3.3 above presents more information on the category of road users that were interviewed.

et al., 2009). Previous researchers such as Basri (2008), Burde (2008) have utilized the quota sampling technique in sampling highway users for customer satisfaction studies.

3.2.3.5 Establishing a Suitable Sample Size for the Research

The sample size for the motorists were calculated based on the Annual Average Daily Traffic volume obtained from Ghana Highway Authority, whereas the sample size for the pedestrians were calculated based on pedestrian count survey. Previous studies conducted by individuals, road agencies, governmental and non-governmental organizations based their estimated sample sizes on traffic counts (Suanmali *et al.,* 2015; Road User Satisfaction Survey in the State of Himanchal Pradesh, 2007; Road User Satisfaction in the State of Tamil Nadu, India, 2007; Road User Satisfaction Survey -1, 2006; Second Road User Satisfaction Survey in Kamataka, India, 2004; Second Road User Satisfaction Survey in Kamataka, India, 2004).

3.2.3.5.1 Sample Size Determination for Motorists

The population of motorists travelling on the George Walker Bush Highway was based on the Average Annual Daily Traffic volume on the Highway. The Average Annual Daily Traffic (AADT) available on the Tetteh Quarshie- Mallam Junction Highway was conducted in 2000 with an estimated traffic volume of 14,539 vehicles per day (MRH, Highway Master Plan 2010-2020 pp. 3-21). However, since the current research is being undertaken in 2016, the researcher converted the 2000 data to 2016. This will give a true picture of current traffic volume on the highway. The present value formula was used for the conversion.

1

$$Pv\ Fv\square \ \_\_\_\_\_(1\square r)_n$$

Where:

PV = Present Value (14,539 vehicles) FV= Future Value (?) r = rate of return; which is the projected economic growth rate for Ghana in 2016 was 6% (African Development Bank, 2016). n = the number of years (2016-2000) = 16years

Hence, $Fv = Pv(1 + r)^n$

$$Fv = 14{,}539(1 + 0.06)^{16}$$

$$Fv = 36{,}934.173 \approx 36{,}934\ Motorists$$

Therefore, the estimated Average Annual Daily Traffic (AADT) on the George Walker Bush Highway for 2016 based on the calculation above is 36,934. The respondents for the questionnaire survey for this category of road users shall be Motorists who have travelled on the highway before and after it was reconstructed. The traffic count data obtained from Ghana Highway Authority (AADT) is attached in Appendix 1.

The sample size was determined based on the Yamane Sampling Technique. The level of precision or sampling error is 5% or 0.05. The sample size calculation is indicated below;

$$n = \frac{N}{1 + Ne^2}$$

Where:

n = Required Sample size

N = Population size

e = Level of precision

$$n = \frac{36{,}934}{1 + [(36{,}934)(0.05)^2]}$$

$$=395.7144 \approx 396$$

Therefore, the minimum number of the sample size for Motorists is 396

3.2.3.5.2 Sample Size Determination for Pedestrians

The pedestrian traffic data available on the George Walker Bush Highway was conducted in 2011 by the Planning Division of the Ghana Highway Authority. The population (pedestrians) that crosses the highway per day as of 2011 was estimated to be 73,850 people (GHA, 2015). The data for pedestrian count obtained from Ghana Highway Authority is attached in Appendix 1.

This data represent the volume of pedestrians that crosses the highway during the peak hours of the day. The peak hours considered in the study are 7:00am to 10:00am, 12:00 noon to 2:00pm, 4:00pm to 6:00pm. These times were assumed to be the effective times during the day in which human activities become vibrant along the highway. However, since the current research is being undertaken in 2016, the 2011 data was converted to 2016. This gives a true picture of current pedestrian volume on the highway. The present value formula was used for the conversion.

$$Pv = Fv\frac{1}{(1+r)^n}$$

Where:

PV = Present Value (73,850) FV= Future Value (?) r = rate of return; which is the projected population growth rate for Ghana in 2016 was 2.2 % (World Bank, 2016).

n = the number of years (2016-2011) = 5 years

Hence, $Fv = Pv(1 + r)^n$

$$Fv = 73{,}850\ (1 + 0.022)^5$$

$$Fv = 82{,}338.884 \approx 82{,}339 \text{ Pedestrians}$$

The sample size was determined based on the Yamane Sampling Technique. The level of precision or sampling error is 5% or 0.05. The sample size calculation is indicated below;

$$n = \frac{N}{1 + Ne^2}$$

Where:

n = Required Sample size

N = Population size e =

Level of precision

$$n = \frac{82{,}339}{1 + [(82{,}339)(0.05)^2]}$$

$$= 398.066 \approx 398$$

Therefore, the Minimum number of the sample size for Pedestrian traffic is 398.

Table [2].4 presents the summary of the technique and sizes for the various groups of road users considered in the survey.

Table 3.4: Sample sizes for the Targeted Groups

No.	Target Group	Research Technique	Sample Size
1	Pedestrians	Structured interview (closed-ended questions)	398
2	Motorists	Structured interview (closed-ended questions)	396

the day. The peak hours included the Mornings session from 7am-10am, Afternoon sessions from 12noon-2pm and Evening sessions from 4pm-6pm. The non-peak hours were from 11am-12noon and 2pm-4pm.

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[2] .2.3.5.3 Conducting Fieldwork

The selection of respondents for the survey was mainly based on road users who have used the highway before and after re-construction. The field data was collected within seven days from Sunday to Saturday on the following sections of the highway; Achimota Overhead, Dworwulu, Akweteman, Hong Kong, Lapaz, Lapaz Laspamas, Lapaz Traffic Light, Nyamekye, Kwashieman, Awoshie and Mallam Junction. According to the Planning Division of Ghana Highway Authority, these eleven sections of the George Walker Bush Highway constitute the major crossings for both pedestrians and Motorists (GHA, 2015). Thus, the decision to conduct the survey within these sections of the highway was based on Ghana Highway Authority's assumption. The survey was conducted during the peak hours and non-peak hours of

The motorists were as well stopped and interviewed on the side of the highway. Twenty-Two (22) field assitants who were familiar with data collection were engaged to assist with the field work. Each of the eleven (11) sections of the George Walker Bush highway which formed the main crossings for motorized and non-motorized traffic according to Ghana Highway Authority (2015) were allocated with two (2) field assistants who helped with the administration of the motorist and pedestrian questionnaire. Saunder *et al.* (2009) classified the administration of questionnaires into self-adminsitered and interviewer-administered. Following the thougts of Saunder *et al.* (2009) and based on the fact that respondents considerd in this study were interviewed on the highway, the interviewer-administered mode of administration of questionnaire was found appropriate. The responses to each questions were recorded based on the respondents' own views. The field survey was conducted with the aid of the police from the Motor Transport and Traffic Directorate who helped in stopping the moving vehicles for the survey.

3.2.3.5.4 Data Entry and Editing

Yuen (2007); Neuman (2006); Cooper and Schindler (2006), indicates that the exportation and editing of field data prior to the main statistical analysis were necessary in improving the quality of data by reducing the occurrences of errors that could affect the accuracies of the outcome of the research. The data obtained from the field was recorded into the Statistical Package for the Social Science (SPSS) version 21. This enabled the researcher to check the completeness and any errors in the questionnaires. Studies have shown that the SPSS software is useful in sorting and analyzing data in quantitative inquires. This includes regression analysis, measures of central tendency and cause and effect analytics (Chikono, 2015).

3.2.3.5.5 Data analysis and Interpretation

The processes involved in data analysis in any studies comprises mostly of the responsibilities of organizing, examining, categorizing, tabulating, interpreting, and testing of data collected to obtain adequate proof intended to answer research questions (Saunders *et al.*, 2009; Sexton, 2004; Easterby-Smith *et al.*, 2003). The study employed a set of analytical tools in measuring the hypotheses. Descriptive statistics was used to present the research data in a more meaningful way which allowed for a better interpretation of the data which included the measures of central tendency (mean) and measures of spread (standard deviation) whereas the regression analysis, multivariate statistical technique were used mainly to reduce the sizes of variables from a larger number to a smaller number. It was also used to establish the underlying dimensions between the measured variables.

The first phase of the analysis entails a descriptive analysis of the demographic profile in Section A of the questionnaire instrument. Regression analyses were as well performed on the data in Section B and C of the questionnaire. Measures of central tendency and measures of spread were the typical descriptive statistics that were used to describe the research data. The details of such description has been presented in Chapter Four (4). Similarly, the study employed Factor Analysis as the main multivariate statistical technique in establishing the relationship among the variables. Williams *et al.* (2010), indicates that Factor Analyses are largely employed in the areas of psychology and education but are considered significant method in interpreting self-reporting questionnaires.

Factor analysis is a robust statistical analytical method preferred over mean scores and analysis of variance (Field, 2009; Motulsky, 2005), thus the drive for it usage in this study. The Factor Analysis has multiple uses, such as its ability to minimize a huge set

of variables into a minimum set of variables, ability to create principal relationship between measured variables and latent variables, ability to provide constructs validity confirmation of self-reporting scales among others (Suanmali *et al.,* 2015). The aspects in Factor Analysis that were considered are the Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity as well as Rotated Component Matrix. These measures show the validity and suitability of the responses collected in addressing the research objectives. Principal Component Analysis (PCA) technique was also used to convert the correlated variables into a values of linearly uncorrelated variable. The application of the Principal Analysis in this study is in line with similar researches (see Suanmali *et al.,* 2015; Wardhana *et al*., 2011), the results of the significant service quality dimensions that influence the satisfaction of road users are presented in Chapter Four (4).

3. 3 SUMMARY

This chapter has considerably introduced and discussed the methodology employed to undertake this research by considering the philosophical worldview, the strategy of inquiry and the research methodology applicable for the study. The postpositivism worldview was considered as the most suitable stance for the research. The determination and the conclusions drawn with respect to the research approach, design, strategy, administration of the research questionnaires including the logical presentation of the research procedures have been clearly discussed further in the study. The questionnaire instrument was used in the study to collect relevant research data from both motorists and pedestrians whose expectation and perception constituted the basis for the research. The next two chapters; chapter 4 and 5 dwells extensively on the analysis and discussion of the research results as well and the presentation of the research findings, recommendations and conclusion made for the research.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 INTRODUCTION

Chapter Four presents the analyses and detailed discussion on the results from the quantitative data obtained from road users on the George Walker Bush-Highway. The chapter is in two sections. Section one and two presents the analyses carried on data obtained from motorists and pedestrians respectively. Two set of questionnaires were prepared separately to elicit the views of both the motorists and pedestrians. The sections begin with the analysis of the demographic information of the respondents and concludes with the analyses of the quantitative data elicited from road users.

4.2 SECTION ONE: DEMOGRAPHIC PROFILE OF MOTORISTS

A total of 396 motorists who have travelled on the George Walker Bush Highway before and after the reconstruction of the highway were interviewed. The survey was conducted by a face to face interview thus 100% of responses rate was attained. The profile was based on the categories of respondents, age group distribution and educational background of respondents. The demographic profiles of respondents are significant in comparing the variability in respondent-level and also act as a level for related studies to be undertaken in future.

4.2.1 Category of Respondents

Figure 4.1 indicates the distribution of categories of motorists who were interviewed in the survey. Among the 396 motorists who participated in the survey, majority of motorists were the Saloon Car Drivers representing 32.7% followed by Small Bus Drivers and Taxi Drivers representing 27.5% and 15% respectively. The minority of motorists were the Trailer Drivers who constitute only 0.21% of the total percentage.

The details of the categories of motorists are provided in Figure 4.1.

