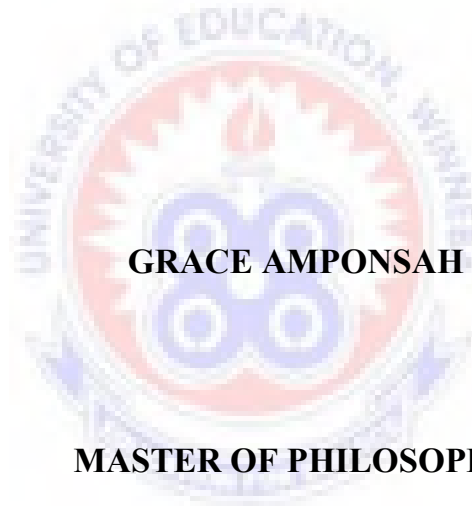


UNIVERSITY OF EDUCATION, WINNEBA

**CHOICE OF PUBLIC TRANSPORT TO WORK AND DRIVERS'
AGITATION FOR INCREASE IN TRANSPORT FARES IN SOME
SELECTED TOWNS IN THE CENTRAL REGION**



MASTER OF PHILOSOPHY

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AGITATION FOR INCREASE IN TRANSPORT FARES IN SOME
SELECTED TOWNS IN THE CENTRAL REGION**



**GRACE AMPONSAH
(201818970)**

**A thesis in the Department of Economics Education,
Faculty of Social Sciences Education, submitted to the School
of Graduate Studies in partial fulfilment**

**of the requirement for the award of the degree of
Master of Philosophy
(Economics)
in the University of Education, Winneba**

OCTOBER, 2020

DECLARATION

Student's Declaration

I, GRACE AMPONSAH, hereby declare that this thesis is the result of my own original research and it has not been submitted, either in part or whole for another degree elsewhere with the exception of quotations and references contained in published works which have all been identified and acknowledged.

Signature:

Date:

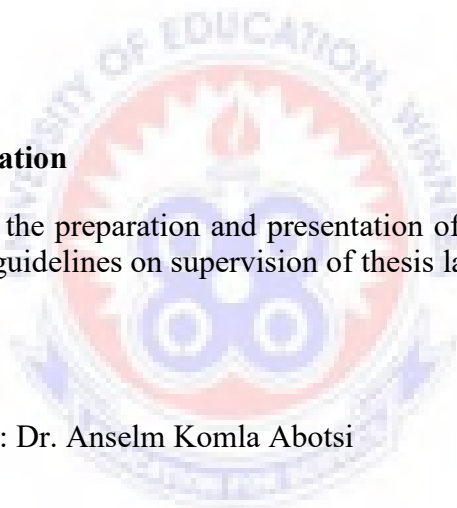
Supervisor's Declaration

I hereby declare that the preparation and presentation of the thesis was supervised in accordance with the guidelines on supervision of thesis laid down by the University of Education, Winneba.

Name of Supervisor: Dr. Anselm Komla Abotsi

Signature:

Date:



DEDICATION

To my sweet mother Mrs. Margaret Adeleke, my siblings Ernestina, Magdalene, Ruth and Joshua, my niece Britney Maya Sarpong and nephew Jayden Kwabena Otchere.



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My foremost and deepest appreciation goes to God Almighty for guiding me through this study till completion. I also express my profound and infinite gratitude to my supervisor, Dr Anselm Komla Abotsi who is my supervisor and the Head of Economics Department of the University of Education, Winneba for his wholehearted guidance throughout the completion of this work. I say thank you for your valuable contributions. I am grateful to the University of Education Winneba for offering me the opportunity to pursue my postgraduate studies. Many thanks go to the lecturers of the Economics Department, University of Education Winneba especially Mr. Anthony Abbam for his encouragement and tutelage during my studies. To Dr. Ishmael Y. Dadson, I say thank you. Special thanks to Dr. Isaac Owusu-Mensah of the University of Ghana, Political Science Department, I appreciate you.

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ABSTRACT

Traffic congestion has gained the attention of researchers and policy makers due to how common it has become in the cities of Ghana. This study sought to empirically investigate the factors that influence the choice of public transport to work and drivers' agitation for increase in transport fares in the Central Region of Ghana. The study employed quantitative research approach with structured questionnaire as the main instrument for data collection. With respect to choice of public transport to work, a sample of 210 household heads were selected from Kasoa using multi-stage sampling technique. On drivers' agitation for increase in transport fares, simple random sampling technique was used to select 200 drivers from Kasoa, Swedru and Mankessim. A double-hurdle model was used to analyse the factors that influence choice of public transport to work as well as households' expenditure on public transport. Probit regression model was used to examine factors that influence drivers' decision to agitate for increase in transport fares. The results revealed that the level of income, reliability, convenience and safety of public transport are the factors determining participation in public transport to work while gender, household size, employment type and affordability of public transport influence households' expenditure decisions on public transport. In addition, results of the study showed that cost of fuel, cost of spare parts and nature of road are the factors that influence drivers' decision to agitate for increase in transport fares. The study recommends that, public transport should be made safe, reliable and convenient to enhance choice of public transport to work and this will help reduce traffic congestion during peak hours. Also, though the introduction of import tax waiver on spare parts will help reduce cost of spare parts, steps need to be taken to rehabilitate and maintain roads and reduce prices of fuel, in order to minimise drivers' decision to agitate for an increase in transport fares thereby making public transport more affordable for households.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Transportation, according to the Full English dictionary is a facility consisting of the means and equipment necessary for the movement of passengers or goods. Transportation can be broadly seen as not to only include the conveyance of freight and mobility of persons, but also recognising the flow of information, labour and capital, and the activity of providing access to resources and opportunities (Schulz, 2004). This definition of transportation broadens the scope to include non-motorised systems; walking, bicycle and animal drawn cart (Rahman, D'Este & Bunker, 2008; Krizek, Handy, & Forsyth, 2009), as well as non-traditional modes such as the use of ICT (Information and Communication Technologies) to transfer expertise and resources between spatial environments (Schulz, 2004). Mbara (2002), refers to transportation as a "system" made up of two main constituents, thus, the vehicle commonly referred to as the "carrying unit" and the path which in transport term is referred to as the "way". Based on this, transport comprises of an "infrastructure component" and a "service component". The infrastructure component represents the roadway, railway, tunnel bus, aircraft, ship and train. The service component constitutes the carrying unit such as bus, aircraft, ship or train. From the above definitions, it can be observed that transportation is a conduit through which mobility is facilitated.

Mobility is an essential part of human life especially in the cities. It is an irrefutable fact that mobility is part of the daily round of activities and as such, an essential component of the life of every human being (Albalate and Bel, 2010). This calls for a reliable, effective and affordable transport system capable of enhancing mobility.

Since the beginning of time, transportation services have become important to societies as it affects greatly the life and development of people and region.

The contributions of the transportation sector to the sustainability of cities have been widely recognised. However, it has been inseparably linked to the climate-change challenge. In 2009, transport was responsible for 23 percent of energy-related greenhouse gas emissions, and its share keeps growing. In one projection, energy related carbon dioxide emissions were expected to grow by 40 percent between 2013 and 2040. In addition, transport is responsible for 13% of Greenhouse Gas (GHG) emissions worldwide and 23% of total energy-related Greenhouse Gas emissions (UN Habitat, 2011 as cited by Cervero, 2013).

It is projected that cities will be home to some 5.4 billion residents by 2050, equivalent to 2/3 of the projected global population and the number of vehicles on the road will double to reach 2 billion by then (World Bank Group, 2019). An estimated one billion people in low-income countries still lack access to an all-weather road. In many cities, time lost to congestion erodes prosperity. High mobility costs adversely affect the disposable income of the poor who often lack reliable and affordable public transportation (World Bank Group, 2019).

Transportation infrastructure plays a critical role in the transition from a middle- to high-income economy since it serves as a key necessity for specialization thus allowing production and consumption of products to occur at different locations thereby enhancing economic growth (Rodrigue, 2020).

Transportation being a crucial driver of economic and social development, it brings opportunities for the poor and enables economies to be more competitive. Transport infrastructure connects people to jobs, education, and health services. It enables the

supply of goods and services around the world; and allows people to interact and generate the knowledge and solutions that foster long-term growth (World Bank, 2019). In an urbanized society, an efficient transportation system is one of the fundamental components of the social, economic, and physical structures, and it has to be competitive and attractive to commuters (Rodrigue, 2020). Rural roads, for example, can help prevent maternal deaths through timely access to childbirth-related care, boost girls' enrolment in school, and increase and diversify farmers' income by connecting them to markets. The sector is crucial to reducing poverty, boosting prosperity, and achieving the Sustainable Development Goals (SDGs), as transport is at the heart of critical development challenges (World Bank, 2019).

Due to the manner modern cities and communities are planned and operated, a physical demarcation between home and work is usually created, which makes it compulsory for people to transport themselves to places of work, study, or leisure, as well as to temporarily relocate for other daily activities. Passenger transport is also the essence of tourism which is a major part of recreational transport. Business activities require the transport of people to engage in commerce, either to allow face-to-face communication for important decisions or to move specialists from their regular place of work to sites where they are needed.

According to Abuhamoud, Rahmat and Ismail (2011), transport in Africa is a blend of different modes. Some of the most popular transport modes are motorcycle taxis, commuter taxis, personal vehicles, auto-rickshaws, and non-motorized means like cycling and walking. The continent's transit sector is evolving with the emergence of new transport modes such as Bus Rapid Transit, light rail systems, and e-ridesharing. Even the use of unmanned aerial vehicles is emerging in Africa's transport landscape,

with a number of foreign organizations currently piloting drones, particularly for medical deliveries. However, the sector has its short falls some of which include fractured road networks that limit access to work for a significant portion of the population; decreasing air quality in major cities due to increasing motorization; and inadequate safety measures, especially on roads, resulting in a high accident incidence rate. Haq and Schwela (2012) also adds that, road transport in Africa is accompanied with traffic congestion, air pollution, high level of accident rate, waste of time, inaccessibility to vehicles by the poor, poor vehicle condition, high maintenance, travel and repair cost, etc. Further, there is the issue of worsening traffic congestion and air quality largely due to the proliferation of informal operators, such as the private microbus and minibus in most African cities. These mini-buses have been said to be typically composed of second-hand vehicles which are inadequately maintained; operated for long hours at low speed as well as characterised by unpredictability of routes, schedules, and fares (Kumar & Barrett, 2008).

According to the World Bank (2007), transport in Ghana is accomplished by road, rail, air and marine. Ghana's transportation and communications networks are centered in the southern regions, especially the areas in which gold, cocoa, and timber are produced. The northern and central areas are connected through a major road system. Road transport in Ghana may be categorized into four (4) main segments namely urban, express services, rural-urban and rural. The demand for urban passenger transport is mainly by residents commuting to work, school, and other economic, social and leisure activities. Most urban transportation in Ghana is by road and provided by private transport including taxis, mini-buses and state/private-supported bus services. By road transport buses are the main mode of transport accounting for about 60% of passenger movement. Taxis account for only 14.5% with

the remaining accounted for by private cars. According to the Ministry of Roads and Transport (2016), Ghana's road transport infrastructure is made up of 72,381 km of road network linking the entire country in the year 2008. The network consisted of 12,786km of trunk roads, 40,671km of Feeder roads and 9,764km of urban roads. The road network as 21st December, 2011 had increased to 13,367km of trunk roads, 42,100km of feeder roads and 12,600km of urban roads. On the whole, traffic densities are low, except in the large cities of Accra and Kumasi, where peak hour densities are relatively high.

The vision of Ghana's transport sector has been to ensure the provision of "an integrated, efficient, cost-effective and sustainable transportation system which is responsive to the needs of the society, supports growth and poverty reduction and is well capable of establishing and maintaining the nation as a transport hub of West Africa" (Ministry of Transport, 2008). In all, about 95% of passenger travels and 98% of freight cargo is transported on the country's road network. Travel to work is faced with many challenges including bad roads, lack of access roads, traveling over long distances, heavy traffic on road and difficulty in getting access to vehicles (Ghana Statistical Services, 2015). Looking at transportation expenditure in Ghana, according to the GLSS-7 main report, transportation expenditure is one of the important expenditures among the category of non-food expenditures. In figures, household transport expenditure constitutes 8.1% of the total household non-food expenditures. (Ghana Statistical Service, 2019)

Accra is the capital of Ghana and is very densely populated. Accra is located in the southern part of Ghana and has a population of about 4 million (Government of Ghana, 2016 as cited by Bartels-Kodwo, 2016). Overall, 55.3% of Ghana's total

population is urbanised and according to 2015 estimates, the country's rate of urbanisation is 3.07%. It is obvious that Ghana's urbanisation has been increasing persistently over the past three decades rising from around 4 million to 14 million (World Bank, 2015). The persistent increase in the population in the urban centers comes with a noticeable effect on the transport sub-sector in the country in terms of its availability, efficiency, reliability and affordability for most urban low-income earners who generally rely on public transport to conduct economic and other services in Central Business Districts (CBDs).

Motorization in the Accra Metropolitan area, at 90 vehicles per 1,000 people, was higher than the average in Africa. For example, motorization in Nairobi, Dar es Salaam, and Addis Ababa were between 20 and 30 vehicles per 1,000 people (Bus Priority Design and Infrastructure Report, 2013). Nonetheless, road transport is almost the only transport option for Accra as it carries 97% of Accra's passengers from one point to another (Mensah, Annan & Andoh-Baidoo, 2014). Public transportation is one of the biggest problems Accra faces because options for transportation are limited to road transport, creating heavy congestion on the road and hence, acute traffic problems (Bartels-Kodwo, 2016). Bus Rapid Transport (BRT) was proposed to improve public transport system through improvement in efficiency and affordability, reduction in congestion and Green House Gas emissions in CBD-Kasoa transit corridor in Accra. Essentially BRT involves coordinated improvements in transit system infrastructure, equipment operations and technology that gives preferential treatments to buses on the CBD-Kasoa transit corridor (Ministry of Roads and Transport, 2016).

The primary objective of public transport is to be sustainable, and for it pricing to generate sufficient revenues to ensure an adequate, efficient and continuing supply of public transport services. It is commonly argued that if urban public transport is to satisfy these objectives, it cannot be expected to cover its full costs. The role of public transport system is not only to cater for those who cannot afford a personal means of transport, but also to reduce traffic congestion and, most importantly, to economize in the use of road space, which is very expensive to provide especially in developing countries (Poku-Boansi, 2008). Urban mass transport is consequently subsidized in many major cities. However, many of these cities are no longer in a position to fund such policies, and their mass transport sectors are facing deterioration as a consequence of inadequate funding. This process of decline is compounded by the fact that many governments have attempted to use the public transport industry as an instrument of social policy through public transport unions such as the Ghana Private Road Transport Union (GPRTU) by simultaneously constraining fare levels and structures.

The Ghana Private Road Transport Union (GPRTU) is the umbrella group that unites private commercial vehicle owners and their drivers in Ghana. The organization has branches in all the 16 regions of Ghana and is a member of the Ghana Trades Union Congress. (GPRTU 2011). It was founded on 19th May 1967 in Accra (Ocran, 1997). Poku-Boansi and Adarkwa (2011) consider the Ghana Private Road Transport Union (GPRTU) as a dominant player constituting almost 80% of intra urban public transport services. Abane (2013) similarly observes that GPRTU controls 70-80 percent of passenger and freight movements of inter-urban (intercity) public transport. The GPRTU also are responsible for the negotiation of transport fares on behalf of public transport drivers.

1.2 Statement of the Problem

Over the last few decades, the world has experienced an unprecedented increase in population (UNFPA, 2012). The ratio of urban dwellers among the world's total population which was estimated at 3.36 billion inhabitants, majority of whom live in the developing world. This population is projected to see a colossal increase over the next few decades (Demographic report, as cited by AFD & MEEDDM, 2009). It is estimated that African countries will see the biggest upsurge as 55% of the African population will be living in urban areas by 2020, thereby imposing a high demand for mobility (Trans-Africa Consortium, 2010). The situation is threatening as much of the existing transport infrastructure and services in many African states are in a deplorable state, coupled with the dearth of inefficient public transit organisations in Africa (AFD & MEEDDM, 2009; Trans-Africa Consortium, 2010). This has resulted in increased congestion in cities, loss of productive man-hours in traffic, environmental pollution amongst others, due to uncoordinated public transport systems largely provided by the informal sector (Pucher, Korattyswaroopam & Ittyerah, 2004).

In response to the mobility crisis arising from the gross inadequacies of the various public transportation modes, African governments have developed various strategies to meet transport needs (Kwakye, Fouracre, & Ofosu-Dorte, 1997; World Bank, 2012). These strategies range from improving highways capacity to ensuring access to mobility for vulnerable groups like the disabled, the urban poor who are usually mobility deprived (Docherty, Shaw, & Gather, 2004). For instance, Nigeria, Côte d'Ivoire and South Africa, just to mention but a few, have developed and maintained mass public transit systems (AFD & MEEDDM, 2009; Trans-Africa Consortium,

2010). In Kenya, plans are underway to develop new mass rapid transport systems to ease the country's urban traffic congestion (World Bank, 2012).

Ghana's public transport system has been dominated by private sector provision of paratransit for many years. It serves about 95% of public transport needs, often using shared taxis and minibuses (Wilson, 2006). The most common form of public transport in Accra is the minibus (trotro). It transports almost 60% of Accra's passengers while taxis transport about 15% (Armah, Yawson, & Pappoe, 2010). The paratransit sector provides low service capacity; nevertheless, large number of vehicles is required to meet demand. The dominance of these services, inter alia, creates discomfort, traffic congestion, journey delays and high level of environmental pollution, thereby retarding national economic growth and development (Trans-Africa Consortium, 2010; Poku-Boansi & Adarkwa, 2011). Combined with poor traffic management and the increasing cost of living, public transport mobility in cities continues to have tremendous impact on the livelihoods of citizens and development aspirations. Meanwhile, it has been observed that, commuters are perceived to act as rational beings, choosing travel modes most likely to offer them maximum utility. Therefore, an analysis of the factors that influence public transport choice will provide policy makers with information needed to implement interventions to ensure efficient, effective and affordable public transport services.

Making public transport services in Ghana affordable, especially in the private sector, has been a persistent problem for all the stakeholders in the transport sector. It has been observed that road transport operators in Ghana tend to increase fares indiscriminately. This phenomenon keeps reoccurring year after year especially anytime there are upward adjustments in fuel prices (Poku-Boansi, 2008). Another

argument put forward by road transport operators is the persistent increase in prices of spare parts. However, this indiscriminate pricing system results in high food prices, high inflation as well as instances of very nasty quarrels and violence between commercial drivers, their assistants and passengers at various lorry stations (Poku-Boansi, 2008). There is also the problem of persistent strike actions by drivers demanding higher transport fares, which the government and passengers often resist. This unsystematic fare increases may not be affordable to low-income travelers. However, in the absence of a matching compensation, non-increment in transport fares may erode the revenue base of the transport operators, which will have a toll on costs operation. Following from the above, it is important that an empirical study is undertaken to identify and describe the factors that influence drivers' agitation for increases in transport fares so that appropriate policy strategies are put in place to curb indiscriminate adjustment in transport fares in Ghana.

According to Abekah-Nkrumah, Assuming and Telli, (2019) like most major cities in developing countries, prevalence of traffic congestion poses a serious problem for mobility in Accra, the capital city of Ghana. Accra is experiencing increasing urban sprawl: A growing number of residents live in the expanding outskirts of the city and commute to the central business district (CBD). However, the city lacks modern mass transport systems and transport infrastructure is inadequate. This problem is compounded by inefficient use of the available road space, mainly due to low adherence to traffic regulations or bad driving habits, hawking, and jaywalking. The Winneba-Graphic Road corridor is one of the heaviest-used routes in the Accra metropolitan area and daily traffic volume along the entire Winneba Road is estimated to be about 50,000, while along Graphic Road, daily traffic volume has reached 40,000 (Department of Urban Roads (DUR), 2010). Population projections predict

growth of Kasoa and other communities to the west of Accra, which will put additional pressure on these roads (DUR, 2010). To help address the problem of traffic congestion, the Greater Accra Passenger Transport Executive (GAPTE) launched a basic bus rapid transport (BRT) -Lite service in November 2016 as an improved high-capacity transport alternative to the traditional semiformal system of public transportation according to Abekah-Nkrumah et al, (2019). A study conducted by Nkrumah et al (2019) focused on the Adenta-CBD corridor and the Amasaman-CBD Corridor, also, the study focused on the patronisation of the BRT Lite (Ayalolo Bus System) and compared households' choices from the time it was introduced and eighteen months later.

This study first of focuses on the Kasoa-CBD corridor which is one of the four main corridors that lead to CBD as identifies by the Greater Accra Passenger Transport Executive (GAPTE). Also, this study is focuses on the choice of all modes of public transport and making public transport affordable that will make households increase expenditures on public transport. This is done by looking at factors that influence drivers' decision to agitate for increase in transport fares which leads to making the public transport services less affordable.

1.2 Objectives of the Study

The general objective of the study is to analyse choice of public transport to work and drivers' agitation for increase in transport fares in Ghana.

Specifically, the study seeks to;

1. Analyze the factors that influence transport choice to work.
2. Examine the factors that influence drivers' decision to agitate for an increase in transport fare.

1.3 Research Questions

1. What are the factors that influence the choice of public transport to work?
2. What are the factors that influence public transport drivers' decision to agitate for an increase in transport fare?

1.4 Significance of the Study

The study will inform government and policy makers in formulating and implementing policies and programs to develop an accessible, adequate, safe, and affordable transport system. This may support efforts to reduce traffic congestion, air pollution and fuel consumption and this will help reduce labor time spent in traffic and increase productivity as well as trade. Again, the study will help appreciate the crucial role of the state and the private sector in the efficient management of transportation in Ghana. In addition, the study brings to light the factors apart from fuel that influence drivers to agitate for increase in transport fares.

Also, the study will add unto the body of growing literature on public transportation and serve as a reference document for future researchers to build upon existing knowledge. That is, because the research focuses on household's involvement in public transport usage in Ghana and what goes into transport fare increment; an area where research is lacking, the study will serve as a channel to get more researchers into researching the area.

1.5 Definition of Terms

Household – A household consists of one or more people who live in the same dwelling and share meals. It may also consist of a single family or another group of people (Haviland, 2003). The household is the basic unit of analysis in many social,

microeconomic and government models, and is important to economics and inheritance (O'Sullivan & Sheffrin, 2003).

Public transport – they are all modes available to the public irrespective of ownership. Scheduled bus services, coach, domestic air and rail operators, including taxis, private hire buses and coaches, are all examples of public transport. Provision of school services by hired-in buses and coaches, which may in some cases be restricted to pupils of a specific school or education authority, is also included (White, 2009). The study defines public transport as taxis, buses and trotro (which is a Ghanaian jargon of large vans that has been converted to 12-14 passenger seat and operated by a driver and mate and work along pre-defined routes)

Transport Mode-mode of transport is a term used to distinguish between different ways of transportation or transporting people or goods. The different modes of transport are air, water, and land transport, which includes Rails or railways, road and off-road transport. Other modes also exist, including pipelines, cable transport, and space transport. The means of transport, on the other hand, refers to the (motorized) vehicles necessary for transport according to the chosen mode (car, airplane, ship, truck and rail). Each mode of transport has a fundamentally different technological solution, and some require a separate environment. Each mode has its own infrastructure, vehicles, and operations.

Transport Choice- is defined as the act of selecting among different alternatives of different transport mode to meet a travel need at a particular point in time.

Transport Expenditure-All payments made by households on transportation services from home to their choice of destination. It includes expenses on lorry fares, fuels as well as that on school bus, train, airplane, etc.

Transport Fare- Payment that drivers receive from passengers for transport service provided.

1.6 Organisation of the Study

The study is organised under five main chapters. Chapter One gives the background of the study which include the problem statement, objectives of the study, research questions, significance of the study, definition of terms and organisation of the study. Chapter Two presents varied literature on transport systems in Ghana, development of transport in Ghana, the role of transportation in economic growth and development, problems of public transport, theories of public transport demand, empirical literature among others. Chapter Three is concerned with the study methodology: This chapter details out methods used in data collection and analysis. Chapter Four presents data gathered from the field surveys as well as analysis and discussions of the data. Chapter Five is devoted to the summary of the findings and conclusions of the study. This was done under the study research questions and objectives. Recommendations made from the study analysis have also been presented in chapter five.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter provides a review of relevant literature on choice of transport mode, expenditure on transport and pricing of public transport. It involves a review of theoretical and empirical literature. The theoretical review entails a discussion on transportation systems in Ghana, development of transportation system in Ghana, factors that influence transport and the role of transport in economic growth and development. This is followed by a brief review of the main theories on transport choice and pricing of public transport services. After this, relevant empirical literature on choice of transport mode, expenditure on transport and pricing of transport services are presented.

2.1 Transportation systems in Ghana

The inter-regional transportation system consists of transportation facilities and services that allows movement trips involving people and goods to occur. The Overview of Transportation and Socio-Economic Conditions Report (2007) describes the transportation system infrastructure for all modes of travel that are in Ghana which are, road, rail, marine and air. Originally the British administration promoted the motorized road transport. The first car in Ghana was a French steam car built by Gardner-Serpollet in 1902. The car was steam-driven through a fire made by paraffin (Heap, 1990). The construction of a narrow-gauge railway began in 1898 and the line between the harbor in the twin town Sekondi-Takoradi and the gold mine in Tarkwa opened in 1901. In 1911, a side connection to a manganese mine in Prestea was opened (Gould, 1960; Jedwab & Moradi, 2012).

2.2 Development of transport in Ghana

The transportation infrastructure in Ghana has grown through daily use. Where people cut down trees and made a path, permanent paths developed. In this way, a network arose that met the needs for the self-sufficient farming communities. Originally a few trade routes existed over the Sahara and through these routes came the new Islamic culture and ideas for some empires north of Ghana such as Mali and Songhay (Burchardt, 2014). Railways were the focus from 1900 to 1920 and it was the only way to industrialize the gold production with heavy equipment for steam power to handle lifts, pumps, mechanical drills and other tools (Luntinen, 1996).

According to Burchardt (2014), in 1928 the loading time of manganese went down from three weeks to three days. The railways covered only a little part of Ghana, and they were not a success in the long run. According to Burchardt (2014), a report following the military coup in 1979 said the railway doubled the number of staff since the end of the colonial era in 1957. Now 20 years later it had 15,524 people employed - one for each 60 meters (Burchardt, 2014). This explains how transport employed people into the sector. In international comparative measurement of efficiency, Ghana's railway was among the worst. Its wagons ran less than 100 km a year. According to Luntinen (1996) the policy in the 1960s and 1970s was building new roads that were one-third cheaper than railways. Railroads became stronger in many of the French-influenced countries around Ghana because of their longer lines and links with other countries.

The use of personal cars was still low in the interwar period, and most owners were white colonial officers and missionaries or natives working for them (Pirie, 2011). Those who drove trucks, buses, and taxis were dominated black people (Hart, 2011).

Road transportation continued to grow and it was estimated in 1951 that the turnover of the truck transportation was 4-6 times larger than the turnover of the railways. A lot of secondary roads were built, often by local initiatives Burchardt (2014). It has not been possible to obtain statistics about the road length for all years, while the available statistics are not reliable. According to Pedersen (2001), it is estimated that the deterioration of the roads was larger than the investments in the roads between 1970 and around 1997, in spite of some large construction projects financed by foreign countries. Since then, the road network has expanded, but not enough to handle the rapidly growing traffic.

According to World Bank (2009) the roads in Ghana are managed by three road agencies. The Ghana Highway Authority (GHA) which was established in 1974 and is responsible for the trunk roads. The Department of Feeder Roads (DFR) was established in 1981 to be responsible for the rural roads. Around 50% of the network is in maintainable condition. The head office is in Accra and there are regional and district offices. The Department of Urban Roads (DUR) is responsible for city roads in urban areas. The road network was in a very good condition at the time of independence in 1957. The road budgets declined in the 1960s and the maintenance suffered. In the 1970s the roads were breaking faster than they could be maintained. According to Burchardt, (2014) in 1982, the Ministry of Roads and Highways was established to handle the matters. It did not solve the problem due to lack of money, and a reconstruction of the ministry in 1996 to Ministry of Roads and Transport made for better administration. Organizational initiatives were taken to make better plans for construction and maintenance. One of the initiatives was the establishment of the Ghana Road Fund in 1985 to provide a secure source of funding for road maintenance. The revenue was derived from a fuel levy on petrol (that became the

dominant income on 90 % of the income), from road, bridge and ferry tolls and vehicle examination fees. When the Road Fund was established in 1985, the policies said agencies should receive their money in the ration of 50:30:20 respectively, but this ratio is not very stable (World Bank, 2009). Since 1998, further income has come from transit fees. For its first few years, the fund had huge problems with its economy where less than 35% the required funding came in. The administration of the road fund has improved, but there are still problems.

According to Wilson (2006), urban public transportation experienced a downturn similar to the railway in the year's independence. To address public transportation needs in Ghana, successive Governments, among other things, created public transport enterprises such as the Omnibus Service Authority (OSA) Transport Company, State Transport Company (STC), City Express Services (CES), and lately Metro Mass Transit (MMT), limited for efficient delivery of public transportation to increase productivity and economic growth. The need for transportation was gradually overtaken by trotros and today a number of vehicles are operated by MMT on regular lines (Burchardt, 2014). Over the past few decades, containerization and the logistical revolution transformed the shipping industry worldwide, but the new infrastructural requirements have not yet been introduced to Ghana, and only a few percent of the containers arriving in Ghana continue inland. An explanation for this could be that the labor costs are low and therefore the costs of loading and unloading trucks are still of little importance (Pedersen, 2005). Many of the export goods such as manganese, gold, and wood, to some extent, are not suitable for containers, and they are transported as bulk (Hilling, 1973). The development of cell phone had an enormous impact on transportation because now farmers can sell their goods without the earlier

problem of contacting transportation services. This advantage can give the farmers better prices (Porter, 2014).