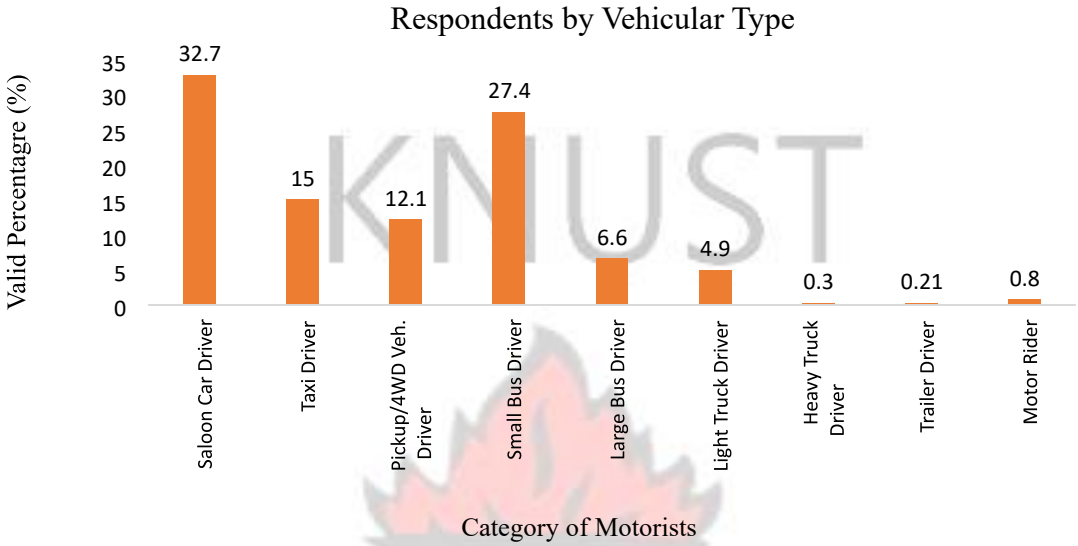

Figure 4.1: Respondents by Vehicular Type

4.2.2 Age Group Distribution of Respondents

The age group distribution indicates that, majority of the motorists are in the range of 36-54 years (31.8%) followed by those within 26-35years (23.5%). Those within the age groups of 18-25 and 46-55 years constitute 13.1% and 20.5% respectively. Those above 55 years represents the lowest numbers, that is, 11.1% only. Based on the results below, it may be assumed that the majority of the motorists who travels on the GWBhighway are in the middle age group between 36-45years. Figure 4.2 indicates the detailed distribution of respondents by age group.

Respondents by Age Group

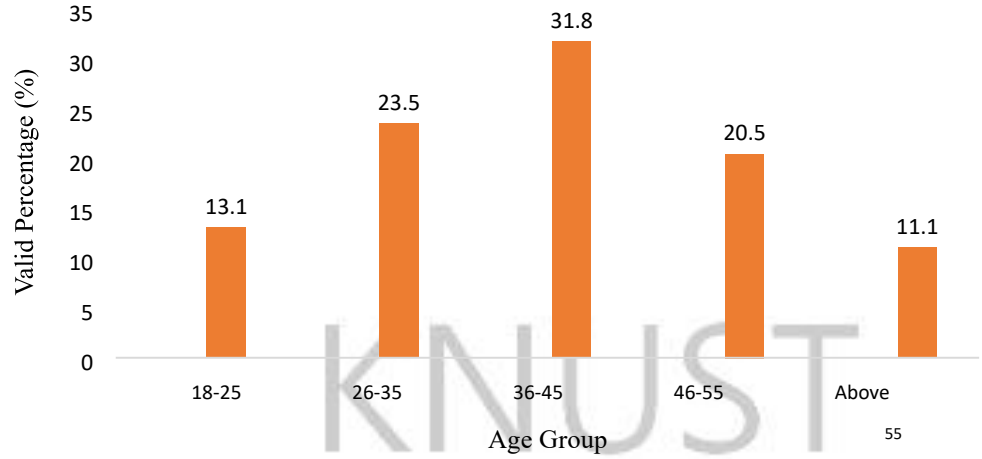

Figure 4.2: Respondents by Age Group

4.2.3 Educational Background of Respondents

The results in Figure 4.3 show that the majority of motorists have attained JHS/Middle School educational levels with 25.3%. The second highest educational levels were recorded among those with Vocational/Technical/Commercial School levels with 20.5% followed by SHS/'O' Level/'A' Level with 18.2%. The educational background of respondents is provided in Figure 4.3.

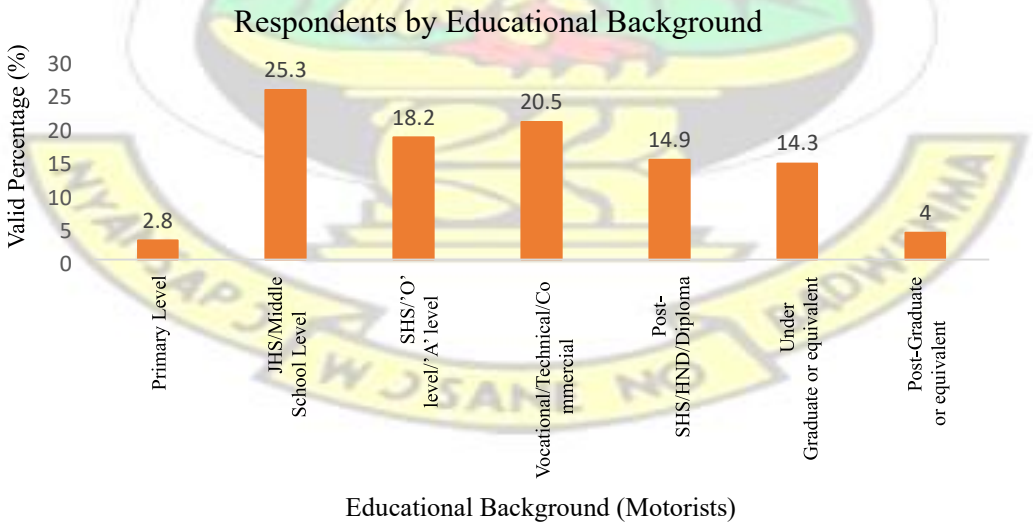

Figure 4.3: Respondents by Educational Background

4.3 RELIABILITY TEST

The reliability indicates the degree to which an instrument yields error free and consistent results (George and Mallery, 2003). Cavana e*t al.* (2001) added that the reliability of a measure shows the stability and consistency with which the instrument measures the concept and assists to determine the 'goodness' of a measure. According Sekaran (2003), the closer the reliability coefficient to 1.0 the better, likewise values above 0.8 are considered good, whiles values within 0.7 are considered acceptable. However, the reliability values below 0.6 are considered to be poor (Sekaran, 2003). The reliability test for both technical and functional constructs were determined using the Cronbach's alpha reliability test. The results are illustrated in Table [3].1.

Table 4.1: Cronbach's Alpha Reliability Test

Construct	Dimensions	Alpha Coefficient		No. of Items
		Importance Levels	Satisfaction Levels	
Technical	Road Safety	0.865	0.745	5
	Road Surface Condition	0.822	0.612	2
	Roadside Amenities	0.712	0.698	3
	Cleanliness	0.653	0.589	3

[3] **.3.1 Overall Reliability Test**

The overall reliability assessment for the overall items gives a value of Alpha Cronbach of 0.781 as indicated in Table 4.2. Cronbach's alpha of 0.781obtained in this study suggests an acceptable level of internal consistency and reliability in the instruments and the scale (Hair *et al*., 2014; Field, 2009; Sekaran, 2003). The result of the overall test is illustrated in Table 4.2.

Functional	Responsiveness	0.748	0.604	2
	Reliability & Assurance	0.767	0.653	2

Table 4.2: Reliability Test for Overall Items

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
0.781	0.786	17

4.4 ANALYSES OF DATA COLLECTED

The main multivariate statistical technique used in this study is the Factor Analysis which included Kaiser-Meyer-Olkin (KMO) and Bartlett test sphericity, Principal Component Analysis and Rotated Component Matrix. The results of the analyses performed on the research data have been presented further in this chapter.

4.4.1 Factor analysis on service dimensions influencing motorist' satisfaction

The Factor Analysis test was performed after the Kaiser-Meyer-Olkin (KMO) and Bartlett test of sphericity. The appropriateness of the correlational matrix for Factor Analysis includes the calculation of the Kaiser-Meyer-Olkin measure of sampling suitability (KMO). Once the KMO approaches 1.0, it means the sum of the squared partial correlation coefficients between all pairs is small, which is compared with the sum of the squared correlation coefficients (Zillmer and Vuz, 1995). Thus a KMO index < 0.50 specifies the correlational matrix is inappropriate for the Factor Analysis. Table 4.3 shows the results of KMO and Bartlett's test.

Table 4.3: KMO and Bartlett's Test[a]

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.659
Bartlett's Test of Sphericity	Approx. Chi-Square	474.648
df	140	
	Sig.	.000

a. Based on correlations b. Cronbach's Alpha = 0.781

From Table 4.3, the KMO test value obtained is 0.659, this shows that the sample sizes for the study are appropriate to undergo Factor Analysis. This is based on the assumptions made by Hair *et al.* (2014), that the Kaizer-Meyer-Olkin (KMO) measure of sampling adequacy of 0.600 is considered very adequate. Similarly, the value of Bartlett test of sphericity obtained from Table 4.3 was 474.648 with a significance of 0.000. This implies that correlation between variables are adequately large for the Principal Component Analysis (PCA). Communalities extracted on each item were determined before the Principal Component Analysis were undertaken. The results are indicated in Table 4.4. According to Field (2009), the Communalities are crucial and significant in determining the items that have to be finally extracted.

From Table 4.4, the average Communality of the items after extraction was 0.64. The average Communality of the items after extraction should exceed 0.60 in order to provide reliable outcomes and interpretations in Factor Analysis (Field, 2009; Motulsky, 2005). Thus, the extraction supports the use of Factor Analysis on the items (variables) in this study. From Table 4.4, the extracted eigenvalues for five (5) items were found to be less than the cut-off point of 0.50 signifying that they do not explain much variance as such were removed from the analysis (Hair *et al.*, 2014; Field, 2009). The remaining seventeen (17) items with Communalities greater than 0.50 were considered for the Factor Analysis extractions.

Table 4.4: Communalities Extracted

Factors influencing the satisfaction of motorists	Initial	Extraction
Provisions of Road Markings	1.000	.652
Provisions of Street Lights	1.000	.747
Provision of Traffic Control Devices	1.000	.586
Provision Traffic Barrier	1.000	.531
Provision Road Signage	1.000	.648
A Non-defective road surface	1.000	.742
Free flow of run-offs	1.000	.674
Air pollution	1.000	.405*
Provision of Parking Areas & Bus stop	1.000	.618
Provision of Drainage Structure	1.000	.687
Landscaping Mtce	1.000	.243*
Provision of Service Lanes	1.000	.829
Accessibility to Social Facilities	1.000	.444*
Cleanliness of Parking Areas	1.000	.626
Cleanliness of Road Surface	1.000	.543
Cleanliness of Drainage Structure	1.000	.635
Willingness to address road users' need	1.000	.548
Promptness to address road users' concern	1.000	.632
Experience Staff	1.000	.590
Consideration to needs of road users	1.000	.461*
Dependability to perform road services	1.000	.220*
Accuracy in performing road services	1.000	.658

Extraction Approach: Principal Component Analysis. *extraction less than 0.5

Table 4.5: Total Variance Explained

		Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sum of Squared Loadings	
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %

1	2.259	22.595	22.595	2.259	22.595	22.595	2.062	20.623	20.623
2	1.524	15.237	37.832	1.524	15.237	37.832	1.990	19.902	40.525
3	1.427	14.271	52.103	1.427	14.271	52.103	1.686	16.861	57.386
4	.896	8.962	61.065	.896	8.962	61.065	1.282	12.383	69.769
5	.810	8.102	69.167	.810	8.102	69.167	.496	4.962	74.731
6	.765	7.652	76.819	.765	7.652	76.819	.209	2.088	76.819
7	.504	5.035	81.854						
8	.379	3.792	85.646						
9	.334	3.341	88.987						
10	.320	3.202	92.189						
11	.295	2.951	95.140						
12	.134	1.343	96.483						
13	.123	1.225	97.708						
14	.117	1.166	98.874						
15	.053	0.532	99.406						
16	.038	0.381	99.787						
17	.021	0.213	100.00						

Extraction Method: Principal Component Analysis
Source: Field Data, 2016

The results of the total variance explained is indicated in Table 4.8. Six (6) factors were extracted and the cumulative value for the six (6) components accounted for 76.82% of the total variance which exceeds the minimum recommended value of 50% (Field, 2009). Component one accounted for 22.59%, component two recorded 15.24%, component three 14.27%, component four 8.96%, component five 8.10% and component six 7.65%. Table 4.6 presents the Rotated Component Matrix for all the items (variables) contained in the various components extracted that is aimed at identifying the significant service quality dimensions that influences the satisfaction of road users.