Looking at water transport, a study conducted by Larbie and Belboo (2014) explained that Ghana has a major water body along the southern boundary of the country, that is, the Gulf of Guinea and a major river body, the Volta Lake linking the southern section to the northern section which when used wisely can improve upon the transportation system in Ghana by reducing the pressure on the road networks. Along this lake and the coast are towns, communities, villages that depend on the use of these water bodies for their livelihood and business activities. The use of fishing canoes has been the available mechanism for transporting people and goods. According to Solomon, Otoo, Boateng, and Koomson (2020), water bodies have been an amazing mode of transport for carrying people and/or goods within and across regional, national and continental borders. Hitherto, a lot of countries depended on inland water transport for the transportation of bulk and general cargo across lakes/ivers over long distances.

Ghana's Inland Water Transport (IWT) system managed by Volta Lake transport Company (VLTC) has been in operation for decades. Ghana's maritime trade has seen significant development over the years (Ghana Ports and Harbour Authority (GPHA), 2007). Ghana has two major maritime ports namely, the Tema Port and the Takoradi Port. These ports are regulated by the GPHA. The shipping industry in Ghana with major entities such as the ship-owners Agents Association of Ghana (SOAG) and the Ghana Institute of Freight Forwarders (GIFF) has contributed immensely to the economic and trade development in Ghana. The Ghana Shippers' Council is formed with the sole aim of protecting and promoting the interest of shippers in Ghana. The

Council ensures conducive and transparent environment to maintain business efficiently at the ports (GPHA, 2007).

2.3 Role of Transportation in economic growth and development

The railway was the only way to industrialize the gold production with heavy equipment for steam power to handle lifts, pumps, mechanical drills and other tools. In spite of the Ashanti surrender, the railway engineers were in danger during the construction of the railway around 1900 (Luntinen, 1996).

In 1928 the loading time of manganese reduced from three weeks to three days. The use of personal cars was still low in the interwar period, and a lot of the owners were white colonial officers and missionaries or natives working for them (Pirie, 2011). Those who drove in the trucks, buses, and taxies were dominated by black people (Hart, 2011). Road transportation continued to grow. It was estimated in 1951 that the turnover of the truck transportation was 4 to 6 times larger than the turnover of the railways. The construction of secondary roads increased, mostly by local initiatives. The economy forced the politicians to stop building and maintaining roads in 1961. The situation became worse for many years, with its lowest point in 1983. It has not been possible to obtain statistics about the road length for all years, while the available statistics are not reliable.

Pedersen (2001) said it may ~~be~~ be a matter of definition when a trail is a feeder road or just a food path". It was estimated that the deterioration of the roads was larger than the investments in the roads between 1970 and around 1997, despite some large construction projects financed by foreign countries. Since then, the road network has expanded, but not enough to handle the rapidly growing traffic. Urban public transportation experienced a downturn similar to the railway in the years after the

independent. Trying to solve public transportation needs in Ghana, successive governments, among other things, created public transport enterprises which includes the Omnibus Service Authority (OSA) Transport Company, State Transport Company (STC), City Express Services (CES), and lately Metro Mass Transit (MMT) Limited for efficient delivery of public transportation to increase productivity and economic growth (Wilson, 2006). The need for transportation was gradually overtaken by trotros and today only a few hundred vehicles are operated by MMT on regular lines. Another factor has reduced the need for large roads.

According to Adanu, Konadu-Agyemang, and Panford (2006), the roads in Ghana are managed by three road agencies. The Ghana Highway Authority (GHA) was established in 1974 and is responsible for the trunk roads. The Department of Feeder Roads (DFR) was established in 1981 to be responsible for the rural roads. Around 50% of the network is in maintainable condition. The head office is in Accra and there are regional and district offices. The Department of Urban Roads (DUR) is responsible for city roads in urban areas. The road network was in a very good condition at the time of independence in 1957.

From the previous discussions on how transport plays an important role in economic growth and development, it is realized that, public transport plays an important role in the transport sector and the economy as a whole. Public transport being made accessible to both the rural and urban settlements as well as households of all income levels helps in economic growth. One of the aims of this study is to help reduce traffic congestion. It is believed that, traffic congestion during peak hours reduces productivity time. In that, the time spent in traffic, could be used in production and this will increase productivity at the end of the day. Also, the longer individual sits in

traffic, labour experiences stress and fatigue and therefore cannot produce efficiently at work. This will gradually decrease productivity which will decrease GDP per capita. Reduction in traffic congestion will lead to efficient and effective economic activity in the urban centers of Ghana. This will make the GDP per capita of Ghana increase significantly.

According to Gwilliam (1996) and Rodrigue (2003), cities are major origins of growth in most developing countries with urban population expanding at a high rate (more than 6 percent annually or doubling in size in less than 12 years). He further states that urbanization has been one of the dominant contemporary paradigms as a growing share of the global population lives in cities. Considering this trend, urban transportation issues are of foremost importance to support the passenger and freight mobility requirements of large urban agglomerations. Transportation in urban areas is highly complex because of the modes involved, the multitude of origins and destinations, and the amount and variety of traffic.

Traditionally, the attention of urban transportation has been on passengers as cities were viewed as locations with highest human interactions with intricate traffic patterns linked to commuting, commercial transactions and leisure activities. However, cities are where production, consumption and distribution of activities are located linked to movements of freight. Conceptually, the urban transport system is linked with urban form and spatial structure. Urban transit is an important dimension of urban transportation, notably in high density areas, as viable cities are linked with efficient transit systems. The World Bank (2004) report on Urban Transport Overview (UTO), categorizes the urban transport sector into the following elements: The urban

road system, Traffic management systems (for increasing the efficiency of available road space), Non-motorized transport systems (facilities for pedestrians and people-powered vehicles), Urban transport institutions (planning, design, finance, implementation, and enforcement), and Urban public transport: On-street systems (for buses, trolley-buses, trams), mixed on-street and off-street systems (bus lanes, bus ways and light rail); and off-street systems (metros and commuter rail).

The report again states that urban motor vehicle ownership and use is growing even faster than the urban population. Vehicle ownership growth rates of 15-20 percent per year in developing countries are common (World Bank, 2004). This has been hugely caused by growing per capita incomes in urban areas. Ownership and usage of vehicles is growing much faster than the ability of developing and industrial countries to provide road space and alternative means of coping with the problem. Severe traffic congestion and its adverse side effects on the urban economy, environment, and society are being felt in many cities. The growing reliance on private vehicles has resulted in a substantial decline in the share of total trips being provided by urban public transport systems in many cities. In some instances, there has been an absolute decline in urban public transport patronage and service levels. Similarly, the travel space for pedestrians and people-powered vehicles has rapidly declined. This trend is particularly unfavourable for the urban poor as they are typically captive riders and often dependent on public transport for access to their jobs (World Bank, 2004).

Rodrigue (2003), further states that cities represent places with a high level of accumulation and concentration of economic activities. They are complex spatial structures to be supported by transport systems. The most important transport problems are often related to urban areas, especially when urban transport systems,

for a variety of reasons, cannot satisfy the numerous requirements of urban circulation. Urban productivity is highly dependent on the efficiency of its transport system, notably to move labour, consumers and freight between several origins and destinations. The growing complexity of cities has been accompanied by a wide array of urban transportation problems. These include problems of service provision with its related issues. One of such issues critical to an efficient transport service industry is that of pricing. This is critical because, the continuous existence of service providers in the industry can be threatened by poor pricing strategy. The same, however, cannot be said of the consumer, but this may be manifested in conflicts and increasing long queues emanating from people's unwillingness to invest in the provision of the service.

According to the World Bank (2004) report on Urban Transport Overview (UTO) report, the consequent increase in traffic volumes and road congestion has caused substantial adverse impacts, especially in the largest cities of developing countries. These impacts are expressed in several dimensions. They include; Economic, where business efficiency is adversely affected by traffic delays. Environment, where slow moving traffic, combined with an ill-maintained stock of vehicles, is making the megacities in developing countries the most polluted in the world; in some large city centres road traffic accounts for 90-95 percent of health threatening lead and carbon monoxide in the air and a major share of suspended particulate matter. Lastly, social, where sprawling land-consuming urban structures and deteriorating traffic conditions are making the journey to work, particularly for some of the very poor, excessively long and costly (World Bank, 2004).

Kwakye and Fouracre and Ofosu-Dorte (1997) also established that the urban transport problems in Ghana, is as a result of the following: Poor terminal or lorry-park organization and management, which restricts the optimum use of the available public transport capacity. Secondly, the use of small vehicles for public transportation, which contributes significantly to congestion on the roads. Thirdly, the low affordability threshold of the majority of the urban poor, who can only meet low public transport fares. In addition, lack of funding (local and foreign) available to operators, who are thus unable to replace their existing vehicle stock with more modern, efficient and comfortable buses. Also, the low capacity of the existing road network, and its inefficient use. Again, poor planning and control procedures for land use development, resulting in additional traffic congestion and safety hazards. Further, the low standards of road traffic awareness, vehicle maintenance, and driver behaviour, which contribute to the high accident rates, particularly amongst pedestrians and children. Lastly, the poor upkeep of vehicles which causes excessive vehicular emissions.

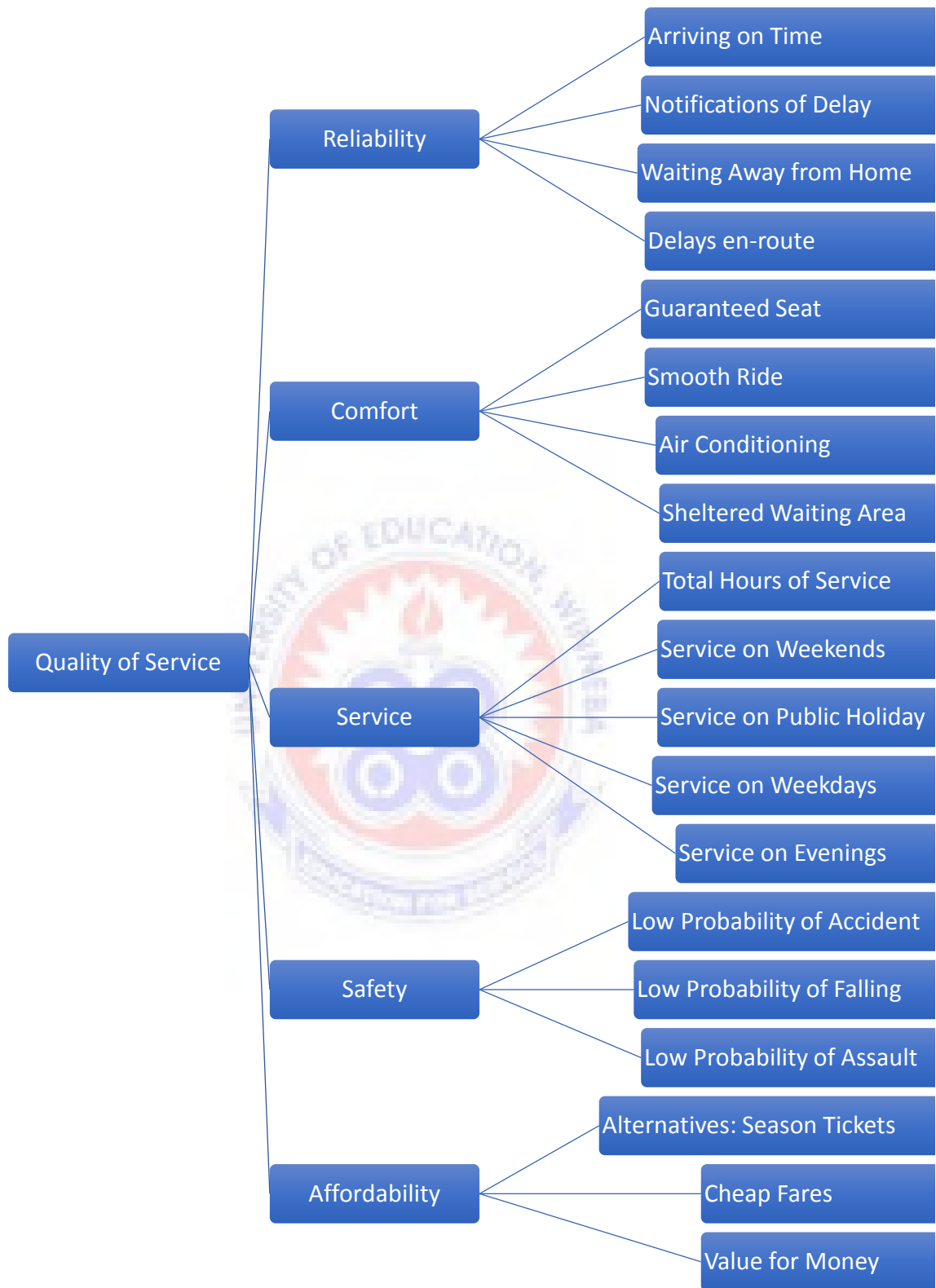
Recognizing the inability of the public sector to provide adequate finance for urban transport infrastructure and, in many cases, the relative inefficiency of the public sector in providing urban transport services, the public sector is increasingly relying on the private sector to provide these facilities and services. It is estimated that, at least 80 percent of all urban bus services provided around the world are now privately owned and operated (World Bank, 2004). Increasingly, cities are arranging concessions or other arrangements for the private provision of urban transport infrastructure and services. In short, cities are moving from providers of transport infrastructure and services to facilitators (World Bank, 2004). It must be said that unless prices in the industry are efficient and attractive enough to realize this desire of

private sector involvement in the provision of the service, the desire to have them providing the services will not be realized. This therefore calls for the consideration of the interest of all stakeholders within the urban transport industry.

Below is a figure that shows service quality of public transport



Figure 1: Service quality of public transport



Quality of Service

Aspects of Quality

Attributes of Quality

Source: McKnight, Pagano and Paaswell (1986).

2.4 Pricing of Public Transport

Pricing refers to fees and financial incentives, including fares, fuel taxes, road tolls, parking fees, vehicle insurance premiums, and other vehicle charges (Litman, 2002). According to Kotler and Armstrong (1998), price is all around us. It is the amount of money charged for a product or service or the sum of the values that consumers exchange for the benefit of having or using it. It must be said that price goes by many names: rent for an apartment, tuition for education, fee to a physician or dentist, rate for utilities, interest for money borrowed and fare for taxi, bus, and airline or railway services, among others (Schwartz, 1981; Kotler, 2000). According to Litman (2003), price also refers to perceived, internal, variable costs; that is, the direct incremental costs that an individual consumer trades off in exchange for using a good or service. For example, the price of travel generally includes the fare, vehicle expenses, travel times, risk and discomfort that an individual bears, but not external cost they impose on others (such as congestion delay, crash risk or pollution cost borne by others), or costs a consumer bears individually, such as general taxes used to fund roadways that an individual pays regardless of their travel habits. For the purposes of this study, pricing refers to the amount of money drivers charge passengers for using the public transport services they are providing. In other words, it is the cost incurred for the use of transport services, either passenger or freight.

There are key pricing principles. Firstly, according to Mitric (2002), price can be made to reflect costs (cost-based pricing). This principle is also shared by Litman (2003). They both state that cost must be defined to encompass full cost of service provision. In the analysis of the operating costs of the operators', two types of cost were estimated. They are Direct Operating Costs; made up of wages, fuel and energy, parts and suppliers as well as purchased services and reflection of Capital Costs; also

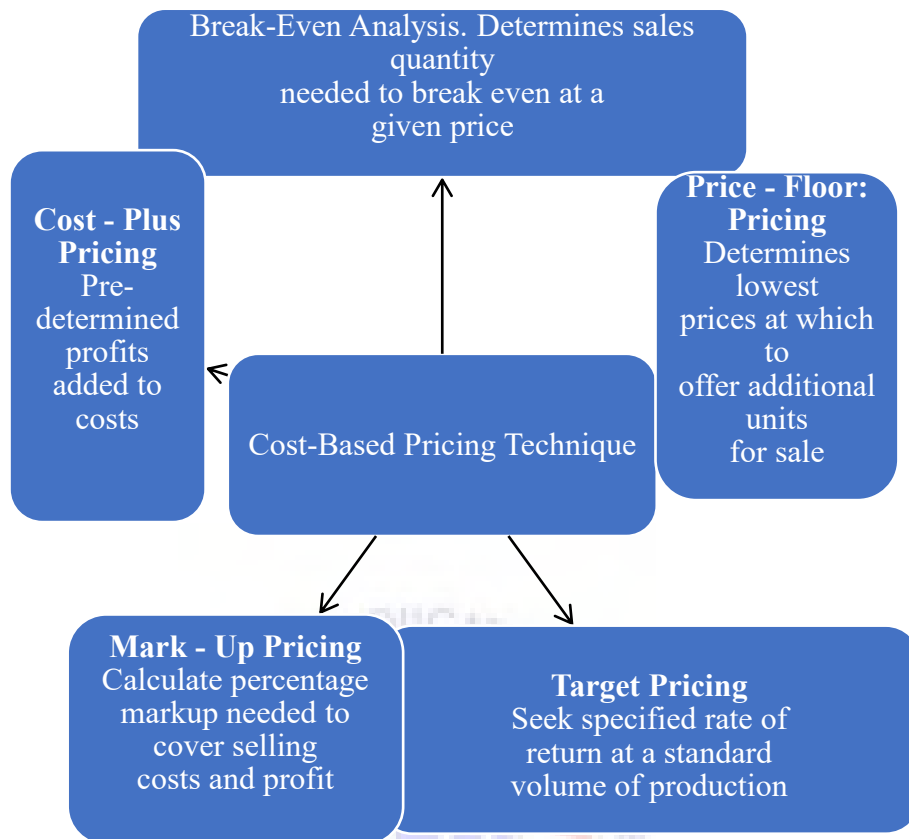
made up of depreciation and financial costs (interest). These two costs can be added to obtain the cost (generalized cost) of operating transport services. It must be noted that, the cost of transport services is subsidized since it is common to find urban public transport fares lower than the required full cost recovery (break-even). These include Russia, most eastern European countries and Central Asian countries (Mitric, 2002).

2.5 Pricing Strategies for Public Transport Services

Techniques and approaches used in the pricing of the transport services in some countries were reviewed.

According to Evans and Berman (1997), a pricing strategy may be cost, demand or competition based. The first pricing strategy is cost-based, where a firm sets prices by computing merchandise, service and overhead costs and then adding an amount to cover its profit goal. Cost-based prices are rather easy to derive because there is no need to estimate elasticity of demand or competitive reactions to price changes (Kotler, 2000). There is also greater certainty about costs than demand. Finally, cost-based pricing seeks reasonable profit since it is geared towards covering all types of cost. When used by itself, cost-based pricing does have some significant limitations. It does not consider market conditions, the full effects of excess plant capacity, competitive prices, the product or service phase in its life cycle, market share goals, consumer's ability to pay and other factors (Nagle and Holden, 1995; Evans and Berman, 1997; Kotler, 2000). Examples of cost-based pricing as shown in Figure 2 are Cost-Plus Pricing, Markup Pricing, Price-Floor, Breakeven Analysis and Target Profit Pricing.

Figure 2: Cost-Based Pricing Technique

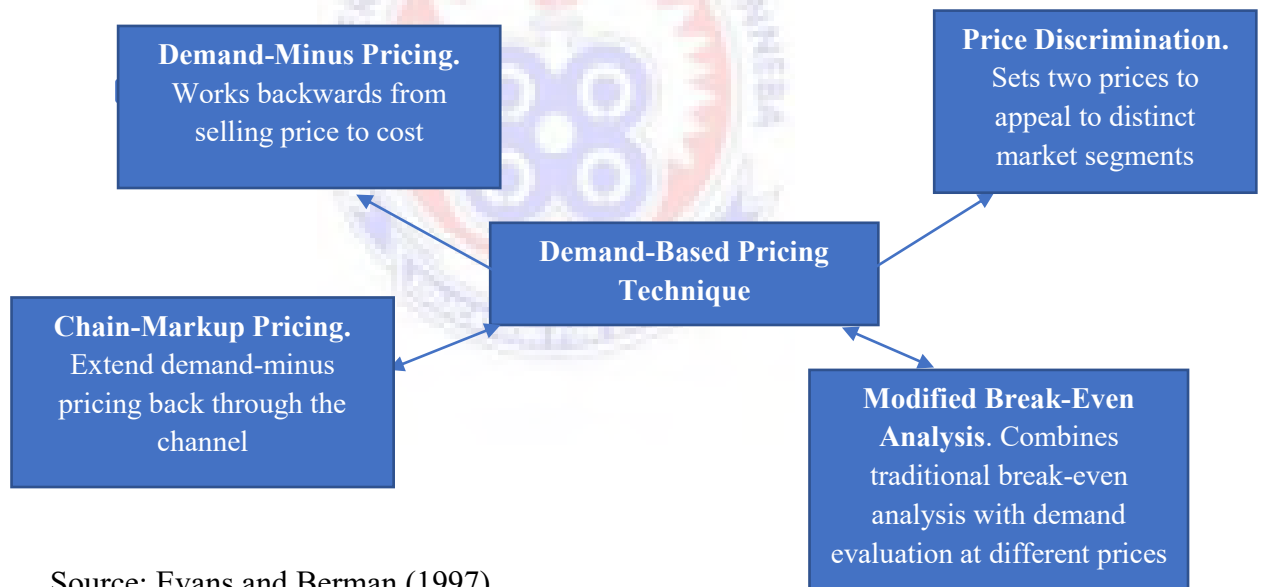


Source: Evans and Berman (1997)

From Figure 2, it can be seen that all the examples of cost-based pricing techniques aim at cost recovery. For example, Mark-Up pricing strategy uses a percentage mark-up needed to cover selling cost as well as make profit. With regards to the interest of the current study, this pricing technique is best applicable in an industry where the interest of the service provider (driver) is paramount. It therefore follows that this pricing strategy serves the interest of transport operators in the urban transport industry. This is so because, transport operators seek to cover their cost of providing transport services as well as make some profit on their operations.

Another pricing technique is demand-based pricing. With this strategy, a firm sets prices after studying consumer desires and then ascertaining the range of prices acceptable to the target market. This approach, according to Evans and Berman (1997) as well as Kotler and Armstrong (1998), is used by companies that believe price is a key factor in consumer decision making. It identifies a price ceiling which is the maximum amount consumers will pay for a given good or service. Its level depends on the elasticity of demand and consumer objective price regarding the particular good or service (Hanssens, Leonard, Parsons and Schultz, 1990). It requires research into quantities that will be purchased at various prices, sensitivity to price changes, the existence of market segments and consumer's ability to pay.

Figure 3: Demand-Based Pricing Technique



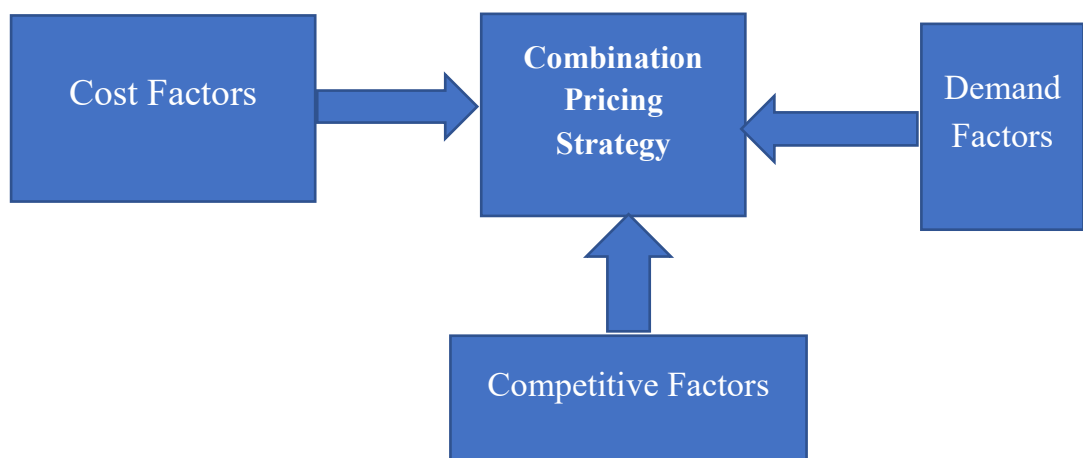
Source: Evans and Berman (1997)

The types of demand-based pricing techniques as shown in Figure 3 lay more emphasis on the consumers' ability to pay for the service or product. For example, the price discrimination technique sets prices for different categories of consumers since it aims at enticing different market segment. Higher prices are offered for inelastic segments while lower prices are offered for elastic segments. It is worth noting that

this pricing strategy will best fit the pricing of different transport modes of the urban transport industry. Thus, minibus, taxis and the metro mass transit services. This is so because each mode offers a service with certain characteristics all aimed at attracting certain category of passengers. This means, for example, that passengers who will like to enjoy higher levels of comfort may have to pay much higher than those who will not experience the same level of comfort.

The final pricing strategy is the combination pricing (Nagle & Holden, 1995; Evans & Berman, 1997). Although cost, demand and competition-based pricing methods are useful separately, aspects of all should be integrated when necessary. This is done often in practice. From Figure 5, it can be seen that it is important that companies and service providers integrate their cost, demand and competitiveness when pricing their products and services (Kotler, 2000). This will help them to price their products or services realistically and efficiently. It must be noted that in the urban transport industry, this pricing strategy may be the best form of pricing since issues such as costs, demand and competitiveness reflecting the interest of stakeholders are taken into consideration.

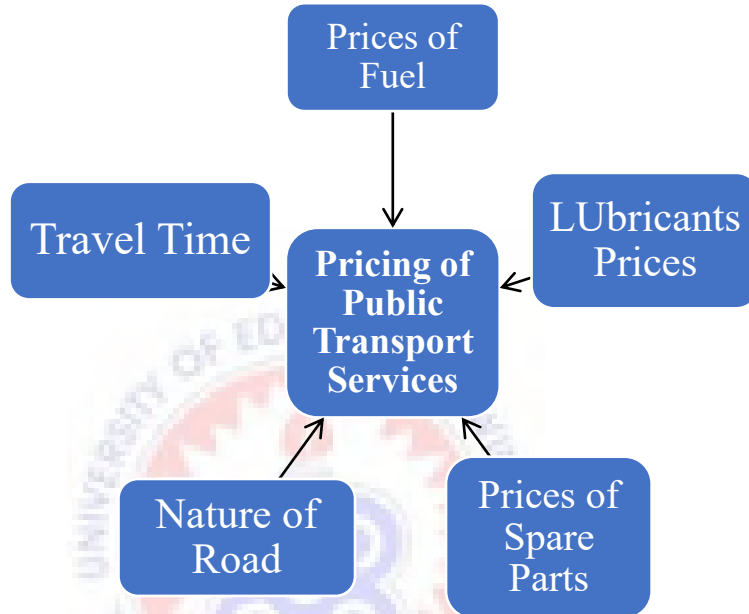
Figure 4: Combination Pricing Technique



Source: Evans and Berman (1997)

Based on the above pricing strategies reviewed, the study adopts that the cost-based pricing technique to develop a framework for pricing public transport services in Ghana based on the various cost that drivers incur when providing the service in Figure 5.

Figure 5: Pricing of Public Transport



Source: Author's Construct, 2020

From Figure 5, prices of fuel, lubricant prices, prices of spare parts, nature of road and travel time should be considered in the pricing of public transport services in Ghana.

2.6 Theories of Public Transport Demand

In the literature, a number of theories have been developed to explain demand for public transport some of which are described as follows.

2.6.1 The theory of planned behaviour

The theory of planned behaviour demonstrates how social influences can predict behaviour (Ajzen, 1985). The theory postulates that positive attitudes and social norms surrounding public transport as well as a high perceived level of behavioural

control (or the ease with which public transport can be used) determine the level of intention or willingness to use public transport, which should relate strongly to actual public transport use (Ajzen, 1985). Bamberg (2000) analysed several meta analytic review articles which concluded that intentions account for approximately 20-30% of the variance in actual or revealed behaviours. Gardner and Abraham (2008) used a meta-analysis to examine social predictors of car use and found that the elements of the Ajzen's (1985) theory of planned behaviour were all supported in the context of car use. Habit was also found to have a strong social influence over car driving behaviour (Gardner & Abraham, 2008). The authors suggest that if habit is the primary psychological factor determining car use, then advertising campaigns to shift attitudes to promote public transport use are unlikely to succeed, as the decision to travel is automated and better interrupted by instrumental interventions (e.g. price or trip duration changes).

2.6.2 Social equity theories

Social equity theories among other theories is firmly attributed to state intervention in public transport delivery, (Litman, 2002; Cervero, 2011). Social equity often requires subventions for disadvantaged people such as the low-income earners, physically challenged, elderly and the infirm (Litman, 2002). In the view of Cervero (2011), public transport is a form of social investment. Cervero (2011) therefore concurs with Litman (2002) that public provision of transport infrastructures and services is more efficient and socially equitable than the market alternatives. Governments therefore intervene either solely or collaboratively in public transport provision to ensure adequate access to jobs, healthcare, education, and other public services for the vulnerable and mobility deprived, who are usually public transit dependent (Cervero,

2011). State intervention in public transit industry plausibly serves as instrument of social policy to guarantee decent living for the citizenry.

2.6.3 Location theory

More than a century and a half ago, Thünen (1826) and Ricardo (1817) observed that land, labour, and capital are the primary inputs of production and that the use of land is determined, in part, by its location. The location of transportation facilities and transportation technology determines the relative location, or accessibility, of places. Thus, land values as well as land uses reflect the relative locational advantages transportation systems confer. Thünen (1826) among others, dealt with agricultural land uses; Isard (1956), Wingo (1972), and Alonso (1964), among others, dealt with the urban case. Kain (1962), Mills (1967), Anas (1985), and others have extended and elaborated on the basic approaches. All of this group of models are rooted in land economics and in the concepts of optimality and equilibrium in land allocation.

In simple form, consider a center at which production and distribution activities are concentrated. Transportation costs increase with distance from the center, and in determining the amount to bid for land at a particular location, the bidder takes the transportation costs into account. All else being equal, location at the center minimizes transportation costs; land values therefore are highest at the center, and other locations will command lower rents reflective of their greater costs of transport. But not all land uses would gain equally from a central location. If transportation is easily accessible, a central location maximizes access to suppliers and to markets (Pisarski, 1981).