Table 4.6: Rotated Component Matrix[a]

Quality dimensions influencing satisfaction of motorists (Variables)	Component					
	1	2	3	4	5	6
Provision of adequate Road Markings	.747					
Provision of adequate Street Lights	.649					
Provision adequate Traffic Control Devices	.732					
Provision adequate Traffic Barrier	.698					
Provision of adequate Road Signage	.731					
A Non-defective Road Surface						
Free flow of Run-offs		.653				
Provision of adequate Parking Areas & Bus Stop		.657				
Provision of adequate Drainage Structure			.644			
Provision of adequate Service Lanes			.736			
Cleanliness of Parking Areas			.547			
Cleanliness of Road Surface				.503		
Cleanliness of Drainage Structure				.635		
Willingness to address road users' need				.507		
Promptness to address road users' concern					.610	
Experienced Staff at the Road Agency					.511	
Accuracy in performing road services						.546
						.505

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization

a. 6 Components extracted

Based on the relationship among the variables with respect to each component, the following labels were given to the various quality dimensions' factors;

i. Factor One (Road Safety)

The five variables loaded onto factor one were 'Provision of adequate road marking'. 'Provision of street lights', Provision of adequate traffic control devices', 'Provision of adequate traffic barrier' and 'Provision of adequate road signage'. These variables were related to the safety of the motorists, as such were labelled "Road Safety".

ii. Factor Two (Road Surface Condition)

The two variables loaded onto factor two were 'A non-defective road surface' and 'Free flow of run-offs'. These variables were related to the condition of the pavement; as a result, they were labelled "Road Surface Condition".

iii. Factor Three (Roadside Amenities)

The two variables loaded onto factor three were 'Provision of adequate parking area & bus stops' 'Provision of adequate service lanes' and 'Provision of adequate drainage structures'. These variables were linked to the roadside facilities, as a result, these variables were labelled "Roadside amenities".

iv. Factor Four (Cleanliness)

The three variables loaded onto factor four were 'Cleanliness of road surface', 'Cleanliness of parking area & bus stops', and 'Cleanliness of drainage structures'. These variables were related to motorists' sanitation of the highway as, a result, these variables were labelled "Cleanliness".

v. Factor Five (Responsiveness)

The two variables loaded onto factor five were 'Willingness to address road users' need' and 'Promptness to address road users' concern'. These variables are linked to the operational performance of the road agency. These variables were labelled "Responsiveness".

i. Factor Six (Reliability and Assurance)

The two variables loaded onto factor six were 'Experienced staff' and 'Accuracy in performing road services'. These variables are linked to the operational performance of the road agency. These variables were labelled "Reliability and Assurance".

4.4.2 Objective 1: Significant Service Quality Dimensions

A multiple regression analysis, stepwise approach was employed to identify the nature of the relationship between the independent variables and dependent variable. Table 4.7 presents the results of the regression analysis.

Regression analysis is a statistical tool that estimates the relationship among variables. Also, it shows the nature of the correlation among the variables. Regression analysis is also useful in predicting a continuous dependent variable from a series of independent variables. The Multiple regression analysis was employed in this study to establish the nature of correlation between the overall satisfaction of road users and the service quality dimensions. The regression analysis was also employed to examine the hypotheses developed for this study, thus, assessing if the technical and functional constructs scores predict road users' satisfaction.

Hypothesis 1

H_0: There is no significant relationship between road safety and road users' satisfaction

H_1: There is significant relationship between road safety and road users' satisfaction The

road safety was a significant predictor of road users' satisfaction, B = .069, F (1,165) = 74.26 $p<0.05$, suggesting that for every one-unit increase in road safety, road users' satisfaction increased by .069 units. The first null hypothesis can be rejected, illustrating that road safety is a significant service quality dimension of road users' satisfaction.

Hypothesis 2

H_0: There is no significant relationship between road surface condition and road user satisfaction

H_1: There is a significant relationship between road surface condition and road user satisfaction

The road surface condition was a significant predictor of road users' satisfaction, B = .077, F (1,184) = 85.25 $p<0.05$, suggesting that for every one-unit increase in road surface condition, road users' satisfaction increased by .077 units. The second null hypothesis can be rejected, illustrating that road surface condition is a significant service quality dimension of road users' satisfaction.

Hypothesis 3

H_0: There is no significant relationship between roadside amenities and road user satisfaction

H_1: There is a significant relationship between roadside amenities and road user satisfaction

The roadside amenities were a significant predictor of road users' satisfaction, B = .054, F (1,167) = 52.60 $p<0.05$, suggesting that for every one-unit increase in roadside amenities, road users' satisfaction increased by .054 units. The third null hypothesis

can be rejected, illustrating that roadside amenities is a significant service quality dimension of road users' satisfaction.

Hypothesis 4

H_0: There is no significant relationship between cleanliness and road user satisfaction

H_1: There is a significant relationship between cleanliness and road user satisfaction

Cleanliness was a significant predictor of road users' satisfaction, B = .038, F (1,148) = 48.29 $p<0.05$, suggesting that for every one-unit increase in cleanliness, road users' satisfaction increased by .038 units. The fourth null hypothesis can be rejected, illustrating that cleanliness is a significant service quality dimension of road users' satisfaction.

Hypothesis 5

H_0: There is no significant relationship between responsiveness and road user satisfaction

H_1: There is a significant relationship between responsiveness and road user satisfaction

Responsiveness was a significant predictor of road users' satisfaction, B = .026, F (1,137) = 33.41 $p<0.05$, suggesting that for every one-unit increase in responsiveness, road users' satisfaction increased by .026 units. The fifth null hypothesis can be rejected, illustrating that responsiveness is a significant service quality dimension of road users' satisfaction.

Hypothesis 6

H_0: There is no significant relationship between assurance and road user satisfaction

H_1: There is a significant relationship between assurance and road user satisfaction

Assurance was a significant predictor of road users' satisfaction, B = .022, F (1, 110) = 28.62 $p<0.05$, suggesting that for every one-unit increase in assurance, road users' satisfaction increased by .022 units. The sixth null hypothesis can be rejected, illustrating that assurance is a significant service quality dimension of road users' satisfaction.

Hypothesis 7

H_0: There is no significant relationship between reliability and road user satisfaction

H_1: There is a significant relationship between reliability and road user satisfaction

Reliability was a significant predictor of road users' satisfaction, B = .018, F (1, 152) = 24.63 $p<0.05$, suggesting that for every one-unit increase in assurance, road users' satisfaction increased by .026 units. The sixth null hypothesis can be rejected, illustrating that assurance is a significant service quality dimension of road users' satisfaction.

Table 4.7: Summary of Hypotheses findings

Context of Hypotheses	Findings
Hypothesis 1 H_0: There is no significant relationship between road safety and road users' satisfaction H_1: There is significant relationship between road surface condition and road users' satisfaction	Not supported Supported
Hypothesis 2 H_0: There is no significant relationship between road surface condition and road users' satisfaction H_1: There is significant relationship between road surface condition and road users' satisfaction	Not supported Supported
Hypothesis 3 H_0: There is no significant relationship between roadside amenities and road users' satisfaction H_1: There is significant relationship between roadside amenities and road users' satisfaction	Not supported Supported
Hypothesis 4 H_0: There is no significant relationship between cleanliness and road users' satisfaction H_1: There is significant relationship between cleanliness and road users' satisfaction	Not supported Supported
Hypothesis 5 H_0: There is no significant relationship between responsiveness and road users' satisfaction H_1: There is significant relationship between responsiveness and road users' satisfaction	Not supported Supported
Hypothesis 6 H_0: There is no significant relationship between assurance and road users' satisfaction H_1: There is significant relationship between assurance and road users' satisfaction	Not supported Supported
Hypothesis 7 H_0: There is no significant relationship between reliability and road users' satisfaction H_1: There is significant relationship between reliability and road users' satisfaction	Not supported Supported

Table 4.8: Multiple Linear Regression Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.735	0.38		113.041	.000
	Road safety	.069	.037	.158	2.058	.032
	Road Surface Condition	.077	.042	.177	2.225	.026
	Roadside amenities	.054	.035	.095	1.474	.038
	Cleanliness	.038	.055	.091	1.061	.040
	Responsiveness	.026	.027	.062	1.240	.042
	Assurance	.022	.041	.037	.685	.045
	Reliability	.018	.049	.042	.548	.047

a Dependent Variable: Overall Road Users' Satisfaction

The results in Table 4.8 shows that, all the independent variables have a significant influence on the overall satisfaction of motorists. These variables are; road safety, road surface condition, roadside amenities, cleanliness, responsiveness as well as reliability and assurance. With the level of significance set at $p<0.05$, road surface conditions dimension seemed to be the most significant dimension with the highest standardized co-efficient of (.177) followed by road safety (.158), roadside amenities (.095), cleanliness (.091), responsiveness (.062), assurance (.037) and reliability factor (.042).

Table 4.9 shows the percentage R square which explain the percentage of variance in overall satisfaction scores. This also provides the adjusted R-square of 0.349 which shows 34.9% of the total variation in road users' satisfaction is explained by their satisfaction with the technical and functional constructs.

Table 4.9: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.545	.377	.349	.34527

a Predictors; Road safety, Road Surface Condition, Roadside amenities, Cleanliness, Responsiveness, Assurance, Reliability b Dependent Variable: Overall Road Users' Satisfaction

Drawing on the multiple regression result, the significant service quality dimensions that most influenced the satisfaction of motorists were road surface condition which are the non-defective road surfaces and free flow of run-offs when it rained. The second most significant service dimensions that influenced satisfaction of motorists are road markings, street lights, traffic control devices, traffic barrier and road signage. This is followed by roadside amenities, cleanliness, responsiveness, while the reliability and assurance service dimensions accounted for the least significant dimensions that influence the satisfaction of motorists.

4.4.3 Objective 2: Gap Analysis

The gap is the difference of mean score for importance rating (expectation) and the mean score for the satisfaction rating (perception); thus G= Satisfaction levels (perception)-Importance levels (expectation). The interpretation of the gap analysis indicates that when the expectation of road users towards a specific dimension exceeds their satisfaction levels then, the gap measured will account for a negative gap. Likewise, positive gaps show the expectations of road users have been exceeded with respect to the dimensions measured. In this instance action/improvement is not so much required for those services with positive indications although interventions are required for the dimensions with negative indications. Harris and Strout (2002) also suggests that a gap score greater than one means that there is a tremendous difference between the satisfaction (perception) and importance (expectation) ratings.

From the results in Table 4.10; it is obvious that motorists' rated the service dimensions as very important although their expectations were not met. The importance levels among the service quality dimensions vary from 4.34 to 4.00 while satisfaction levels ranges from 3.67 to 3.36. The difference in the satisfaction levels and importance levels as shown in Table 4.10 accounted for the negative gap scores in all the service quality dimensions evaluated by motorists. The descriptive statistics of motorists' importance and satisfaction levels towards service quality dimensions is presented in Table 4.10.

Table 4.10: Results of Descriptive Statistics Analysis

	Satisfaction Levels (Perceptions)		Importance Levels (Expectations)		Gap Score	
	M	SD	M	SD	M	SD
Road Safety	3.67	0.60	4.34	0.65	-0.67	0.74
Road Surface Condition	3.36	0.55	4.08	0.58	-0.72	0.83
Roadside Amenities	3.43	0.58	4.11	0.61	-0.68	0.76
Cleanliness	3.59	0.56	4.15	0.53	-0.56	0.66
Responsiveness	3.55	0.53	4.20	0.60	-0.65	0.72
Reliability Assurance	3.37	0.51	4.00	0.55	-0.63	0.67 &

Note: M=Mean, SD- Standard Deviation

Gap Analysis between Satisfaction and Importance Levels

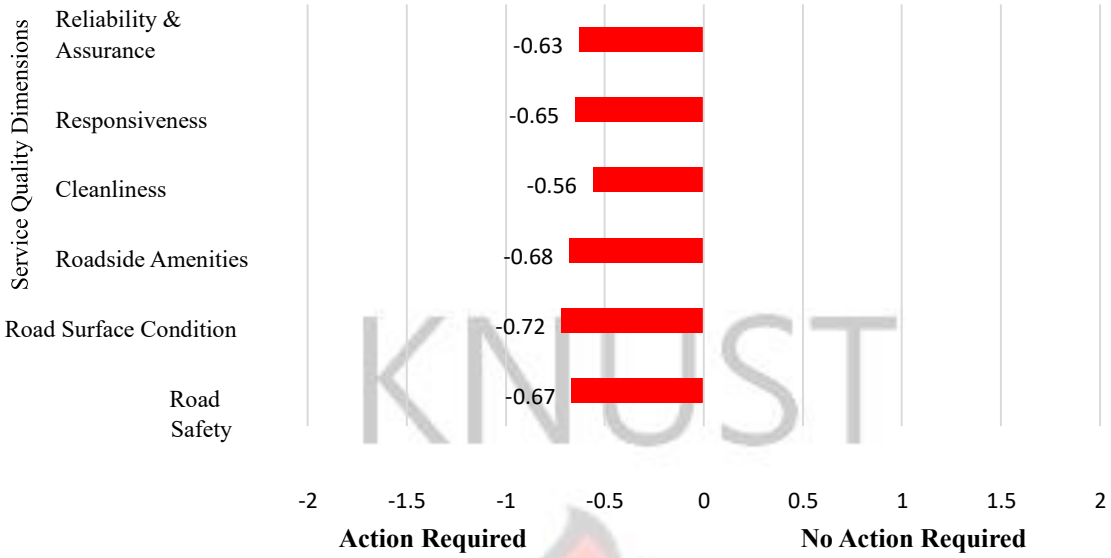

Figure 4.4: Results of Gap Analysis

Figure 4.4 displays the results of gap scores between satisfaction and importance levels for the service quality dimensions measured. The highest gap scores from Figure 4.4 is with road surface condition with a gap score of -0.72, followed by roadside amenities with a gap score of -0.68 and road safety with a gap score of -0.67. The analysis shows that improvement is required for all the service quality dimensions. However, much attention must be given to the road surface condition, roadside amenities and road safety.

4.4.4 Objective 3: Satisfaction Levels of Motorists

Satisfaction levels of road users are the experiences they encounter with the services provided by the road agencies. Following Basri (2008), satisfaction/ perceptions are generally considered relative to expectations. Road users are dissatisfied when expectation exceeds their perception. Based on the five point Likert scale used, it can been concluded from Table 4.11 that motorists' satisfaction levels varies considerably with respect to the various service quality dimensions measured. The mean score of 4.71 gives an indication that motorists are satisfied with the non-defective nature of

the highway as it's been ranked the highest among the service quality dimensions. This is followed by the cleanliness of the road surface which was ranked second highest with a mean score of 4.68.

However, the range of dissatisfaction among motorists fall within the mean scores of 2.40 to 2.01. The provision of adequate service lanes were ranked the most dissatisfied service quality dimensions by motorists with a mean score of 2.01. The results in Table 4.11 also gives an indication that motorists on the average are dissatisfied with the general service dimensions of the George Walker Bush highway as the mean score for the overall satisfaction shows 2.94. The satisfaction levels of motorists towards the service quality dimensions are provided in Table 4.11.

Table 4.11: Satisfaction Levels of Motorist (Mean, Standard deviation, Rank)

Quality Dimensions	Variables	Mean	StD	Rank

Road Safety	Provision of adequate Road Markings	3.76	0.28	6
	Provision of adequate Street Lights	2.06	0.07	15
	Provision adequate Traffic Control Devices	2.33	0.16	10
	Provision adequate Traffic Barrier	2.04	0.06	16
	Provision of adequate Road Signage	2.27	1.01	11
Road Surface Condition	A Non-defective Road Surface	4.71	0.37	1
	Free flow of Run-offs	3.82	0.18	5
Roadside Amenities	Provision of adequate Parking Areas & Bus Stop	2.40	0.19	8
	Provision of adequate Drainage Structure	3.85	0.13	4
	Provision of adequate Service Lanes	2.01	0.22	17
Cleanliness	Cleanliness of Parking Areas	2.14	0.14	13
	Cleanliness of Road Surface	4.68	0.25	2
	Cleanliness of Drainage Structure	2.34	0.17	9
Responsiveness	Willingness to address road users' need	2.12	0.25	14
	Promptness to address road users' concern	2.19	1.20	12
Reliability & Assurance	Experienced Staff at the Road Agency	3.85	0.23	3
	Accuracy in performing road services	3.48	0.25	7
	Overall Satisfaction	**2.94**		

4.5 SECTION TWO: DEMOGRAPHIC PROFILE OF PEDESTRIANS

A total of 398 pedestrians consisting of children, adults and the elderly were interviewed. The demographic profile is based on the age group and category of respondents as well as their educational background.

4.5.1 Age Group Distribution and Category of Respondents

Figure 4.5 shows that the majority of pedestrians who use the highway are the adults. They constituent over 85% of pedestrians and are within the age group of 15-60 years. They are followed by children who represent 11.69% of respondents. The minority of

pedestrians are the elderly who represents only 2.10% of the total respondents. A detailed distribution of respondents by age group is indicated in Figure 4.5

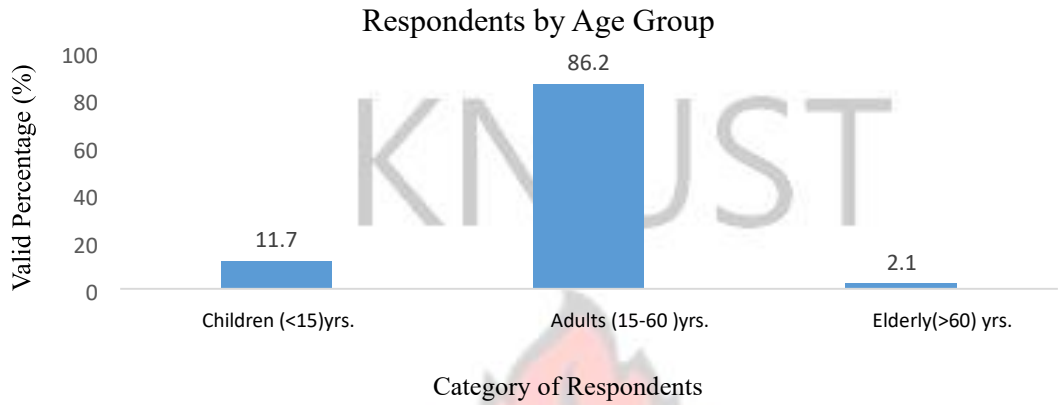

Figure 4.5: Respondents by Age Group

4.5.2 Educational Background of Respondents

Figure 4.6 shows, that majority of respondents are of SHS/'O' Level/'A' Level representing 28.9% of the pedestrians interviewed with the graduates (Under-graduate and post-graduate) representing the minority group. The educational background of respondents is provided in Figure 4.6.

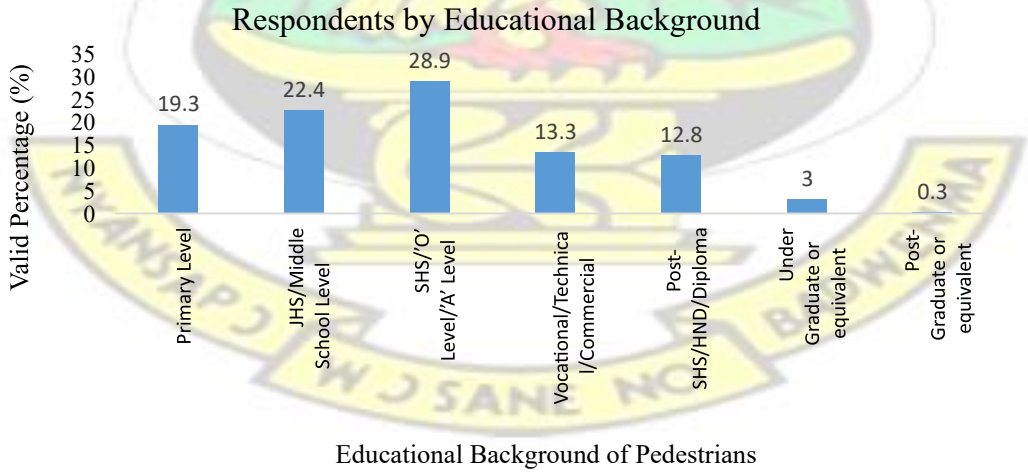

Figure 4.6: Respondents by Educational Background

4.6 RELIABILITY ASSESSMENT

The reliability test was performed on the instrument used in surveying the expectations and perceptions of pedestrians towards the technical and functional quality dimensions of the George Walker Bush Highway. The technical quality dimensions considered are the pedestrian safety, pedestrian crossings, roadside amenities and cleanliness of the highway. Likewise, the functional quality dimensions consisted of the responsiveness, assurance and reliability. The results of the Cronbach's alpha reliability tests for each dimensions is shown in Table 4.12.

Table 4.12: Cronbach's Alpha Reliability Test

Construct	Dimensions	Alpha Coefficient		No. of Items
	Levels	Importance	Satisfaction	
Technical	Pedestrian Safety	0.762	0.680	5
	Roadside Amenities	0.738	0.605	2
	Cleanliness	0.692	0.522	3
Functional	Responsiveness	0.689	0.518	2

The reliability test for the overall items indicated in Table 4.13 shows that, the value for the Cronbach's alpha is 0.726 which means the instrument used for the pedestrian survey is considered acceptable. This is based on Nunnally's (1959) assumption that Cronbach's alpha above 0.70 is considered acceptable.

Table 4.13: Reliability Test for Overall Items

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
0.726	0.735	12

4.7 FACTOR ANALYSIS ON PEDESTRIANS SERVICE QUALITY DIMENSIONS

The application of the Factor Analysis was undertaken to identify the dominant service dimensions influencing pedestrians' satisfaction with the George Walker Bush highway. The Factor Analysis test was preceded by a Kaiser-Meyer-Oklin (KMO) and Bartlett test of sphericity to measure sampling adequacy. These measurements form the conventional requirements for determining the dependability and the reliability of the outcome of Factor Analysis (Fields, 2009).

Table 4.14: KMO and Bartlett's Test[a]

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.692
Bartlett's Test of Sphericity	Approx. Chi-Square	467.225
df	137	
	Sig.	.000

a. Based on correlation b. Cronbach's Alpha = 0.726

From Table 4.14., the KMO test recorded is 0.692 out of 1, which is considered very adequate and therefore affirms the adequacy of sampling used for the Factor Analysis. Based on the Bartlett's Test of Sphericity, the approximation of Chi-square and the significance is 467.225 from 137 *df*, and 0.000 respectively. This implies that correlations between the variables adequately large for a Principal Component Analysis. The Communalities extracted is shown in Table 4.15. The average Communality of the variables after extraction was 0.61. The average Communality of the variables after extraction must be greater than 0.60 to ensure the reliability and dependability of the Factor Analysis results. Field (2009), also suggested that the Communality values in factor analysis must produce an extraction value (eigenvalues)

greater than 0.50 at the initial iteration. Table 4.16 shows that, four components should be extracted as their respective eigenvalues were greater than 1.00.

Table 4.15: Communalities Extracted

Factors influencing the satisfaction of Pedestrians	Initial	Extraction
Provisions of Footbridge	1.000	.760
Provisions of Street Lights	1.000	.668

Provision of Traffic Control Devices	1.000	.603
Provision Traffic Barrier	1.000	.446*
Provision Road Signage	1.000	.244*
Soundness of Footbridge	1.000	.614
Free flow of run-offs	1.000	.353*
Air pollution	1.000	.517
Provision of Bus stops	1.000	.638
Provision of Drainage Structure	1.000	.523
Landscaping Mtce	1.000	.243*
Accessibility to Social Facilities	1.000	.444*
Cleanliness of Bus stops	1.000	.640
Cleanliness of Footbridges	1.000	.611
Cleanliness of Drainage Structure	1.000	.562
Willingness to address road users' need	1.000	.640
Promptness to address road users' concern	1.000	.562
Experience Staff	1.000	.308*
Consideration to needs of road users	1.000	.356*
Dependability to perform road services	1.000	.445*
Accuracy in performing road services	1.000	.264*

Extraction Method: Principal Component Analysis.* Extraction less than 0.50

Also, the Rotated Component Matrix[a] presented in Table 4.17 confirms that four of the components belongs to an independent factor. The conclusion drawn from this is that, the four components extracted constitute the main service dimensions that are perceived to influence satisfaction of pedestrians of the George Walker Bush highway.

The results in Table 4.16, also shows the variance explained for each of the extracted component; the Principal Component one accounted for 27.860% of the total variance, component two accounted for 15.833% of the total variance, component three accounted for 14.855% and whereas component four accounted for 8.151% of the total

variance explained in the measure of satisfaction among pedestrians. The accumulated value of the four components extracted accounts for 66.729% of the total variance which exceeds the minimum requirement of 50.0% (Field, 2009). The Rotated Component Matrix in Table 4.17 outlines all the variables contained in each of components extracted.