Specialization is best supported by such a location, which also offers greater opportunities for economies of agglomeration and economies of scale than do less centrally situated sites. Activities that are specialized, that can capture the economies that central places make possible, or that need regular face-to-face contact with other firms, can minimize their costs by locating close together in central locations. They thus outbid others for space there. Ancillary firms that provide goods and services to these central offices also need good access to the center but require less face-to-face contact (and probably have a lower-salaried work force, with lower values of time). Hence, they will locate near, but not at the center. Other activities with less frequent need for central access bid less and locate further out.

Housing is one such activity, because access to the center is primarily needed for employment. A balance is reached with particular uses characteristically found in central places, others in successive rings farther out. The theory postulates a clear causality: Accessibility determines the worth of land for different uses at different locations. If transportation costs are changed, the rent gradients change; because land uses and rents for land are tied to each other by market processes, land use potentials are changed. According to Deakin (1991) applying this theory, investments that lower the cost of transportation to an employment center should simultaneously reduce the value of land at the center and increase the value at the periphery. Reduced commuting costs (or times, because time has value) would make it possible for commuters to spend more on housing, to travel farther, or both. If, as is usually the case, transportation is cheap relative to housing and one can buy more house per dollar farther from the center, households will have an incentive to live farther away from their work places. All else being equal, then, investments in transportation are likely to decrease residential density and increase the size of the urbanized area.

Applying similar reasoning, an increase in real income also would have a decentralizing effect. Population growth, on the other hand, would tend both to increase density in the center (because of greater competition for a fixed amount of land) and cause outward growth, as demand spilled over. Based on this theory, the variables place of residence and accessibility will be included in the empirical model of the study.

2.6.4 The demand theory

Demand theory is an economic principle relating to the relationship between consumer demand for goods and services and their prices in the market. According to Hayes (2019), demand is simply the quantity of a good or service that consumers are willing and able to buy at a given price in a given time period. People demand for goods and services in an economy to satisfy their wants, such as food, healthcare, clothing, entertainment, shelter, etc. The demand for a product at a certain price reflects the satisfaction that an individual expects from consuming the product. This level of satisfaction is referred to as utility and it differs from consumer to consumer. The demand for a good or service depends on two factors: (1) its utility to satisfy a want or need, and (2) the consumer's ability to pay for the good or service. In effect, real demand is when the readiness to satisfy a want is backed up by the individual's ability and willingness to pay.

Demand theory is one of the core theories of microeconomics. It aims to answer basic questions about how badly people want things, and how demand is impacted by income levels and satisfaction (utility). Based on the perceived utility of goods and services by consumers, companies adjust the supply available and the prices charged. Built into demand are factors such as consumer preferences, tastes, choices, etc.

Evaluating demand in an economy is, therefore, one of the most important decision-making variables that a business must analyse if it is to survive and grow in a competitive market.

According to Small and Verhoef (2007), travel is a derived demand; usually undertaken not for its own sake but rather to facilitate a spatially varied set of activities such as work, recreation, shopping, and home life. Also, Rodrigue (2020) adds that, in economic systems, what takes place in one sector has impact on another; the demand for a good or service in one sector is derived from another. For instance, a consumer buying a good in a store will likely trigger the replacement of this product, which will generate demands for activities such as manufacturing, resource extraction, and the related transport. What is different about transport is that it cannot exist alone, and a movement cannot be stored. An unsold product can remain on the shelf of a store until it's bought (often with discount incentives), but an unsold seat on a flight or unused cargo capacity in the same flight remains unsold and cannot be brought back as additional capacity later. In this case, an opportunity has been missed since the amount of transport being offered has exceeded the demand for it. The derived demand for transportation is often very difficult to reconcile with an equivalent supply and transport service providers prefer additional capacity to accommodate unforeseen demand (often at much higher prices).

2.6.5 Theory of Consumer Behaviour

Walters (1974) defines consumer behaviour as the process whereby individuals decide whether what, when, where, how, and from whom to purchase goods and services. Mowen (2000) provides a different definition by explaining consumer behaviour as the study of the buying units and the exchange processes involved in acquiring,

consuming and disposing of goods, services, experiences and ideas. This definition focuses on buying units in an attempt to include not only the individual but also groups that purchase products or services.

Considering the first objectives of this study, the analysis of household choice of public transport mode to work would be based on the theory of consumer behaviour. Where households derive a level of utility (getting to work early and with less stress) from choosing public transport to work which will increase production time.

2.6.6 Cost Theory

To an economist, the cost of producing any good or service is its opportunity cost. In everyday living, all man-made choices have alternatives. Therefore, the opportunity cost of obtaining a commodity is the foregone utility which could have been derived from the forgone alternatives. Cost is best described as a sacrifice made in order to get something. In business, cost is usually a monetary valuation of all efforts, materials, resources, time and utilities consumed, risk incurred and opportunities forgone in production and delivery of goods and services. More explicitly, the costs attached to resources that a firm uses to produce its product are divided into explicit costs and implicit costs. All expenses are costs but not all costs are expenses. Those costs incurred in the acquisition of income generating assets are not considered as expenses.

Based on the second objective of the study, the factors that influence drivers' agitation for increase in transport fares would be based on the cost theory. There are costs involved in producing public transport services and these costs are the basis on which drivers agitate for increase in transport fares. Such costs include fuel costs, spare parts costs, lubricants costs.

2.8 Empirical Literature on Studies

This part reviews previous literatures relating to the choice of public transport mode based on the various factors that affect the choice of a particular transport mode.

2.8.1 Determinants of public transport demand

There is no doubt that a wide range of factors influence the patronage of one public transport system to the other. Research clearly shows that individual and household socio demographics exert a strong influence on travel mode choice decisions. Specifically, gender, income, car ownership, employment status affect travel mode decisions (Bhat, 1997; Bhat and Sardesai, 2006). Also, Ortuzar, and Willumsen (2011) in their opinion, mode choice related to the commuter can be examined basically with three categories, namely; characteristics of the trip maker (age or gender, income, vehicle ownership, etc.), characteristics of the journey, thus, trip purpose, time of the day, when trip is undertaken, whether the trip is taken alone or with others, etc.) and characteristics of the transportation facility vehicle in time, component of monetary cost, availability and cost parking, .reliability of time travel, comfort and convenience, safety, etc.). In addition, Dewi (2010) conducted a research that identified factors affecting transportation mode choice for working activity from the internal side (traveler's side) such as socio-economic characteristics and also from the external side (service providers side) such as the service attributes of travel modes. According to the study, factors affecting respondents in choosing transport mode generally include; job and level of income; safety and security; trip characteristic and travel cost. Based on these studies, the empirical literature will be reviewed under the following themes which are;

1. Trip characteristic
2. Travel Cost (fare)

3. Service quality of transportation facility
4. Characteristics of travelers (their demographics and socio-economic characteristics).

Time of travel is already known to be an important factor on public transport demand. Especially in work trips, journeys are made in certain times of the day. Morning and evening times are the peak times, while other times of the day are more relaxed. People generally go to their occupation in the morning and return to their various homes in the evening. Although this is already a known topic, many studies pointed out the time of the day effect on the travel demand both for work and non-work trips. In non-work trips such as shopping, recreation and child care, people have more freedom to choose the time of their trips. The choice of mode is reported to be more susceptible to out-of-vehicle times that passengers spend overall than in-vehicle time. For instance, Balcombe, Mackett, Paulley, Preston, Shires, Titheridge, Wardman and White (2004) reported the wait time to be valued at about 1.6 times in-vehicle time for buses and 1.2 times in-vehicle time for rail for the UK case. Other countries may have different outcomes. Walle and Steenberghen (2006) conducted a study on the time and space related determinants as the influential factors in the choice of transport mode. They also emphasized that travel time enforces the choice of travel mode as a crucial factor with their own characteristics and specific influence on mode choice decisions. Again, Nurdden, Rahmat and Ismail (2007), found travel time to be an important factor influencing the individual's choice of transportation. Therefore, individuals' travel patterns are a result of how and when they want to use their time. Wang and Liu (2015) in their study examined travel patterns and identified factors that influence commuters' choice of travel mode, using web-based surveys conducted in two consecutive years of 2013 and 2014. Looking at potential reasons affecting

respondent's mode selection, the study highlighted that travel time is one of the most influential predictors of public transport use

The changes in public transport fare is one of the variables with the most direct and powerful influence on patronage (FitzRoy and Smith, 1998; Bonnel and Chausse, 2000; Bresson 2003, 2004). The transport literature also throws more light on how pricing policies affects competition among different transport modes, studies have shown how transport policies distorted competition between different transport modes and how they promoted the transport demand for some specific modes (e.g., urban car travel when underpriced) in case of France (Bonnel and Chausse, 2000). Souche (2001) also pointed to two structural variables that stand out. One of which is the user cost of transport-by public transport and private car. The cost of public transport has an effect on its demand. The effects of fares on public transport patronage are relatively easy to observe. The relationship between fares and public transport patronage tend to be inverse, where higher fares seem to be associated with decreased patronage and vice versa (Bresson et al., 2004).

However, it could be observed that the effect of fares on patronage is not similar in all public transport modes and in all time frames. Albalate and Bel (2010) in their study pointed out that the cost (fares) of public transport is one of the determinants of public transport demand. Polat, (2012) noted that some railway companies in the UK already use the price tool to manage the demand of rail transport, example to distribute the service demand through different hours of the day, especially during the rush hours by applying higher prices and lower prices at out of rush hours. The fare of public transport is an effective competition tool and can be utilized in competing among other modes of transport (e.g., private car use). For instance, Aidoo (2013)

pointed out in a study conducted in Ghana that, public transport service is highly influenced by fare. In general, if fares are increased, public transport patronage will decrease. Sam, Adu-Boahen and Kissah-Korsah (2014) in their study, found that transport fares is one of the main criteria students look out for in deciding which public transport operator.

Other studies have highlighted the role of service quality of the transport facility in explaining choice of public transport mode. Different transport modes provide different degree of comfort and it is a major factor that influences the demand for public transport. For instance, car provides door-to-door transport and is more comfortable and convenient in terms of how the seats are arranged, ventilation and storage capacity (Hovell & Jones, 1975). According to Neumann (1978), It is thought that elements with the most physiological importance to comfort are those which affect quality of a ride as well as the effort of driving such as noise, vibration, ventilation, glare, odour and seating arrangement. Koppelman and Lyon (1981) stressed that people's perceptions about convenience and comfort as well as their normative beliefs correlate positively with preference and hence the choice for a given mode of transportation. FitzRoy and Smith (1998) made specific emphasis on the quality of public transport services. For most goods, the quality of a product is an attribute which is a fixed characteristic. However, in the case of public transport services, it is clear that quality is a function of the quantity supplied. Thus, a greater supply of vehicle kilometers over a given route network implies, in general, a more frequent service, lower waiting times for customers and greater demand for public transit all other things being equal.

According to Murray (2001), access to public transport is an important service performance measure and affects demand for public transport. Similarly, Maswanto (2002) adds that trip duration, trip origin and purpose of the trip influence mode choice to recreational and shopping centers. In addition, a study conducted by Corpuz, McCabe and Ryszawa (2006) using multiple regression model and household transport survey data indicated that accessibility to public transport from the place of residence is associated with lower levels of vehicle kilometres travelled. According to Crotte (2008), if policy makers want to attract more users to public transport, improvements in quality of service should take precedence over reduction in fares. Comfort is one indicator of service quality. Although the degree of importance given to it may differ from one group of passengers to another based on the journey time, journey purpose and passenger type, the comfort is a quality factor that should be taken into account. Fonseca (2010) also argued that reliability, security, speed, comfort and punctuality are vital in public transport services. In spite of the existence of a distinction between the constructs of quality and satisfaction, the transport company, non-consumers and customers clearly do not make such a distinction. Also, Dewi (2010) adds that prestige, privacy, accessibility, reliability and availability affect individuals transport mode choice decisions to work.

Khurshid (2012) sought to ascertain how service quality influences customer satisfaction and demand for public transport in Pakistan using a multiple regression. The result of the study indicated that there was a positive relationship between service quality and customer satisfaction in the demand for public transport in Pakistan. These results are consistent with the findings of Aidoo (2013) who conducted a study in Ghana on Kumasi-Accra route using binary logit model affirms that, passenger's satisfaction with public transport service is highly influenced by bus traffic safety

record, comfort and control of crime rate at the bus station. This is because these factors seem to affect level of satisfaction of passengers on Accra-Kumasi route. For instance, Ojo, Mireku, Dauda, Nutsogbodo (2014) in their study on service quality and customer satisfaction of public transport on cape coast-accra route, in Ghana, revealed that reliability, security, speed, comfort and punctuality are quality dimensions of greater importance for public transport services. In addition, a study conducted by Sam, Adu-Boahen and Kissah-Korsah (2014), assessing the factors that influence the preference and the patronage of one public transport mode compared to the others found that perceived safety, comfort and vehicle reliability are the factors students consider when choosing a particular public transport. Again, Madhuwanthi, Marasinghe, Rajapakse, Dharmawansa and Nomura (2015), researched the factors influencing households travel behavior on transport mode choice for their regular activities and summarized that vehicle safety and comfort are some of the main substantial factors that influence the choice of travel mode for the people in the selected region.

According to Cervero (2001), an increase in access time or distance is connected with a decrease in the use of public transport services. If access time or distance exceeds a maximum threshold, travelers are likely to prefer alternative transport modes other than public transport. If public transport is within the acceptable limits, the preference of use depends on how convenient the system is (Krkygsman et al., 2004). Corpuz (2007) conducted a study on factors that impact mode choice. Thus, public transport or private vehicle and found that some public transport commuters cite accessibility as their reason for their choice of a particular transport mode. Hossain et al. (2010) in their investigation on the impact of walking distance on the attractiveness of transit. The study taking into consideration alternative utility functions for the transit option

with different representations of the walking component and variations in sensitivities, found that walking distances to and from bus stops have important and significant influences of the attractiveness of bus use, along with fares, and schedule mis-match times, indicating that all of these have negative values, which mean the attractiveness of transit is reduced as these values increase.

Several empirical studies have recognized the important role of demographic characteristics in influencing choice of public transport. Such studies include Household income, household composition and the presence of children were among the factors affecting the public transport use (Lawson, 1999). Again, De Palma and Rochat (2000) found that age has a relationship with use of public transport. According to Francis (2002) population growth as a leading factor and population characteristics (e.g., age structure), for instance, the declining proportion of young people have a negative impact on the use of public transport. In addition, Maswanto (2002) identified that age and vehicle ownership influence mode choice on shopping and recreational trips. Bresson et al. (2004) also investigated the effect of structural factors including population ageing and urban sprawl on public transport demand and concluded that in a long-run perspective, economic factors were not the only determinants of the demand for public transport.