Table 4.16: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sum of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.789	27.890	27.890	2.789	27.890	27.890	2.462	21.462	21.462
2	1.583	15.833	43.723	1.583	15.833	43.723	1.899	18.985	40.447
3	1.486	14.855	58.578	1.486	14.855	.81558.578	1.453	14.527	54.974
4	.815	8.151	66.729	8.151		66.729	1.176	11.755	66.729
5	.719	7.185	73.914						
6	.625	6.252	80.166						
7	.512	5.124	85.290						
8	.354	3.535	88.825						
9	.347	3.472	92.297						
10	.320	3.201	95.498						
11	.241	2.411	97.909						
12	.210	2.100	100.00						

Extraction Method: Principal Component Analysis
Source: Field Data, 2016

Table 4.17: Rotated Component Matrix [a]

Factors influencing satisfaction of Pedestrians (Variables)	Component			
	1	2	3	4
Provision of adequate Footbridges	.859			
Provision of adequate Street Lights	.662			
Provision adequate Traffic Control Devices	.574			
Soundness of Footbridges	.647			
Air pollution	.552			
Provision of adequate Bus Stops		.684		
Provision of adequate Drainage Structure		.508		
Cleanliness of Bus Stops			.641	
Cleanliness of Footbridges			.836	
Cleanliness of Drainage Structure			.540	
Willingness to address road users' need				.616
Promptness to address road users' concern				.662

Extraction Method: Principal Component Analysis
Rotated Method: Varimax with Kaiser Normalization
a. 4 components extracted

Based on the relationship among the variables with respect to each component, the following labels were given to the various factors;

i. Factor One (Pedestrian Safety)

The five variables loaded onto factor one were 'Provision of adequate footbridges'. 'Provision of street lights', 'Provision of adequate traffic control devices', 'Soundness of footbridges' and 'Air pollution'. These variables were related to the safety of the pedestrians as a result they were labelled "Pedestrian Safety".

ii. Factor Two (Roadside Amenities)

The two variables loaded onto factor two were ‘Provision of adequate bus stops’ and ‘Provision of adequate drainage structures’. These variables were linked to the roadside facilities thus, were labelled “Roadside amenities”.

iii. Factor Three (Cleanliness)

The three variables loaded onto factor three were 'Cleanliness of bus stops’, ‘Cleanliness of footbridges’ and ‘Cleanliness of drainage structures’. These variables were related to the general sanitation of the highway thus, these variables were labelled “Cleanliness”. iv. Factor Four (Responsiveness)

The two variables loaded onto factor four were ‘Willingness to address road users’ need’ and ‘Promptness to address road users’ concern’. These variables are linked to the operational performance of the road agency. These variables were labelled “Responsiveness”.

4.7.1 Objective 1: Significant service quality dimensions

A multiple regression analysis, stepwise approach was employed to identify the nature of the relationship between the independent variables and dependent variable. Regression analysis is a statistical tool that estimates the relationship among variables. Also, it shows the nature of the correlation among the variables. Regression analysis is also useful in predicting a continuous dependent variable from a series of independent variables. The Multiple regression analysis was employed in this study to establish the nature of correlation between the overall satisfaction of road users and the service quality dimensions. Table 4.18 presents the results of the regression analysis.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.602	0.31		107.461	.000
	Pedestrian safety	.078	.044	.164	2.531	.015
	Roadside amenities	.053	.037	.172	2.118	.024
	Cleanliness	.046	.056	.048	1.630	.041
	Responsiveness	0.24	.042	.042	1.353	.049

Table 4.18: Multiple Linear Regression Analysis

The results from Table 4.18 shows that, all the four independent variables have a significant influence on the overall satisfaction of pedestrians. These variables are; pedestrians safety, roadside amenities, cleanliness and responsiveness. With the level of significance set at $p<0.05$, pedestrian safety dimension appeared to be the most significant dimension with the highest standardized co-efficient of (.164) followed by roadside amenities (.172), cleanliness (.048) and responsiveness (.042).

Table 4.19 shows the percentage R square which explain the percentage of variance in overall satisfaction scores. This also provides the adjusted R-square of 0.362 which shows 3.62% of the total variation in road users' satisfaction is explained by their satisfaction with the technical and functional constructs.

Table 4.19: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.474	.385	.362	.3286

a Predictors; Pedestrian safety, Roadside amenities, Cleanliness, Responsiveness
b Dependent Variable: Overall Road Users' Satisfaction

Conclusion drawn from the multiple regression result shows that, the significant service quality dimensions that most influenced the satisfaction of pedestrians were pedestrian safety which are the provision of adequate footbridges, provision of adequate street lights, provision of traffic control devices, soundness of footbridges and air pollution. The second most significant service dimensions that influenced satisfaction of pedestrians are provision of adequate bus stops and the provision of adequate drainage structures. This is followed by cleanliness and responsiveness.

4.7.3 Objective 2: Gap Analysis

A descriptive statistics analysis was performed on both the technical and functional service quality dimensions. The results in Table 4.20 show that pedestrians' expectations of all the road infrastructure dimensions were higher than their satisfaction levels of the dimensions. The gap scores which indicates the difference between mean score for the satisfaction rating (perception) and the mean score for the importance rating (expectation) shows negative for all the quality dimensions measured. This implies how significant the various aspects of quality dimensions are to pedestrians, compared with how satisfied pedestrians actually are with the specific dimensions. The negative scores suggest that pedestrians rated the service quality dimensions very important but are not satisfied with the service they are receiving with respect to the dimensions measured. The results of descriptive statistics of pedestrians' expectations and perceptions of service quality dimensions is displayed in Table 4.20.

Table 4.20: Descriptive Statistics of the Gap Score

	Satisfaction Levels (Perceptions)		Importance Levels (Expectations)		Gap Score	
	M	SD	M	SD	M	SD
Road Safety	3.67	0.60	4.34	0.65	-0.67	0.74
Road Surface Condition	3.36	0.55	4.08	0.58	-0.72	0.83
Roadside Amenities	3.43	0.58	4.11	0.61	-0.68	0.76
Cleanliness	3.59	0.56	4.15	0.53	-0.56	0.66
Responsiveness	3.55	0.53	4.20	0.60	-0.65	0.72
Reliability Assurance	3.37	0.51	4.00	0.55	-0.63	0.67 &

Note: M= Means; SD=Standard Deviation

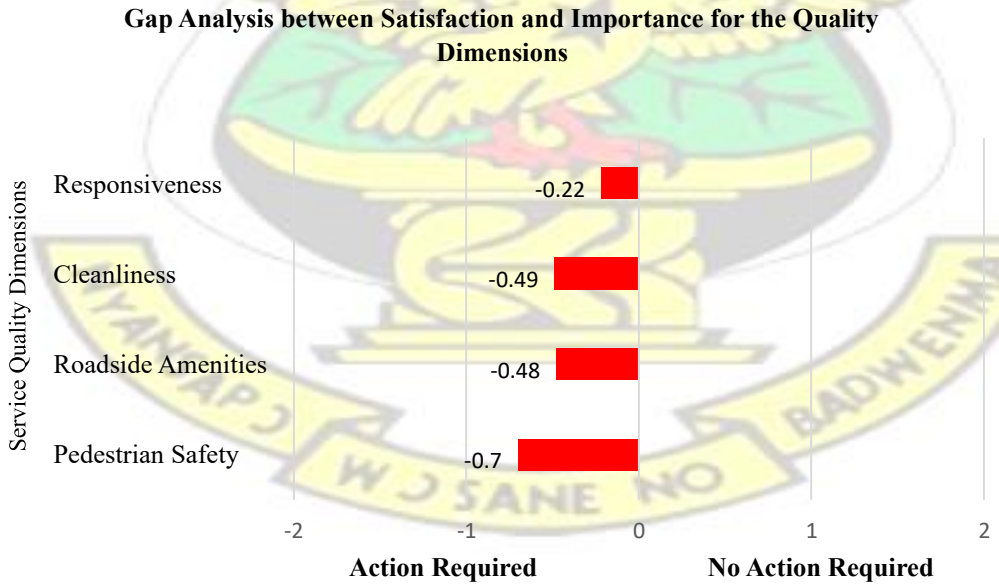

Figure 4.7: Results of Gap Scores

Figure 4.7 shows the sizes of the gaps between satisfaction and importance levels for the service quality dimensions measured. The biggest size of gap from Figure 4.7 were recorded for pedestrians' safety and cleanliness which have sizes of -0.7 and -0.49 respectively. This results show that, action is required to improve these service dimensions so as to increase pedestrians' satisfaction with the road infrastructure.

4.7.4 Objective 3: Satisfaction levels among Pedestrians

The results in Table 4.21 show that pedestrians' satisfaction levels varies largely with respect to the various service quality dimensions measured. The mean score of 4.65 gives an indication that pedestrians are satisfied with the provision of drainage structures along the highway as it's been ranked the highest among the service quality dimensions. The provision of adequate traffic control devices were ranked the second highest service dimension with the mean score of 4.62. The levels of dissatisfaction among pedestrians ranges within the mean scores of 2.43 to 2.74. The pedestrians were mostly dissatisfied with the inadequate provision and citing of footbridges along the George Walker Bush highway with a mean score of 2.43. Pedestrians also ranked the provision of adequate street lights as the second most dissatisfied service dimensions measured.

The overall satisfaction rate perceived by the pedestrians is 3.87. This gives an indication that on the overall assessment, pedestrians can be assumed to be satisfied with the service dimensions of the George Walker Bush highway. The satisfaction levels of pedestrians toward the service quality dimensions are provided in Table 4.21.

Table 4.21: Overall Satisfaction among Pedestrians

Quality Dimensions	Variables	Mean	StD	Rank
Pedestrian Safety	Provision & citing of adequate Footbridges	2.43	0.23	12
	Provision of adequate Street Lights	2.66	0.37	11
	Provision adequate Traffic Control Devices	4.62	0.18	2
	Soundness of footbridges	4.59	0.15	3
	Air pollution	3.84	0.69	8
Roadside Amenities	Provision of adequate Bus Stops	2.74	0.25	10
	Provision of adequate Drainage Structure	4.65	0.35	1
Cleanliness	Cleanliness of Bus Stops	4.00	0.36	7
	Cleanliness of Footbridges	4.53	1.37	5
	Cleanliness of Drainage Structure	4.56	1.46	4
Responsiveness	Willingness to address road users' need	4.09	0.37	6
	Promptness to address road users' concern	3.70	0.33	9
	Overall Satisfaction	**3.87**		

4.8 SUMMARY

This chapter presented a review of the research objectives and how they were achieved. The analyses performed on the quantitative research data obtained from motorists and pedestrians were clearly stated. Based on the results from the analyses, it can be assumed that service quality dimensions have significant influence on the overall satisfaction of road users. The results show that the expectations of road users towards all the service

quality dimensions measured were exceeded considerably. This accounted for the negative scores as displayed by the gap analysis chart.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

Chapter Five presents the review of the research objectives, major findings, the limitations of the study and the potential implications of research findings to stakeholders and practitioners in the road sectors.

5.2 REVIEW OF THE RESEARCH OBJECTIVES

The aim of the research was to evaluate the level of satisfaction of road users with the George Walker Bush highway. The aim was achieved through the formation of three (3) main objectives. This section presents the summary on how the research objectives were addressed.

5.2.1 Objective One: To determine the significant service quality dimensions that influence the satisfaction of road users

There is an indication that, the satisfactions of customers with service quality are influenced by two key dimensions; *technical* and *functional service quality dimensions*. Even though several factors have been attributed to the satisfaction of customers in the service industries such as in the Hotels Management Services (Saleh and Ryan, 1991), Restaurants Operations Services (Lee and Hing, 1995), Banks (Babakus and Glynn, 1992), Telecommunication Providers (Tyran and Ross, 2006; Sureschander *et al.,* 2002; Hoffman and Bateson, 2001; Stafford *et al.,* 1998) Properties (Zarita, 2006 and Seiler, 2004), Railway Service (Lim and Low, 1998) , what actually constitute the satisfaction of road users are yet to be explored to its fullest. Thus, this objective was formulated to identify those factors applicable to the road industry that had significant influence on the satisfaction of road users with the use of modified Service Quality Instrument

(SERVQUAL Model). A detailed account on how this objective was addressed has been provided in Chapter Four.