Also, Dewi (2010) pointed that gender, age ownership of vehicle affects mode of transport choice to working activities. For instance, Polat (2012) stated that demographic and social factors are known to be very influential on the public transport demand and explained that males travel longer than females, young people are more likely to use public transport than elderly, People who are more socially oriented are expected to use transport services more than those who are not very much

socially oriented. Fiagborlo and Kyeremeh (2015), used a typical probabilistic model (discriminant function analysis) to classify and predict the choice of mode of transport of intra-city spare parts dealers, and to examine the relevant personal specific characteristics and mode choice attributes that determine the choice of mode of transport. Their study found that, sex, age, family size, time, residential zone, risk (missing appointment, robbery, accident and break-down), accessibility and habit determined the choice of mode of transport of the spare parts dealers. Similar to that, Madhuwanthi, Marasinghe, Rajapakse, Dharmawansa and Nomura (2015), in their study, found that vehicle ownership rate is one of the main substantial factors for influencing the choice of travel mode.

Some studies have identified the role of various socio-economic characteristics is an influencing factor of choice of public transport mode. In addition, Maswanto (2002) identified that, occupation, income, education level, influence mode choice on shopping and recreational trips. Income of commuters has also been found significant to affect the demand for public transport. Households with high income can afford to satisfy more of their travel demands than low-income households. In cities where population growth or change in population is minimal, traffic growth can come about in two ways: people making additional trips and people making longer journeys. In both situations, it is possible for trip production to increase with income, although the effect may not be very strong. In a similar vein, studies conducted by Okoko (2004) revealed that high income households often embark on more trips than their counterparts in the medium and low-income categories. Similar to that, Dewi (2010) pointed that job and level of income affects mode of transport choice to working activities. Albalate and Bel (2010) found that socio-economic variables play the most important role on local public transportation. Poku-Boansi and Adarkwa (2013) found

that high income households made about 35% more trips than those in the lower income category. In addition, they found that, about 88% of households using public transport services fell within the low and medium-income category in Kumasi. Supporting this study is Fiagborlo and Kyeremeh (2015), who also found that, income and level of education, determined the choice of mode of transport of the spare parts dealers.

Finally, there are studies that have shown that degree of reliability is factor that influence public transport demand. Other factors such as service frequency and service capacity also determine the usability of public transport services and thus also affect the reliability. If the service capacity available is insufficient to meet the current demand, travelers are less likely to find those services reliable (Hovell & Jones, 1975). According to Polat et al, (2012) “bus reliability refers to the degree of dependability on and trust-ability of passengers in a bus service”. It includes features such as accessibility and confidence. Passengers should be able to depend on those services and be able to see that they are obtainable on regular basis and are long termed. Longer waiting times due to late arrival of buses and excessive in-vehicle times due to traffic or system problems reduce reliability.

2.9 Empirical Literature on Expenditure

This part reviews previous literature on expenditure on public transport. According to Grey and Lewis (1975), apart from income, there are several other important influences on people's reactions to different fare policies such as whether they own a car, or have one available for their journey, their social class, occupation, age and sex. Fish and Waggle (1996) stated that higher-income families were clearly expected to have higher trip expenditures than lower income families. They concluded that family decisions regarding vacation and pleasure travel are based on their income. They further stated that vacation and pleasure travel is considered to be a luxury and posited a greater amount proportionally being spent on the item by families at higher income levels. Many of these factors are closely related relatively, Nolan, (2003) adds that the number of adults in a household, level of education, the presence of at least one person entitled to remuneration for mot expenses, age, gender affects bus fares expenditures.

Similarly, Thakuriah, and Liao, (2006) single-parent households with a female head spend significantly less on transportation than other households. They also add that households in which the household head did not complete high school are also likely to pay less for transportation. Contrary to the other studies, Wang, Rompf, Severt, and Peerapatdit, (2006) found out in their study that, there was no significant relationships identified between five socio-demographic variables and transportation expenditures namely, gender, age, marital status, children under 18 and household income. Also, according to Cropper, and Bhattacharya, (2007), in Mumbai, expenditure on transport accounts for 16% of income in the lowest-income category, with 10% of income, on average, spent on bus and rail fares. This percentage, however, is not evenly distributed; it is much higher than 10% for households in which workers take the bus

or train to work and lower for households in which the main earner walks to work. Even in these households, however, 12.5% of income is spent on transportation. Their study adds that expenditure on public transport would be even higher if bus fares in Mumbai were not subsidized. Olvera, Plat, and Pochet (2008) researched on household transport expenditure in sub-Saharan cities (Dar es Salaam, Niamey and Ouagadougou). According to their study, the relative amount spent on transport increases as household expenditure rises. Conversely, when analysing travel survey data, the share of transport decreases as income rises. Ferdous, Pinjari, Bhat and Pendyala (2010), using a multiple discrete continuous nested extreme value (MDCNEV) model to analyze household expenditures for transportation-related items in relation to a host of other consumption categories, found that a host of household and personal socio-economic, demographic, and location variables affect the proportion of monetary resources that households allocate to various consumption categories which transportation is one.

A technical report by Statistics South Africa, (2015) measuring household expenditure on public transport states that, average per capita monthly household travel cost is higher for households from the highest income quintile compared to households from the lowest income quintile. Households from the lowest income quintile spent a higher proportion of their income on public transport compared to households from the highest income quintile. More than two-thirds of households who fall in the lowest income quintile spent more than 20% of their monthly household income per capita on public transport (66,6%). Less than 3% of households from the highest income quintile spent more than 20 percent of their monthly household income on public transport. The analysis of household expenditure on transportation shows that rich households in LAC spent a larger percentage of their expenditure on

transportation (17.1 percent) than poorer households (7.7 percent) Also, as total expenditure increases, expenditure on private transportation increases (Gandelman, Serebrisky, and Suárez-Alemán 2018). They also found in their study that female household heads tend to spend relatively less in private transport. Similarly, Anowar, Eluru, and Miranda-Moreno (2018) developed an econometric model of household budgetary allocations with a particular focus on transportation expenditure. They adopted the scaled version of the MDCNEV. The model results indicated that a number of household socio-economic and demographic attributes along with the residential location characteristics affect the apportioning of income to various expenditure categories including transportation.

2.10 Empirical Literature Relating to Fares of Public Transport

Lee (1997) has also stated that others emphasize cost recovery pricing, which can be justified on three grounds.

Firstly, Lee (1997) contends, is horizontal equity, which means that users should get what they pay for and pay for what they get. If users pay less than the total cost they impose, somebody else subsidizes their consumption. Secondly, cost recovery represents long-run marginal costs, that is, the full costs of providing a facility or service over its lifetime. The third justification is economic neutrality. Since prices in most markets are based on cost recovery, transport services should be priced comparably. Such pricing encourages consumers and managers to use resources efficiently. Lee (1997) further states that some people stress the importance of pricing that reflects vertical equity objectives, that is progressive and includes provisions for people who have special disadvantages, such as discounts for children, elderly and disabled groups. Others emphasize administrative convenience and transaction costs. This tends to favour fixed pricing, with little or no difference between different types

of vehicles or travel conditions. Such pricing is sometimes also promoted for the sake of horizontal equity that is, charging all users an equal fee. Kotler and Armstrong (1998) argued that historically, price has been the major factor affecting buyer's choice. This, they say, is still true in poor nations, among poorer groups and with commodity products or services. However, non-price factors are said to have become more important in buyer choice behaviour in recent decades. Litman (2002) has argued that a vehicle, route or travel time that imposes lower costs should have a lower fee, and a vehicle, route or travel time that imposes higher costs should have a higher fee. This type of pricing results in economic efficiency. Efficient prices convey information about the costs of producing goods and the value that consumers place on goods. From this perspective, there is no need to charge travellers for sunk or fixed costs, since these are non-marginal, or to structure vehicle fees so they fully recover the costs of facilities and services. Litman (2003) has again stated that efficient pricing is an important market principle that provides market signals that can result in the optimal use of resources. Efficient prices indicate the full costs of providing a good or service and the value the consumers place on using it. Prices that are too high or too low reduce market productivity, equity and overall consumer benefits.

According to Litman (2003) and Kageson (2003) there are calls that transportation should be charged cost recovery prices; that is, with prices set to provide enough recovery to fund the entire operation. Prices can provide many specific transportation benefits, including reduced traffic congestion, increased travel options, consumer savings, environmental protection and more efficient land use, depending on the type of pricing and other factors. Prices can also have significant impact on travel behaviour. Different types of pricing can cause different types of travel charges, which provide different types of benefits and costs to society. For example, distance-

based fares tend to reduce total vehicle trips and trip distances, providing reduction in most external costs as well as causing shifts in modes if travel alternatives are good (Litman, 2003).

Poku-Boansi (2008) developed a pricing model with which prices of urban transport services can be determined following review of prices of petroleum products. However, from the analysis of field data, the study found that, seven factors affect the cost of providing urban public transport services in Kumasi. They are tyre cost, fuel cost, trip length, overhead cost; hours worked, lubricant cost and cost of spare parts and maintenance excluding insurance cost.

A study conducted by Fiagborlo and Kyeremeh (2015) is closely related to the objective of the current study, and a study conducted by Poku-Boansi (2008) is closely related to the second objective despite the differences in methodologies adopted. In contrast to Fiagborlo and Kyeremeh (2015), the current study adopted the double hurdle model to examine the factors that influence the choice of public transport to work. In addition, the study looked at the choice of public transport as well as at the household level. Also, in contrast to Nolan, the included affordability as a factor in analysing households expenditure decisions. Again, in contrast to Poku-Boansi (2018), the study adopted the probit regression in analysing factors that influence drivers' agitation for increase in transport fares. This current study also included the nature of road as one of the factors.

The above theoretical and empirical review influenced the researcher's decision to include socioeconomic, demographic, household, supply factors, drivers and vehicle operating costs in this study.

In as much as these variables were adopted from previous literatures, some studies used secondary data such as transport survey data which may have been recorded years before the study was conducted and may not depict the actual situation but this current study used primary data. Again, some studies used binary logit regression mode and this model used do not specify the level of expenditure on transport.

2.11 Chapter Summary

In conclusion, the chapter has reviewed relevant literature to the study. This was done by first looking at transportation, transportation systems in Ghana, factors that influence transport and the role of transportation in economic growth and development. Theories relating to the study and those underpinning the study were also discussed. Pricing concept and pricing strategies were also reviewed. The latter part reviewed the previous literature on factors on transport mode choice and determinants of expenditure on public transport and pricing of public transport services.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents the methods, techniques and analytical tools employed to carry out data collection and analysis to provide answers to the research questions in order to help achieve the objectives of the study. It discusses the research design, the target population, the selected sample and sampling procedure as well as data that was used. It also looks at the instrument for data collection, pre-test of instrument, procedure for data collection and procedure for data analysis.

3.1 Research Design

A research design has been described as the blueprint for the collection, measurement and analysis of data (Kothari, 2004). Considering the objectives to be achieved in this study, the cross-sectional research design was adopted to analyse choice of public transport to work and factors that influence drivers' decision to agitate for increase in transport fares of selected towns in the Central Region. A cross-sectional study looks at data from a population at one specific point in time. The respondents in this type of study are selected based on particular variables of interest. This method is used in many areas, including social science.

3.2 Theoretical Framework

Many techniques exist for measuring households' choice and expenditure on public transport and defining the importance of the use of public transport attributes to the use of public transportation globally. These techniques are more often not based on households' evaluation. Households' choice of public transport and expenditure on public transport can be evaluated according to different methods. Methods of

measuring households' choice of public transport and expenditure on public transport can be identified in two different categories. The first category includes techniques of statistical analysis, such as quadrant and gap analysis, factor analysis, scatter graphs, bivariate correlation, cluster analysis, and conjoint analysis. Some of these techniques provide an evaluation of household expenditure on public transport. Others provide the relationship of the public transportation with overall household expenditure. The second category of methods consists the estimation of coefficients by modelling. Here, models are used that relate global public transport choice and expenditure (dependent variable) to some attributes (independent variables). Some of these models are regression models and structural equation models (SEM) (Bollen, 1989). Most transport demand studies have previously used the Heckman model where the demand for transport fuel is modelled conditional on ownership of a car (Kayser, 2000). The Heckman model assumes that zeros arise due to non-participation only, that is, if an individual/household participates (passes the first hurdle) then zero consumption is not possible. On the contrary, the double hurdle model assumes that zeros can arise at both the first stage (participation versus non participation) and at the second stage (consumption versus non consumption). Therefore, a household may not patronise public transport because they are not a participant in the market (they have private cars) or they do not patronise because they cannot afford it (due to prices and income that is a corner solution).

3.2.1 Concept of Consumer Behaviour

Households choice of public transport to work is based on the theory of consumer behaviour where households derive some level of utility from consuming public transport services to work.

The consumer theory is concerned with how a rational consumer would make consumption decisions. These decisions are based mainly on income constraints and the availability of the goods. In understanding the consumer behaviour, the study is able to predict how changes occur in consumption of public transport when there is a change in public transport services. The underlying hypothesis is that consumer chooses a vector of goods from a set of alternatives and does so in such a way that they maximise utility subject to their budget constraints. This consumer behaviour is presented in terms of preferences and possibilities. Under the consumer theory, the consumer is assumed rational and therefore in choosing the preferences is guided by some properties.

Public transport services are inputs into the household's consumption of goods and services. Double hurdle models allow differentiating between variables determining the consumption of public transport (the participation decision) and the ones determining the level of expenditures on these goods (the consumption decision).

Assuming the utility of each household can be represented as a function of commodities Z , that are produced in the household using m goods and services purchased in the market, G , and the nonmarket time of the household, T_{nw} , the utility function for a typical household can be represented as:

$$U(Z) = U[F(G, T_{nw}, D)] \quad (1)$$

Where D is a vector of variables referring to the household's socioeconomic characteristics. The household time constraint can be defined as

$$T = T_{nw} + T_w \quad (2)$$

Where T refers to the total time constraint of the household and T_w refers to the amount of time spent outside the home in the labour force. The household's budget constraint can be defined as

$$T_w W + V = Y = \sum_{j=1}^m g_j p_j \quad (3)$$

Where W is the wage rate, V is the nonwage income of the household, Y is the total income of the household, p_j are the market prices of transport services g_j which are used to produce household commodities Z .

Maximizing the utility function (1) subject to the constraints in equation (2) and (3) will yield reduced form demand equation for each of the m market goods g_j .

$$g_j = f(p_j, Y, D, T_w) \quad (4)$$

Making the price and quantity demanded the subject will yield an associated expenditure function

$$p_j g_j = y_j = f(Y, T_w W, T_w) \quad (5)$$

3.3 Double Hurdle Model

According to Cragg's (1971) double hurdle model, households are assumed to first decide whether to participate in the market or not. The second hurdle deals with what determines the expenditure if participation is positive. Thus, the decision process is modelled in two steps. The standard tobit model was originally developed to accommodate censoring in the dependent variable. However, this model is considered very restrictive, as it assumes that the determinants of household expenditure on public transport are the same as the determinants of participation. The double hurdle model is used to overcome this restriction. The dependent variable in the first stage is

a dummy variable/binary outcome/dichotomous (decision to participate) while that for the second stage is a continuous variable that is the second stage (determinants of how much spent) (Keelan, Henschion & Newman, 2009)

$$y_{i1}^* = w_i a + \varepsilon_i \quad \text{participation decision} \quad (6)$$

$$y_{i2}^* = X_i \beta + u_i \quad \text{expenditure decision} \quad (7)$$

$$y_i = X_i \beta + u_i \text{ if } y_{i1}^* > 0 \text{ and } y_{i2}^* > 0 \quad (8)$$

$$y_i = 0 \text{ otherwise} \quad (9)$$

Where y_{i1}^* is the latent variable describing household's i 's decision to use public transport to work and y_{i2}^* is the latent variable describing household's expenditure on public transport, y_i is the observed dependent variable (households public transport expenditures). w_i is the set of individual characteristics explaining participation decision, X_i variables explaining determinants of household expenditure on public transport, β is the coefficient of the variables, ε_i and u_i are the error terms assumed to be independent and distributed as $\varepsilon_i \sim N(0,1)$ and $u_i \sim N(0, \sigma^2)$

The log-likelihood function for the double hurdle model can be written as follow (Moffatt, 2005)

$$\ln L = \sum_0 \ln \left[1 - \Phi(w_i' \alpha) \Phi \left(\frac{x_i' \beta + 1/\lambda}{\sigma} \right) \right] + \sum_+ \ln \left[\Phi(w_i' \alpha) y_i^{\lambda-1} \frac{1}{\sigma} \phi \left(\frac{y_i^T - x_i'}{\sigma} \right) \right] \quad (11)$$

3.3.1 Model specification of the double hurdle

In this study, the double hurdle model was adopted to examine the factors that influence participation in the public transport market and determinants of household expenditure on public transport using primary data. Two empirical models will be specified with regards to participation decision and expenditure decision.

Accordingly, a set of non-economic variables are included in the participation equations of the double-hurdle models. For the second-stage decision equations, economic and non-economic variables were considered to analyse the determinants of household expenditure on public transport. Empirical specification of the first stage of the double hurdle model is as follows:

$$HPD = \beta_0 + \beta_1 Age + \beta_2 HseSize + \beta_3 EduYrs + \beta_4 TripT + \beta_5 Access + \beta_6 Conv + \beta_7 AIncome + \beta_8 Relity + \beta_9 Avail + \beta_{10} Safe + \varepsilon \quad (12)$$

where *HPD* is the household participation decision and it measures what causes household to participate in public transport market or choose public transport, *Age* is the age of household head, *HseSize* is the household size, *EduYrs* is the educational level of household head, *TripT* is the in vehicle travel time, *Conv* is the perceived convenience of public transport by household, *AIncome* is the income range of household head, *Relity* is the perceived reliability of public transport by households, *Avail* is the perceived availability of public transport by household heads, and *safe* is the perceived safety of public transport by household heads.

Empirical specification of the second stage of the double hurdle model is as follows:

$$ExpMonPub = \beta_0 + \beta_1 Age + \beta_2 HseSize + \beta_3 Gender + \beta_4 Afford + \beta_5 EduYrs + \beta_6 Employ + \varepsilon \quad (13)$$

where *ExpMonPub* is the household monthly expenditure on public transport and is measured as how much household spend on public transport, *Gender* is gender of household head, *Age* is the age of household head measured in years, *HseSize* is the household size made up of the number of people in a household, *EduYrs* is the educational attainment of head of household measured in years, *Employ* is the

employment sector of head of household and *Afford* is the perceived affordability of public transport with regards to transport fares.

The researcher selected age as one of the variables for the research based on empirical studies. Example of such empirical studies that used age as one of its variables is Francis (2002) as a factor that affects mode choice who found that older individuals are less likely to choose public transport. Gender is one of the variables adopted in the study because from empirical literature, gender is one of the factors that affects transport mode choice (Polat, 2012) The educational attainment of household head was measured in years for schooling in this study. Educational attainment has been observed to play an important role in influencing choice of transport. For example, a study conducted by Maswanto (2002) considered educational level as a factor that influence transport mode choice. Fiagborlo and Kyeremeh (2015), in their study considered family size as one of the factors that determine transport mode choice to work hence the use of the variable household size in this study. Again, perceived convenience of public transport has been noted as one of the variables that affects public transport mode choice. A lot of studies conducted on transport mode choice considered this variable. For instance, Koppelman and Lyon (1981) adopted convenience as one of the variables that affects transport mode choice. Perceived safety of public transport was used in the study as a factor that affects transport mode choice based on empirical literature. For example, a study conducted by Madhuwanthi, Marasinghe, Rajapakse, Dharmawansa and Nomura (2015) adopted safety as one of the variables that affects transport mode choice. Empirical evidence shows that perceived accessibility, reliability and availability of public transport affects individuals transport mode choice decisions, to work. One of the empirical

studies is Dewi (2010), who noted that, accessibility, reliability and availability affects individuals transport mode choice decisions to work.

Also, a study conducted by Corpuz, McCabe and Ryszawa (2006) considered accessibility as one of the variables in their study and found a negative relationship between household's dwelling to a high frequency train and vehicle kilometers travelled. Travel time was a variable considered in this study because from empirical studies, travel time which is minutes spent during the travel is one of the factors that affects transport mode choice. A study done by Nurclen (2007), found travel time to be an important factor influencing the individual's choice of transportation. In this study, income as a variable was used as a result of its being considered in a lot of empirical literature on transport mode choice. Such studies include Trotte (2008) who considered level of income on transport mode choice.

Variables such as, age, household size, gender, affordability as proxy for bus fare, educational attainment measured in years and employment sector of household head were used to analyse determinants of household expenditure on transport.

The variable gender is selected for this study because according to empirical literature, it is a factor that affects transportation expenditure. For example, Thakuriah, and Liao (2006) considered gender in their study on expenditure on transport which they found that female heads have negative relationship with transport expenditure. Household size is used in this study based on empirical literature reviewed by the researcher. For example, a study conducted by Nolan (2003) adopted household size as one of the variables that affects bus fares expenditures who found that the number of adults impacts positively on per capita bus expenditure and significant. Empirical literature suggests that age is a factor that

affects transport expenditure. Such studies include Wang, Rompf, Severt, and Peerapatdit, (2006), who used age in their study on factors that affects travel expenditures and found a negative but significant relationship between age and travel expenditure.

According to literature, occupation is one of the variables considered when looking at expenditure on transportation. In this study, employment sector was considered since the population considered for the first objective are employed household heads. For example, Sugiarto, Miwa, Sato, and Morikawa (2014) adopted occupation in their study who found that occupation is one of the most significant household attributes with positive impact on transport expenditure frontiers. Educational attainment in this study is measured in the number of years spent in school. It is used because based on literature, it is one of the influencing factors that affects expenditure on transport. Example of such literature is Bhat, Ferdous, Pinjari, and Pendyala (2010) where level of education was considered and from their study, it has a positive relationship with transport expenditures.

3.4 Probit Regression Model

Probit model is a regression model where the dependent variable can take only two values, for example married or not married (Bliss, 1934) The purpose of the model is to estimate the probability that an observation with particular characteristics will fall into a specific one of the categories; moreover, classifying observations based on their predicted probabilities is a type of binary classification model.

A probit model is a popular specification for a binary response model. As such it treats the same set of problems as does logistic regression using similar techniques. When viewed in the generalized linear model framework, the probit model employs a

probit link function (Agresti, 2015). It is most often estimated using the maximum likelihood procedure (Aldrich, Nelson, and Scott 1984). Such an estimation is being called a probit regression. The probit regression model is employed to quantify the magnitude and direction of the factors that influence drivers' decision to agitate for an increase in transport fares.

Suppose a response variable Y is binary, that is it can have only two possible outcomes which we will denote as 1 and 0. For example, Y may represent presence or absence of a certain condition, success or failure of some device, answer yes or no on a survey, etc. We also have a vector of regressors X , which are assumed to influence the outcome Y . Specifically, we assume that the model takes the form

$$\Pr(Y = 1 / X) = \Phi(X^T, \beta),$$

where \Pr denotes probability, and Φ is the Cumulative Distribution Function (CDF) of the standard normal distribution. The parameters β are typically estimated by maximum likelihood.

Suppose there exists an auxiliary random variable

$$Y^* = (X^T \beta) + \varepsilon$$

where $\varepsilon \sim N(0, 1)$. Then Y can be viewed as an indicator for whether this latent variable is positive:

$$Y = \begin{cases} 1 & Y^* > 0 \\ 0 & \text{otherwise} \end{cases} = \begin{cases} 1 & X^T \beta + \varepsilon > 0 \\ 0 & \text{otherwise} \end{cases}$$

3.4.1 Model Specification for Probit Regression

The probit regression model was used to examine the factors that drivers consider in their decision to agitate for increase in transport fares using primary data

The empirical model is specified below

$$DINCFA = \beta_0 + \beta_1 Fuel + \beta_2 SpareAM + \beta_3 TravTime + \beta_4 Road + \beta_5 Lubricants + \varepsilon \quad (14)$$

From the equation DINCFA is the decision of drivers to agitate for increase in transport fares, the independent variables are measured continuously using likert scale. Drivers were asked to tick on a scale of one to ten, where one is least important and ten is very important, the extent to which they considered the variables important in their decision. Fuel represents the extent to which drivers find fuel prices to be important in the agitation for increase in transport fare, SpareAM is the extent to which drivers consider spare parts prices important in their decision to agitate for increase in transport fares, TravTime represents the extent to which drivers consider journey time to be important in deciding to agitate for an increase in transport fares, Road is the extent to which drivers consider the nature of road to be important in agitating for an increase in transport fare, Lubricants represents the extent to which drivers find lubricants prices important in their decision to agitate for an increase in transport fares.

The variable Fuel is used for this study because according to empirical literature, it is a factor that influences cost of operating public transport and as cost of providing a good or a service is related to pricing of the good or service, hence fuel has a relationship with transport fares. Poku-Boansi (2008) considered fuel as one of the

variables in estimating cost of operating urban public transport and found out that cost of fuel affects the cost of operating public transport. Travel time as a variable is considered in this study based on empirical literature reviewed by the researcher. For example, a study conducted by Jansson, Holmgren and Ljungberg (2015) used riding time which in this study is travel time as one of the variables in the public transport producer costs. The variable spare parts is considered for this study because according to empirical literature, it is a factor that influences cost of operating public transport. A study conducted by Poku-Boansi (2008) considered cost of spare parts as one of the variables in estimating cost of operating urban public transport and found that cost of spare parts influences the cost of operating public transport. Nature of road was used in the study and was adopted by the researcher based on comments passed by drivers. Lubricant is one of the variables considered for this study based on empirical literature, it is a factor that influences cost of operating public transport. Poku-Boansi (2008) considered lubricant cost as one of the variables in estimating cost of operating urban public transport and found out that lubricant costs affect the cost of operating public transport.

3.5 Study Areas

For the first objective, the study was undertaken in Kasoa which is located in the Central Region of Ghana. According to the Ghana Statistical Service report on housing and population census report (2014), Kasoa is the capital of the Awutu Senya East Municipality and is located in the Eastern part of the Central Region. Kasoa which is the Municipal capital, is located at the South-Eastern part of Ghana, about 31 km from Accra, the national capital. The major settlements of the municipality are Opeikuma, Adam Nana, Kpormertey, Ofaakor, Akweley, Walantu and Zongo. The main economic activities in the municipal include trading (wholesale/retail), agro

processing, informal sector service and commerce. According to the Ghana Statistical Service report on housing and population census report (2014), trading and its related activities are the leading economic ventures which employ about 35.7 percent of the working population in the Municipality. Livestock production is also practiced in the Municipality but on a smaller scale. The private informal sector's contribution is enormous. The sector employs about 81.9 percent of the working population in the banking and service sectors but needs to be integrated with the formal sector. Other economic activities include: manufacturing, wholesaling and retailing, and transport services, among others.

The Winneba-Graphic Road corridor being one of the heaviest-used routes in the Accra metropolitan area as stated by the Department of Urban Roads (DUR), 2010. Kasoa was chosen for the study because it is a peri-urban town and it is on this route. Peri-urban can be described as the rural-urban transition zone where urban and rural uses mix and often clash. Thus, kasoa was chosen because it is closer to Accra which is the capital of Ghana and also to help reduce the gap since studies had been done on other two corridor of the Central Business District (CBD). Population projections predict growth of Kasoa and other communities to the west of Accra, which will put additional pressure on these roads (DUR, 2010).

The study areas for the second objective are Kasoa, Swedru and Mankessim. Swedru and Mankessim were added to the study based on the fact that, the drivers in the kasoa bus terminals were not enough for the sample of the study and their response may affect the results of the study if all drivers were to be included. Mankessim is a town in the Central Region located in the Mfantseman District and Swedru is located in the Agona West Municipal District (Ghana Housing and Population Census, 2010).

Agona Swedru is the administrative capital of the Agona Swedru district of Central Region, Ghana. It has a total land area of 540 sq. km with a population of 40 000 and an annual growth rate of 2.55%¹⁶. Children aged below 15 years accounts for 47.7% of the total population (Agona Swedru District Assembly as cited by Ovenseri-Ogbomo and Assien, 2010). It has more than one bus terminal.

Mankessim is the most populous town and constitutes one-sixth of the population of the Municipality. Its population comprises 11,511 males and 13,970 females. There are about 5983 households with an average household size of 4.3 (Ghana Statistical Service, 2005). Commerce is the main economic activity in the town. Generally, the market is active throughout the week except on Sundays. However, traditionally, Wednesdays and Saturdays are the market days. The market serves as a hub for a variety of food crops, vegetables, fruits and fish from both nearby and far-flung famling and fishing settlements. Non-food commodities are also brought from various towns and cities. Apart from the main market, there are four vehicle stations which includes bus terminals attract working children (Abani & Esia-Donkoh, 2011). These towns happen to have central bus terminals with different destinations, for instance Western, Ashanti and Eastern Regions of Ghana. Hence the choice of these towns for the study.

3.6 Data Sources

The study employed primary data for the analysis. For the first objective, data was collected from households in Kasoa that go to work in the Central Business District (CBD) in Accra. With the second objective, data was collected from drivers at Kasoa, Swedru and Mankessim bus terminals who travel to some towns in Central, Eastern, Western and Ashanti Regions.

3.7 Population

The target population of the first objective is defined and restricted to include households that reside in Kasoa with heads that go to work at the Central Business District (CBD) in Accra. The target population of the second objective is public transport drivers in the Central Region. The study covers households in Kasoa regardless of their employment sector, educational level among other socioeconomic indicators as well as all drivers regardless of their educational level among other socioeconomic characteristics in the Central Region.

3.8 Sample Size and Sampling Procedure

A multistage sampling scheme was used to select respondents for the first objective. For the first stage, simple random sampling technique (lottery method) was used to select five settlements out of the seven settlements in Kasoa. Communities in Kasoa were identified from the report of the Ghana Housing and Population Census (2014). In the second stage, systematic sampling procedure was used to select 210 households from the five settlements sampled. Respondents were located by asking if the head works in the Central Business District (CBD) of Accra, and if the head does, he or she was solicited for their assistance in the study. If he or she does not, we move on to the next household.

For the second objective, simple random was used to select a driver for each destination route. This was used to give every driver of each destination route an equal chance of being selected. Car numbers of drivers that travel to the various destinations were given by the station master. The sample size was attained by using a rule proposed by Green (1991). According to Green (1991), the sample size n , must be greater than $50+8p$ (where p is the number of independent variables). In this study,

the model for the first objective has 13 independent variables. According to the rule proposed by Green (1991), the sample size of the first objective should be greater than $50 + 8(13) = 154$. And for the second objective, the independent variables for the empirical model are 5. From the equation above, the sample size should be greater than $50 + 8(5) = 90$. Therefore, the sample size for the first objective is 210 which is greater than both 154 and the sample size for the second objective is 200 which is greater than 90. This justifies the fact that the sample sizes of the study satisfy the requirements mentioned earlier and thus satisfactory for multiple regression analysis. The researcher then randomly selected a driver for each destination. The sample size for the first objective is 210 households and the sample size for the second objective is 200.