5.2.2 Objective Two: To assess road users' expectation and perception of service quality provided by road designers

The second objective of the research was to assess road users' expectation and perception of service quality dimensions provided by the road designers. This objective was accomplished by soliciting the opinions on how important various technical and functional service quality dimensions are to road users, compared with how satisfied road users actually are with those dimensions measured. The assessment of the expectation and perception of road users were based on the modification of the SERVQUAL model, where three main functional quality dimensions (responsiveness, assurance and reliability) were adopted in additions to four main technical dimensions (road safety, road surface condition, roadside amenities and cleanliness). The outcome of this measurement led to the determination of the sizes of gap between the expectation and perception of service quality as perceived by the road users of the GWB-highway. This objective also constitute the basis for adopting Gap 5 of the Gap Service Quality model developed by Zeithaml *et al.*, 1990. The gap analysis is useful in identifying priorities for improvement. The details of the analysis are presented in Chapter Four.

5.2.3 Objective Three: To assess road users' satisfaction level towards service quality dimensions of the GWB-highway

Zeithaml and Bitner (2003) indicated that satisfaction is mostly regarded as a wider concept, while service quality assessment centers mainly on dimensions of the service.

Thus, road users are satisfied if their perception about a service dimension exceeds their expectation with that specific dimension. Chapter Four presents a detailed account on the satisfaction levels of road users towards the GWB-highway.

5.3 SUMMARY OF THE MAJOR FINDINGS

The outcome of the study gives an indication that road users' satisfaction is multidimensional as such does not depend solely on the physical features of the road infrastructure. The study has shown that perception of road users towards functional quality dimensions as well contributes significantly to the satisfaction of road users. This assumption was based on previous studies (see Basri, 2008; Gronross, 1982) which identified both technical and functional quality dimensions as the service quality dimensions perceived by customers.

Based on the multiple regression analysis results in Chapter Four, it can be established that six out of the seven independent variables measured have a significant influence on the overall satisfaction of motorists. These variables are; road safety, road surface condition, roadside amenities, cleanliness, responsiveness as well as reliability and assurance. The study has also shown that motorists' satisfaction is mostly influenced by the road surface condition which are the non-defective road surfaces and free flow of runoffs when it rained with reliability and assurance constituting the least significant dimensions. Similarly, safety, roadside amenities, cleanliness and responsiveness have been identified as the significant service quality dimensions that influence pedestrians' satisfaction. This finding is in agreement with studies by (Suanmali *et al.,* 2015; Densu *et al.,* 2014; Basri, 2008) who identified cleanliness, pavement conditions and safety equipment as the significant

concerns to road users. The findings also revealed that road users who had their satisfaction levels (perceptions) towards the service dimensions lower than expected exhibited a moderate but negative relationships with the overall satisfaction of the GWB-highway. Accordingly, these dimensions can be used as a basis for enhancing the overall satisfaction of road users.

From the Gap analysis in Chapter Four, it is clear that the expectation of road users with regard to the service quality dimensions measured exceeded their satisfaction levels as all the dimensions exhibited negative gaps. The biggest gaps were recorded for road surface condition (-0.72) and pedestrian safety (-0.7) while the lowest gaps were recorded for responsiveness (-0.22) and cleanliness (-0.56). Road surface condition include a nondefective road surface and the free flow of run-offs from the road surface when it rained. These dimensions gives a greater concern to road users as the paramount desire of every journey is to travel on a good and smooth road surface free from all obstacles. Similarly, the safety of road users especially the pedestrians of the GWB-highway is much to be desired. According to Densu *et al.* (2014), newly constructed or rehabilitated roads are designed with varying speed limits to enhance travel times of motorists thus posing much danger to pedestrians if their safety are not properly catered for. The outcome of the study affirms that the 14 Kilometer three-lane, high speed dual carriageway poses significant treats to pedestrian road crossing behavior as displayed by the gaps analysis in Chapter

Four. Nonetheless, the road agency (GHA) should consider and view this concerns critically to ensure roads are designed and constructed to the desired standards. The agencies must as well pursue and sustain user education to ensure safety travels.

Road user satisfaction can be experienced at a single encounter level or at an overall satisfaction level. The satisfaction levels among motorists varies from 2.01 (provision of inadequate service lanes) to 4.71 (non-defective road surface) whereas the satisfaction levels among pedestrians ranges from 2.43 (provision and citing of adequate footbridges) to 4.65 (provision of adequate drainage structures). The overall satisfaction rates in Chapter Four indicate that pedestrians of the George Walker Bush highway are more satisfied with the service quality dimensions measured than motorists with an average mean scores of 3.87 and 2.94 respectively.

5.4 CONTRIBUTION OF THE RESEARCH

In regards to the satisfaction of road users, there is no doubt that, this research has significantly contributed to the body of knowledge especially in the area of customer and road user satisfaction studies. This research has shown through evaluation that, the overall satisfaction of road users is indeed influenced by the technical and functional service quality dimensions. Drawing on this perspective, this study indeed affirm the assertion made by previous researchers such as Basri (2008) and Gronross (1988) and as well explored grey areas that needs further researches.

Currently, in road and transportation services, ensuring the satisfaction of road users is considered paramount. Thus, identifying the significant factors contributing to their satisfaction is regarded an essential means that assists road agencies and managers in the planning and implementation of road development projects toward the improvement of road infrastructure services. In this study, significant factors that influences the satisfaction of road users of the George Walker Bush highway has been identified and outlined. Also,

it has provided the satisfaction scores for the various quality dimensions measured. Therefore, as a contribution to existing knowledge in the customer satisfaction and the road industry, this research has thus put more spotlight on how satisfaction are perceived among road users of the George Walker Bush Highway.

5.5 LIMITATIONS OF THE RESEARCH

There are a number of limitations with this study. Firstly, the study was limited to only motorists and pedestrians of the George Walker Bush highway thus restricting other road users such as the households, offices, businesses along the highway from participating in the study. Secondly, the study focused on the 14 Km stretch of the highway, from Tetteh Quarshie to Mallam Junction. Thus, the findings cannot be generalized with the views of the entire road users in Ghana.

5.6 RECOMMENDATIONS FOR PROFESSIONALS AND STAKEHOLDERS

It is evidently clear that road users are becoming informed and knowledgeable about their roles in ensuring road agencies deliver quality and satisfactory road infrastructure projects. This suggests that there is the need for road agencies to streamline their policies and operations to incorporate the different aspects of road users' satisfaction concerns.

The study has also, revealed that both *technical* and *functional* service quality dimensions contribute significantly to the satisfaction of road users. Road agencies are therefore encouraged to focus more on ensuring that both technical and functional service quality concerns of the road users are considered at the planning, design and implementation stages of road projects.

Literature has shown that, there are no common methods of measuring the satisfaction of customers especially in the construction industry. Tikkanen and Alajoutsijarvi (2002) argues that measurement models in the service industries are overly simplistic and mechanistic to take into consideration the complexity of real life. Thus, there is the need for road agencies to create a comprehensive satisfaction measurement model for road user satisfaction researches.

Studies has also shown that for road agencies and road operators to continually provide roads that are non-defective from road users' perspective, then there is the need for road agencies to consistently undertake road user satisfaction surveys and the outcomes incorporated in policies and decision making processes. Thus, there is the need for road agencies to consider road users as their customers and their needs and concerns their priority.

5.7 RECOMMENDATIONS FOR FUTURE RESEARCH

There are more grey areas to be explored in this area of studies. Prospective researchers are encouraged to focus their studies on how feedback obtained from road users are incorporated in the decision making processes by the road agencies. There would also be the need to test the service quality model (SERVQUAL) on several areas in the construction industries particularly the road sectors in order to improve its application in this field.

5.8 CONCLUSION

In relation with the problem statement of this study, it can be established that, although $55.7 million was spent on the reconstruction of the George Walker Bush highway, travels

are still impaired heavily with road user satisfaction challenges. This indication is a clear evident that, the needs and concerns of road users cannot be overlooked or underrated in the planning, design and construction stages. Although customer satisfaction is not a new concept, few studies have been done in relation with road user satisfaction than with other products and services. Nowadays, the road agencies are under consistent pressure to improve their service quality delivery. The expectations of road users are changing over the years and as such road user focus and level of satisfaction are becoming the driving force for many road agencies across the globe. The road user satisfaction survey has become relevant because it gives the road agencies indications of their performance and if their efforts are yielding the desire results. The surveys also give the road users the impression that road agencies care about their needs and concerns. By co-operating with the road users, the road agencies can set measures and develop collective understanding of the expectations of road users.

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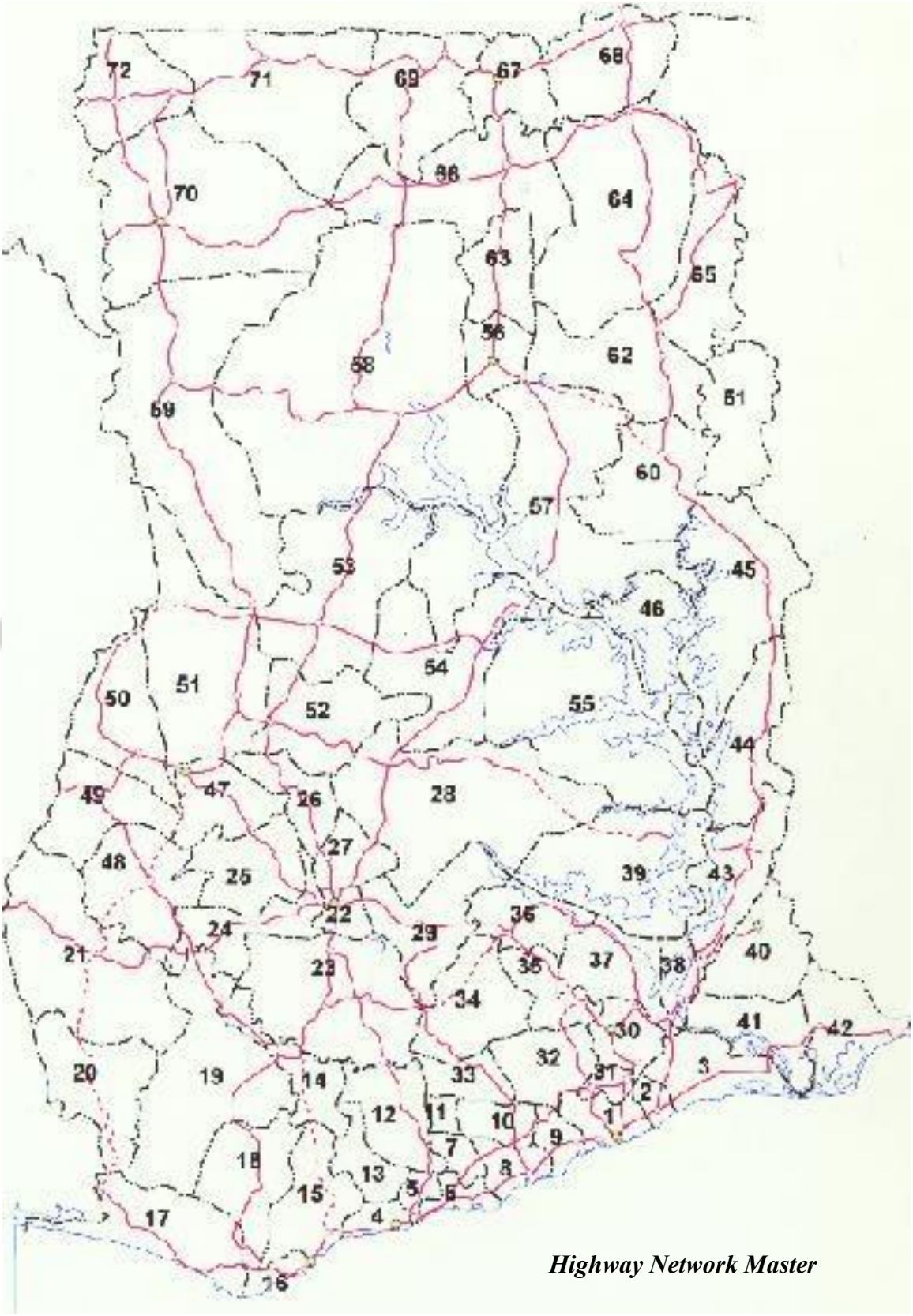
APPENDIX 1 ANNUAL AVERAGE DAILY TRAFFIC DATA Zoning Map



Highway Network Master

Table 2. 1. Traffic volume by typeTraffic Volume by Type

Type	1	2	3	4	5	6	7	8	9	
Station	Saloon	Pick up	Taxi	S.Bus	L.Bus	S.Yruck	L.Truck	Trailer	Others	Total
B1	197	49	9	5	11	25	3	8	1	308
B2	672	801	239	1216	402	227	78	19	82	3736
B3	3349	1216	671	3077	636	849	213	93	129	10233
B4	558	474	129	1365	338	214	56	96	59	3289
B5	224	57	364	12	14	29	5	12	1	718
B6	151	142	41	688	78	76	5	2	10	1193
B7	85	135	61	281	94	60	38	134	19	907
B8	620	561	106	746	460	422	99	173	177	3364
B9	109	183	343	666	149	382	49	97	61	2039
B10	9	7	14	14	0	4	0	0	0	48
B11	3	30	3	14	27	28	4	3	0	112
B12	9	15	0	0	0	0	0	1	0	25
B13	52	33	112	26	13	22	27	30	0	315
B14	2	2	1	41	5	3	4	28	0	86
B15	51	151	4	49	109	73	31	94	0	562
B16	0	0	0	18	3	1	0	0	0	22
A1	444	212	115	602	231	60	14	11	16	1705
A2	4759	1766	2183	3984	957	706	49	12	123	14539
A3	6601	2933	890	2036	523	1085	125	456	501	15150
A4	2211	1509	641	2522	953	1324	476	99	228	9963
A5	1936	1219	1668	1228	136	625	179	11	89	7091
A6	37	64	9	375	40	56	28	27	5	641
A7	694	544	572	1275	308	210	58	57	85	3803
A8	128	119	232	464	27	66	31	23	2	1092
A9	18	14	8	77	5	6	4	4	0	136
A10	10	44	1	1	37	13	2	9	1	118
A11	115	365	236	172	192	99	9	13	19	1220
A12	264	233	87	672	168	143	33	112	25	1737
A13	1	9	7	36	18	16	5	0	5	97
A14	28	5	65	16	0	2	1	0	0	117
A15	21	45	69	29	35	36	32	16	8	291
A17	2	0	0	0	4	4	0	0	0	10
A18	0	7	3	2	21	11	2	0	4	50
A20	1	10	0	0	8	6	17	0	0	42
A21	28	88	1	77	42	38	31	36	0	341
A22	4	42	3	2	10	5	3	2	3	74
A24	5	68	0	28	28	25	30	12	2	198
A25	9	89	10	10	17	21	3	2	2	163
A26	4	62	0	13	26	5	23	5	7	145
A27	0	9	0	0	5	3	11	1	0	29
A28	0	3	0	0	0	1	1	1	0	6
Total	23411	13315	8897	21839	6130	6981	1779	1699	1664	85715
	27.3%	15.5%	10.4%	25.5%	7.2%	8.1%	2.1%	2.0%	1.9%	100.0%

Highway Network Mast Plan

Composition of Traffic by Type

Type	1	2	3	4	5	6	7	8	9	

Station	Saloon	Pick up	Taxi	S.Bus	L.Bus	S.Truck	L.Truck	Trailer	Others	Total
B2	18.0%	21.4%	6.4%	32.5%	10.8%	6.1%	2.1%	0.5%	2.2%	100.0%
B3	32.7%	11.9%	6.6%	30.1%	6.2%	8.3%	2.1%	0.9%	1.3%	100.0%
B4	17.0%	14.4%	3.9%	41.5%	10.3%	6.5%	1.7%	2.9%	1.8%	100.0%
B6	12.7%	11.9%	3.4%	57.7%	6.5%	6.4%	0.4%	0.2%	0.8%	100.0%
A1	26.0%	12.4%	6.7%	35.3%	13.5%	3.5%	0.8%	0.6%	0.9%	100.0%
A2	32.7%	12.1%	15.0%	27.4%	6.6%	4.9%	0.3%	0.1%	0.8%	100.0%
A3	43.6%	19.4%	5.9%	13.4%	3.5%	7.2%	0.8%	3.0%	3.3%	100.0%
A4	22.2%	15.1%	6.4%	25.3%	9.6%	13.3%	4.8%	1.0%	2.3%	100.0%
A5	27.3%	17.2%	23.5%	17.3%	1.9%	8.8%	2.5%	0.2%	1.3%	100.0%
A6	5.8%	10.0%	1.4%	58.5%	6.2%	8.7%	4.4%	4.2%	0.8%	100.0%
A7	18.2%	14.3%	15.0%	33.5%	8.1%	5.5%	1.5%	1.5%	2.2%	100.0%
A8	11.7%	10.9%	21.2%	42.5%	2.5%	6.0%	2.8%	2.1%	0.2%	100.0%
A9	13.2%	10.3%	5.9%	56.6%	3.7%	4.4%	2.9%	2.9%	0.0%	100.0%
B7	9.4%	14.9%	6.7%	31.0%	10.4%	6.6%	4.2%	14.8%	2.1%	100.0%
B8	18.4%	16.7%	3.2%	22.2%	13.7%	12.5%	2.9%	5.1%	5.3%	100.0%
B9	5.3%	9.0%	16.8%	32.7%	7.3%	18.7%	2.4%	4.8%	3.0%	100.0%
B11	2.7%	26.8%	2.7%	12.5%	24.1%	25.0%	3.6%	2.7%	0.0%	100.0%
A10	8.5%	37.3%	0.8%	0.8%	31.4%	11.0%	1.7%	7.6%	0.8%	100.0%
A11	9.4%	29.9%	19.3%	14.1%	15.7%	8.1%	0.7%	1.1%	1.6%	100.0%
A12	15.2%	13.4%	5.0%	38.7%	9.7%	8.2%	1.9%	6.4%	1.4%	100.0%
A13	1.0%	9.3%	7.2%	37.1%	18.6%	16.5%	5.2%	0.0%	5.2%	100.0%
A15	7.2%	15.5%	23.7%	10.0%	12.0%	12.4%	11.0%	5.5%	2.7%	100.0%
B15	9.1%	26.9%	0.7%	8.7%	19.4%	13.0%	5.5%	16.7%	0.0%	100.0%
A18	0.0%	14.0%	6.0%	4.0%	42.0%	22.0%	4.0%	0.0%	8.0%	100.0%
A20	2.4%	23.8%	0.0%	0.0%	19.0%	14.3%	40.5%	0.0%	0.0%	100.0%
A21	8.2%	25.8%	0.3%	22.6%	12.3%	11.1%	9.1%	10.6%	0.0%	100.0%
A22	5.4%	56.8%	4.1%	2.7%	13.5%	6.8%	4.1%	2.7%	4.1%	100.0%
A24	2.5%	34.3%	0.0%	14.1%	14.1%	12.6%	15.2%	6.1%	1.0%	100.0%
A25	5.5%	54.6%	6.1%	6.1%	10.4%	12.9%	1.8%	1.2%	1.2%	100.0%
A26	2.8%	42.8%	0.0%	9.0%	17.9%	3.4%	15.9%	3.4%	4.8%	100.0%
A27	0.0%	31.0%	0.0%	0.0%	17.2%	10.3%	37.9%	3.4%	0.0%	100.0%
Total	27.2%	15.6%	9.9%	25.8%	7.2%	8.2%	2.1%	1.9%	2.0%	100.0%

Note: Excluding the survey stations on national boundaries.

PEDESTRIAN SURVEY DATA

LOCATION: Tullow			DATE: 2/4/12		KM:00	
DAY: Monday						
PEDESTRIAN CLASS	MORNING (7-10am)	AFTERNOON (12-2pm)	EVENING (4-6pm)	AVERAGE CROSSING TIME (SEC) WALKING	AVERAGE CROSSING TIME (SEC) RUNNING	AVERAGE WAITING TIME (SEC)
CHILDREN	15	3	30			
ADULTS	749	505	735			
ELDERLY	4	0	0			
DISABLED	1	0	0			
TOTAL	769	508	765			
LOCATION: North Dworwulu			DATE: 2/4/12		KM:1.6	
DAY: M0nday						
PEDESTRIAN CLASS	MORNING (7-10am)	AFTERNOON (12-2pm)	EVENING (4-6pm)	AVERAGE CROSSING TIME (SEC) WALKING	AVERAGE CROSSING TIME (SEC) RUNNING	AVERAGE WAITING TIME (SEC)
CHILDREN	73	12	36			
ADULTS	811	343	771			
ELDERLY	10	3	13			
DISABLED	1	1	1			
TOTAL	895	359	821			
LOCATION: Achimota Overhead			DATE:2/4/12		KM:5.7	ROAD WIDTH:13m
DAY:Monday						
PEDESTRIAN CLASS	MORNING (7-10am)	AFTERNOON (12-2pm)	EVENING (4-6pm)	AVERAGE CROSSING TIME (SEC) WALKING	AVERAGE WAITING TIME (SEC)	AVERAGE WAITING TIME (SEC)
CHILDREN	26	0	16	6.9	4.12	46.5
ADULTS	1,546	228	333	8.1	4.25	38.8
ELDERLY	24	0	1	10.5	7.3	
DISABLED	3	0	0			
TOTAL	1,599	228	350			

LOCATION: Akweteman			DATE:3/4/12		KM:7.3	
DAY: Tuesday						

PEDESTRIAN CLASS	MORNING (7-10am)	AFTERNOON (12-2pm)	EVENING (4-6pm)	AVERAGE CROSSING TIME (SEC) WALKING	AVERAGE WAITING TIME (SEC)	
CHILDREN	113	26	57			
ADULTS	1,486	763	886			
ELDERLY	10	15	24			
DISABLED	0	0	0			
TOTAL	1,609	804	967			
LOCATION: Lapaz Laspamas			DATE: 3/4/12		KM8.0	
DAY: Tuesday						
PEDESTRIAN CLASS	MORNING (7-10am)	AFTERNOON (12-2pm)	EVENING (4-6pm)	AVERAGE CROSSING TIME (SEC) WALKING	AVERAGE CROSSING TIME (SEC) RUNNING	AVERAGE WAITING TIME (SEC)
CHILDREN	81	29	103			
ADULTS	1,781	1,060	1,200			
ELDERLY	10	4	9			
DISABLED	2	0	2			
TOTAL	**1,874**	**1,093**	**1,314**			
LOCATION: Lapaz			DATE: 3/4/12		KM:8.3	
DAY: Tuesday						
PEDESTRIAN CLASS	MORNING (7-10am)	AFTERNOON (12-2pm)	EVENING (4-6pm)	AVERAGE CROSSING TIME (SEC) WALKING	AVERAGE CROSSING TIME (SEC) RUNNING	AVERAGE WAITING TIME (SEC)
CHILDREN	169	58	146	5.4	3.8	33.7
ADULTS	2,851	1,699	1,797			21.9
ELDERLY	117	63	66			
DISABLED	4	0	2			

TOTAL	**3,141**	**1,820**	**2,011**			
LOCATION: Lapaz Traffic Light			DATE: 4/4/12		KM:8.5	
DAY: Tuesday						

PEDESTRIAN CLASS	MORNING (7-10am)	AFTERNOON (12-2pm)	EVENING (4-6pm)	AVERAGE CROSSING TIME (SEC) WALKING	AVERAGE CROSSING TIME (SEC) RUNNING	AVERAGE WAITING TIME (SEC)
CHILDREN	277	150	1,204			
ADULTS	6,591	4,442	6,278			
ELDERLY	83	121	168			
DISABLED	6	3	4			
TOTAL	**6,957**	**4,716**	**7,654**			
LOCATION: Nyamekye Jn.			DATE: 4/4/12		KM:9.8	
DAY: Wednesday						
PEDESTRIAN CLASS	MORNING (7-10am)	AFTERNOON (12-2pm)	EVENING (4-6pm)	AVERAGE CROSSING TIME (SEC) WALKING	AVERAGE CROSSING TIME (SEC) RUNNING	AVERAGE WAITING TIME (SEC)
CHILDREN	273	43	161			
ADULTS	2,795	1,451	1,829			
ELDERLY	140	14	19			
DISABLED	0	0	0			
TOTAL	3,208	1,508	2,009			
LOCATION: Hong Kong			DATE: 4/4/12		KM:10.3	
DAY: Wednesday						
PEDESTRIAN CLASS	MORNING (7-10am)	AFTERNOON (12-2pm)	EVENING (4-6pm)	AVERAGE CROSSING TIME (SEC) WALKING	AVERAGE CROSSING TIME (SEC) RUNNING	AVERAGE WAITING TIME (SEC)
CHILDREN	101	17	53			
ADULTS	1,038	472	599	8.31	4.69	

ELDERLY	10	2	8			
DISABLED	0	0	0			
TOTAL	1,149	491	660			
LOCATION: Kwashieman			DATE: 5/4/12		KM:11.8	
DAY: Thursday						
PEDESTRIAN CLASS	MORNING (7-10am)	AFTERNOON (12-2pm)	EVENING (4-6pm)	AVERAGE CROSSING TIME (SEC) WALKING	AVERAGE CROSSING TIME (SEC) RUNNING	AVERAGE WAITING TIME (SEC)
CHILDREN	711	875	500			
ADULTS	4,961	2,462	2,402			
ELDERLY	277	105	13			
DISABLED	8	2	2			
TOTAL	5,957	3,444	2,917			
LOCATION: Awoshie			DATE: 5/4/12		KM:13.4	
DAY: Thursday					ROAD WIDTH:11.5m	
PEDESTRIAN CLASS	MORNING (7-10am)	AFTERNOON (12-2pm)	EVENING (4-6pm)	AVERAGE CROSSING TIME (SEC) WALKING	AVERAGE WAITING TIME (SEC)	
CHILDREN	1,182	684	1,111			
ADULTS	2,994	1,402	2,052			
ELDERLY	62	15	31			
DISABLED	2	1	7			
TOTAL	4,240	2,102	3,201			
LOCATION: Mallam			DATE: 12/4/12		KM:15.2	ROAD WIDTH:11.5m
DAY: Thursday						
PEDESTRIAN CLASS	MORNING (7-10am)	AFTERNOON (12-2pm)	EVENING (4-6pm)	AVERAGE CROSSING TIME (SEC) WALKING	AVERAGE CROSSING TIME (SEC) RUNNING	AVERAGE WAITING TIME (SEC)
CHILDREN	188	50	58	8.72	5	38.8

ADULTS	1,298	617	472	7.65	4.97	
ELDERLY	17	0	4	10.2	9	
DISABLED	2	0	4			
TOTAL	1,505	667	538			

APPENDIX 2 QUESTIONNAIRE FOR MOTORISTS KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

COLLEGE OF ART AND BUILT ENVIRONMENT DEPARTMENT OF BUILDING TECHNOLOGY

QUESTIONNAIRE DESIGN FOR MOTORISTS

SURVEY ON ROAD USERS' SATISFACTION OF GEORGE WALKER BUSH HIGHWAY

The Researcher is a Master of Philosophy Student in Construction Management at the Kwame Nkrumah University of Science and Technology, Kumasi and is undertaking a research into **"evaluation of road users' satisfaction of George Walker Bush Highway"** for purely academic purposes. All information furnished will therefore be treated with strict confidentiality.

The study seeks to evaluate the satisfaction level of the George Walker Bush Highway from the perceptive of the road users. The Evaluation of Road Users' Satisfaction is a Survey that identifies and measures the significant factors that influences the satisfaction of road users. The expected outcome of the research is to help provide comprehensive framework and guidelines that would enhance the planning, design, construction and administration of road infrastructure projects.

Your responses will be an immense contribution of the success of the study and its outcome to the road users and stakeholders of the road industry.

Thank you.

PARTS OF THE QUESTIONNAIRE

The questionnaire consists of three main sections; Section A, Section B and Section C. Section A requests for the demographic profile of the respondents. Section B and C measures the satisfaction levels among respondents. Kindly answer or tick the option (s) to each of the questions below;

SECTION A: **DEMOGRAPHIC PROFILE**

1. What Category of respondents do you belong to?

☐ Saloon Car Driver ☐ Taxi Driver ☐ Pick /4WD Veh. Driver
☐ Small Bus Driver ☐ Large Bus Driver ☐ Light Bus Driver
☐ Heavy Truck Driver ☐ Trailer Driver ☐ Motor Rider

2. What age group do you belong to?

☐ 18-25yrs ☐ 26-35yrs ☐ 36-45ys ☐ 46-55yrs ☐ Above 55yrs

3. What is your educational background?

☐ Primary level ☐ JHS/Middle school level ☐ SHS/'O' Level/'A' Level
☐ Vocational/Technical/Commercial ☐ Post-SHS/HND/Diploma
☐ Under graduate or equivalent ☐ Post graduate or equivalent

SECTION B: **EVALUATION OF ROAD USERS' SATISFACTION LEVELS TOWRADS THE TECHNICAL QUALITY DIMENSIONS OF THE ROAD INFRASTRUCTURE**

Considering your experience with the George Walker Bush Highway, please indicate your level of importance and satisfaction levels for the following road infrastructure attributes to you as indicated in the statements below. The response scale for the level of Importance is as follows:

1. Not At All Important 2. Not Very Important 3. Neutral 4. Somewhat Important 5. Extremely Important

The response scale for the level of Satisfaction is as follows:

1. Very Dissatisfied 2. Somewhat Dissatisfied 3. Neutral 4. Somewhat Satisfied 5. Very Satisfied

S/No	TECHNICAL QUALITY DIMENSIONS	Level of Importance						Level of Satisfaction				
		1	2	3	4	5		1	2	3	4	5
A	**ROAD SAFETY**											
A1	The provision of adequate **Road Markings** on the road surface											
A2	The provision of adequate **Street Lights** along the highway											
A3	The provision of adequate **Traffic Control Devices** on the highway											
A4	The provision of adequate **Traffic Barrier** such as guardrails, crash barriers among others											
A5	The provision of adequate **Road Signage**											

		Level of Importance						Level of Satisfaction				
S/No	**TECHNICAL QUALITY DIMENSIONS**	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
B	**ROAD SURFACE CONDITION**											
B1	A **Non-defective** road surface											
B2	The **Free flow** of surface water when it rains											
B3	**Air pollution** caused by Vehicular Fumes											
C	**ROADSIDE AMENITIES**											
C1	The **provision of adequate Parking Areas & Bus Stops**											
C2	The **Provision of adequate Drainage Structures** such as Drains, Culverts											
C3	**Landscaping Maintenance** (such as Grassing and Paving of the median and road sides)											
C4	Provision of **Service Lanes**											
C5	**Accessibility to Social Facilities** such as Schools, Residences, Offices, Hospitals etc. along the highway.											

S/No	TECHNICAL QUALITY DIMENSIONS	Level of Importance						Level of Satisfaction				
		1	2	3	4	5		1	2	3	4	5
D	**CLEANLINESS**											
D1	**Cleanliness of Parking Areas & Bus Stops**											
D2	**Cleanliness of Road Surface**											
D3	**Cleanliness of Drainage Structure** such as Drains, Culverts etc.											

SECTION C: **ROAD USERS' SATISFACTION LEVELS TOWARDS FUNCTIONAL QUALITY DIMENSIONS OF THE ROAD AGENCY (GHA)**

Considering your experience with the George Walker Bush Highway, please indicate your level of importance and satisfaction levels towards the Road Agency as indicated in the statements below. The response scale for the level of Importance is as follows:

1. Not Important 2. Slightly Important 3. Moderately Important 4. Very Important 5. Extremely Important

The response scale for the level of Satisfaction is as follows:

1. Very Dissatisfied 2. Dissatisfied 3. Neither satisfied nor dissatisfied 4. Satisfied 5. Very satisfied

S/No	FUNCTIONAL QUALITY DIMENSIONS	Level of Importance						Level Satisfaction				
		1	2	3	4	5		1	2	3	4	5
E	**RESPONSIVENESS**											
E1	Road Agency's **Willingness** to address road user needs											
E2	Road Agency's **Promptness** in addressing road user concerns											
F	**ASSURANCE**											
F1	**Experienced** Staff at the Road Agency											
F2	Staff at the Road Agency are **considerate** to the needs of road users											
G	**RELIABILITIY**											
G1	The ability of the Road Agency to perform their designated road services/responsibilities **dependably**											
G2	The Road Agency's ability to perform their designated road services/responsibilities **accurately**											

QUESTIONNAIRE FOR PEDESTRIANS

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI
COLLEGE OF ART AND BUILT ENVIRONMENT DEPARTMENT
OF BUILDING TECHNOLOGY

QUESTIONNAIRE DESIGN FOR PEDESTRIANS

SURVEY ON ROAD USERS' SATISFACTION OF GEORGE WALKER BUSH HIGHWAY

The Researcher is a Master of Philosophy Student in Construction Management at the Kwame Nkrumah University of Science and Technology, Kumasi and is undertaking a research into **"evaluation of road users' satisfaction of George Walker Bush Highway"** for purely academic purposes. All information furnished will therefore be treated with strict confidentiality.

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Your responses will be an immense contribution of the success of the study and its outcome to the road users and stakeholders of the road Agencies.

Thank you.

PARTS OF THE QUESTIONNAIRE

The questionnaire consists of three main sections; Section A, Section B and Section C. Section A requests for the demographic profile of the respondents. Section B and C measures the satisfaction levels among respondents. Kindly answer or tick the option (s) to each of the questions below;

SECTION A: **DEMOGRAPHIC PROFILE**

1. What Age group and Category of respondents do you belong to?

☐ Child Up to 14yrs ☐ Adult 15-60yrs ☐ Elderly Above 60yrs

2. What is your educational background?

☐ Primary Level ☐ JHS/Middle school level ☐ SHS/'O' Level/'A' Level
☐ Vocational/Technical/Commercial ☐ Post-SHS/HND/Diploma
☐ Under graduate or equivalent ☐ Post graduate or equivalent

SECTION B: **EVALUATION OF ROAD USERS' SATISFACTION LEVELS TOWARDS THE TECHNICAL QUALITY DIMENSIONS OF THE ROAD INFRASTRUCTURE**

Considering your experience with the George Walker Bush Highway, please indicate your level of importance and satisfaction levels for the following road infrastructure attributes as indicated in the statements below. The response scale for the level of Importance is as follows:

1. Not Important 2. Slightly Important 3. Moderately Important 4. Very Important 5. Extremely Important

The response scale for the level of Satisfaction is as follows:

1. Very Dissatisfied 2. Dissatisfied 3. Neither satisfied nor dissatisfied 4. Satisfied 5. Very satisfied

S/No	TECHNICAL QUALITY DIMENSIONS	Level of Importance					Level of Satisfaction				
		1	2	3	4	5	1	2	3	4	5
A	**PEDESTRIAN SAFETY**										
A1	The provision & location of adequate **Foot Bridges** along the highway										
A2	The provision of adequate **Street Lights** along the highway										
A3	The provision of adequate **Traffic Control Devices** on the highway										
A4	The provision of adequate **Traffic Barrier** such as guardrails, crash barriers among others										
A5	The provision of adequate **Road Signage**										

B	**PEDESTRIAN CROSSINGS**											
B1	The **Soundness** of Foot Bridges											
B2	The **Free flow** of surface water when it rains											
B3	**Air pollution** caused by Vehicular Fumes											
S/No	**TECHNICAL QUALITY DIMENSIONS**	**Level of Importance**						**Level of Satisfaction**				
C	**ROADSIDE AMENITIES**	**1**	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
C1	The **provision of adequate Bus Stops** along the highway											
C2	The **provision of adequate Drainage Structures** such as Drains, Culverts etc.											
C3	**Landscaping Maintenance** (such as Grassing and Paving of the median and road sides)											
C4	**Accessibility to Social Facilities** such as Schools, Residences, Offices, Hospitals etc. along the highway.											
D	**CLEANLINESS**											
D1	**Cleanliness of Bus Stops**											
D2	**Cleanliness of Footbridges**											

D3	**Cleanliness of Drainage Structure** such as Drains, Culverts etc.											

SECTION C: **ROAD USERS' SATISFACTION LEVELS TOWARDS THE FUNCTIONAL QUALITY DIMENSIONS OF THE ROAD AGENCY (GHA)**

Considering your experience with the George Walker Bush Highway, please indicate your level of importance and satisfaction levels towards the Road Agency as indicated in the statements below. The response scale for the level of Importance is as follows:

1. Not Important 2. Slightly Important 3. Moderately Important 4. Very Important 5. Extremely Important

The response scale for the level of Satisfaction is as follows:

1. Very dissatisfied 2. Dissatisfied 3. Neither satisfied nor dissatisfied 4. Satisfied 5. Very satisfied

S/N.o	FUNCTIONAL QUALITY DIMENSIONS	Level of Importance						Level of Satisfaction				
		1	2	3	4	5		1	2	3	4	5
E	**RESPONSIVENESS**											
E1	Road Agency's **Willingness** to address road user needs											
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F	**ASSURANCE**											
F1	**Experienced** Staff at the Road Agency											
F2	Staff at the Road Agency are **considerate** to the needs of road users											

G	**RELIABILITIY**												
G1	The ability of the Road Agency to perform their designated road services/responsibilities **dependably**												
G2	The Road Agency's ability to perform their designated road services/responsibilities **accurately**