3.9 Instrumentation

The main instrument that was used to collect primary data from the sampled households was questionnaire. Questionnaire was found to be the most appropriate and effective tool for data collection because it provides quick and efficient way of obtaining large amounts of information from a sample. Achieving the first objective, for any household chosen, the head of the household was the one information was solicited from and with the second objective, individual drivers were the ones information was solicited from. For the first objective, information was solicited from household heads and for the second objective, information was solicited from individual drivers.

3.9.1 Pre-test of instruments

For the piloting, 20 respondents were randomly selected from Lapaz and Winneba for the first and second objectives respectively to pre-test the instrument. The instrument

was pre-tested to check for its reliability, consistency and validity using Cronbach's alpha. The Cronbach's Alpha is a measure of reliability used to evaluate the degree to which different test items that probe the same construct produce similar results. The Cronbach's Alpha should take a value (in optimal case) higher than 0.7 for each latent variable. One can consider that the latent variable is valid, if the Cronbach's Alpha of the latent variable exceeds 0.7 and higher (Urbánek Denglerová & Širůček, 2011). The reliability test resulted in an overall alpha value of 0.7492 and 0.7551 with regards to the first and second objectives respectively. The results obtained in this study indicate the instrument has a good level of validity as well as reliability.

3.9.2 Field work

Field work started after pre-testing the instrument. Data was collected done by the Researcher and two Research Assistants who hold First Degree in Economics. The Research Assistants were taken through some training in order for them to understand the nature of the task to be undertaken.

3.10 Chapter Summary

This chapter discussed methods, techniques and analytical tools used in the study. In addition, it discussed the research design, the target population, the selected sample and sampling procedure as well as data that was used. Again, the instrument for data collection, pre-test of instrument, procedure for data collection and procedure for data analysis.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0 Introduction

In this chapter, results of data collected from the field by the researcher is presented and discussed. Before the results are presented, it is important to indicate that for the first objective 97 percent response rate was achieved. That is out of the 230 copies of the questionnaire distributed, 210 copies were well answered and received by the researcher. However, 100 percent response rate was achieved for the second objective since all 200 questionnaires were answered and retrieved.

4.1 Descriptive Statistics of Variables in the Double Hurdle Model

This section presents the descriptive statistics of the categorical and continuous variables of the double hurdle model. The variables are grouped into categorical and continuous variables.

4.1.1 Categorical variables

The categorical variables in the double hurdle model are gender, employment type, income range, perceived accessibility, perceived affordability, perceived convenience, perceived reliability, perceived safety of respondents.

Table 1: Descriptive statistics of the categorical variables

Variables	Scale	Frequency	Percentage
Gender	Male	130	61.90
	Female	80	38.10
Employment Sector	Formal	47	22.38
	Informal	163	77.62
Income range	Below 2000	195	92.86
	2000-4000	10	4.76
	4001 and above	5	2.38
Accessibility	Yes	107	50.95
	No	103	49.05
Affordability	Yes	96	45.17
	No	114	54.29
Convenience	Yes	127	60.48
	No	83	39.52
Reliability	Yes	109	51.90
	No	101	48.10
Safety	Yes	127	60.48
	No	83	39.52

Source: Author's computations based on field survey, 2020

Table 1 presents the descriptive statistics of all categorical variables in the study. From the table, it can be observed that 80 (38.10%) households are headed by females and 130 (61.90) are headed by males. This shows that majority of the household heads are males indicating male dominance in household decision making. Secondly, the frequency distribution for the employment sector of household heads is that out of the 210 respondents, 47 (22.38%) household heads are in the formal employment sector and 163 (77.62%) household heads are in the informal employment sector. This indicates that majority of the household heads of the sample size are employed in the informal sector. Thirdly, it can be observed from the table that, out of the 210 respondents, 195 (92.86%) household heads fall within the income range below

GH¢2000, 10 (4.76%) of household heads fall within the range of GH¢ 2000-4000 while 5 (2.38%) household heads fall within the income range of GH¢ 4001 and above. Again, out of the 210 respondents, 107 (50.95%) household heads perceive public transport to be accessible and 103 (49.05%) do not perceive public transport to be accessible. This shows that majority of the household heads perceive public transport to be accessible. According to table 1, out of the 210 respondents, 96 (45.17%) of household heads perceive public transport to be affordable while 114 (54.29%) do not perceive public transport to be affordable. This shows that most of the household heads do not perceive public transport to be affordable. From table one above, out of the 210 sample of household heads, 127 (60.48%) of the household heads perceive public transport to be convenient while 83 (39.52%) do not perceive public transport to be convenient. This indicates that majority of the household heads consider public transport to be convenient. The table also shows that out of the 210 respondents, 109 (51.90%) of household heads perceive public transport to be reliable while 101 (48.10%) of the sample household heads do not perceive public transport to be reliable. This means that a lot of the household heads perceive public transport to be reliable. Finally, with regards to safety, out of the 210 respondents, 127 (60.48%) of household heads perceive public transport to be safe while 83 (39.52%) do not perceive public transport to be safe. This shows that most of the household heads perceive public transport to be safe.

4.1.2 Continuous variables

The continuous variables in the double hurdle model are age, household size, years of education, trip time and monthly expenditure.

Table 2: Descriptive statistics of continuous variables of the first objective of the study

Variable	Mean	Standard deviation	Minimum	Maximum
Age	35.99	11.345	18	80
Household size	4.16	2.94	1	17
Years of education	10.29529	4.10257	0	19
Trip time (in minutes)	102.91	37.67	35	240
Monthly expenditure on public transport (Ghana cedis)	225.82	170.14	0	1120

Source: Author's computations based on field survey, 2020

From Table 2, the minimum age of household head is 18 years and the maximum age is 80. This means that out of the 210 sample, the youngest household head is 18 years old and the eldest household head is 80 years. The mean age is approximately 36 years old. This means that the average age of the 210 household heads is 36 years old. Also, the minimum household size is 1 and the maximum household size is 17 members. The mean household size is 4.16. This means that on the average, every household is made up of approximately 4 people. The descriptive statistic shows that some households have no educational attainment however, for those with some level of education, the maximum years of schooling is 19 years. The mean years of education is 10.29 which means that household heads with an educational attainment spent an average of approximately 10 years. From table 2, the mean time spent by household heads to travel from various homes to their workplace is 102.91 minutes. It

means that, on the average, a household head spends approximately 103 minutes which is equivalent to 1 hour and 43 minutes from Kasoa to work in the Central Business District (CBD) of Accra. The least time that a household head spends from home to work in Central Business District (CBD) is 35 minutes. This is the case for those household heads who leave the house at dawn and are less likely to meet heavy traffic. The maximum time spent by household heads to reach their workplace is 240 minutes which is equivalent to 4 hours. Again, according to table 2, the mean monthly expenditure on public transport is GH¢ 225.82 which means that on the average, households spend GH¢ 225.82 on public transport monthly. Some of the households who own private car do not use public transport and for that matter have no expenditure on public transport. For those households who use public transport, the maximum monthly expenditure is GH¢ 1120.

From Table 2, Household size is relatively least dispersed series with standard deviation of 2.94, while Monthly expenditure on public transport is relatively highly dispersed with standard deviation of 170.14.

4.1.3 Categorical variable in the probit regression model

Table 3: Descriptive statistics for the categorical variable of the second objective

Categorical variable	Scale	Frequency	Percentage
Decision to agitate for an increase in transport Fares	Yes	157	78.50
	No	43	21.50

Source: Author's computations based on field survey, 2020

Table 3 presents the descriptive statistics of the dependent variable of the second objective. From the table, it can be observed that 157 (78.50) of the drivers have

decided to agitate for an increase in transport fares while 43 (21.50) of the drivers have not.

4.1.4 Continuous variables of the probit regression model

Table 4: Descriptive statistics of continuous variables of the second objective

	Mean	Std. Dev.	Min	Max
Fuel Prices	8.575	1.4369	5	10
Spare parts Prices	8.24	1.4742	1	10
Travel time	2.255	1.7393	1	8
Nature of road	6.2	2.6277	1	10
Lubricants Prices	6.675	1.4069	1	10

Source: Author's computations based on field survey, 2020

From Table 4 above, the table shows that the mean of fuel prices is 8.575. It has a minimum value of 5 and the maximum value of 10. Also, table 4 shows that the mean of the extent to which drivers find prices of spare parts to be important is 8.24. The minimum value is 1 and the maximum is value is 10. Again, the table shows that the mean of nature of road is 6.2. The minimum level of importance is 1 and the maximum is 10. The mean of travel time is 2.255. The minimum level of importance is 1 and the maximum is 8. The table 4 shows that the mean of prices of lubricants is 6.675. The minimum level of importance is 1 and the maximum is 10.

From table 4, Lubricants is relatively least dispersed series with standard deviation of 1.40, while Nature of Road is relatively highly dispersed with standard deviation of 2.62.

4.2 Double Hurdle model results

Table 5: Results of estimated coefficients of double hurdle model of household's participation decision in the public transport market

Variable	Coefficient	1 st Hurdle standard error	p> z
Age	-0.02119	0.01866	0.256
Household Size	0.10981	0.10018	0.273
Education	0.00918	0.07488	0.902
Trip Time	0.00243	0.00645	0.706
Accessibility	0.92796	0.73093	0.204
Convenience	8.85725***	1.54875	0.000
Safety	2.43485***	0.75375	0.001
Income_2000-4000	-0.37423	1.21413	0.758
4001 and above	-4.63119***	0.70743	0.000
Reliability	7.11920***	1.20544	0.000
Availability	0.92574	0.70694	0.190
Cons	-1.59969	1.21033	0.186
Insigma	-0.40851	0.05108	
Sigma	0.66463	0.03395	
Prob>chi2	0.0003		
Wald chi2(9)	30.82		
Pseudo R2	0.0448		
Number of observations	210		

Note: ***significant at 1%. ** significant at 5%. * significant at 10% level

Source: Author's computations based on Field Survey,2020

4.2.1 Model specification test results

From Table 5, the probability value is less than 1% significance level indicating that the double hurdle model with all the predictors fit significantly. The results of wald chi2 shows that we reject the null hypothesis that at least one of the predictors' regression coefficient is equal to zero with the chi square being significant at 5% confidence level.

The results from table 5 indicate that perceived convenience has a positive relationship with public transport at 1% significance level. This implies that the more household heads perceive public transport to be convenient, the more likely they would patronize public transport. Perceived convenience is positively related to choice of public transport. This is in accordance with a study conducted by Chen and Li (2017) who concluded that of all the latent variable sets, convenience is one of the variables that has a major impact on mode choice for public transport. It also in line with a study by Corpuz (2007) who found that other aspects of public transport that encouraged its use were comfort and convenience

Also, the use of public transport to work was related to income range. Household heads whose income fall within the income range of GH¢4001 and above has a negative and significant association with public transport use at 1% level. According to the results of the study, households that fall within the income range of GH¢ 4001 and above which is the highest income group are less likely to participate in the public transport market. The result is consistent with Liu (2017) who reported that high income earners are less likely to choose public transport.

In addition, perceived safety has a positive and significant relationship with participating in public transport market at 1% level. This means the more household heads perceive public transport to be safe, the higher the probability of households participating in the public transport market. the study finds perceived safety of public transport to be positively related to public transport participation and this result is consistent with Sam et al (2014) which according to their study, safety is one of the factors that student look out for before they choose a particular public transport.

Furthermore, perceived reliability of public transport is found to be positively related to public transport choice and significant at 1% level. It means that the more household heads perceive public transport to be reliable, the higher the probability of households to choose public transport to work. Polat (2012) explained that the more reliable travelers find public transport, the more they will use and if they find it less reliable, they will find other modes reliable and prefer that to public transport.

The variables Age, Household Size, Education, Trip Time, Accessibility and Availability were not statistically significant.

Table 6: Results of estimated coefficients of the double hurdle model of household's expenditure on public transport

Variables	Coefficient	Standard Error	p> z
Age	0.00402	0.00555	0.469
Informal	0.22373**	0.10086	0.027
Household Size	0.01848	0.02157	0.392
Male	0.23676**	0.09982	0.018
Education	0.03444**	0.01456	0.018
Affordability	0.197193**	0.09343	0.035
Constant	4.327213	0.2615953	0.00

Note: ***significant at 1%. ** significant at 5%. * significant at 10% level

Source: Author's computations based on Field Survey,2020

From table 6, the results shows that male household heads are more likely to spend more on public transport than female headed household. This was statistically significant at 5% level. This means that household heads that are female are less likely to spend more on public transportation than household heads that are males. This is consistent with Thakuriah, and Liao (2006) who in their study found that Single-parent households with a female head spend significantly less on transportation than other households.

The affordability variable is however positive and significant at 5% level. Perceived affordability has a positive relationship with expenditure according to the results of the study. It means that the more households perceive public transport to be affordable, the more they will spend on public transport. Thus, if households find fares of public transport to be affordable enough, households' expenditure on public transport will increase.

In addition, the number of years of formal education of the household head had a positive and statistically significant relationship with expenditure on public transport at 5% level. The results of this study highlight the important role of education on expenditure on public transport which in this study was measured in number of years of education. In other words, spending on public transport increased with years of formal education of the household head. This is in accordance with a study conducted by Bhat, Ferdous, Pinjari and Pendyala (2010), who found that less educated households heads are less likely to spend more on public transport.

Furthermore, the coefficient of the employment type of household head is statistically significant at 5% level and showing that household heads employed in the formal employment sector are more likely to spend more on public transport than those in the informal sector. The variables age and household size were not statistically significant for households' expenditure on public transport. This means that the variables mentioned do not influence households' expenditure on public transport according to this study.

4.3 Probit Model Results

Table 7: Results of estimated coefficients of probit regression model of factors that influence drivers' decision to agitate for increase in lorry fares.

Variable	Coefficient	Standard Error	p> z
Fuel	0.4103052***	0.0860343	0.000
Spare Parts	0.2417715***	0.0735919	0.001
Travel Time	0.0275574	0.07491	0.713
Nature of Road	0.206717***	0.0479627	0.000
Lubricants	0.0942339	0.0827273	0.255
Constants	-6.441996***	1.29351	0.000
LR Chi2(5)	57.26		
Prob> chi2	0.0000		
Pseudo R2	0.2750		
Number of observations	200		

Note: ***significant at 1%. ** significant at 5%. * significant at 10% level

Source: Author's computations based on Field Survey

4.3.1 Model specification test results

From Table 7, the probability value is less than 1% indicating that the probit model with all the predictors fit significantly. The results the LR chi2(5) which is 56.96 means that we reject the null hypothesis that at least one of the predictors' regression coefficient is equal to zero with the chi square being significant at 5% confidence level.

The results from Table 7 above indicate that the extent to which drivers consider fuel prices to be important in agitating for an increase in transport fares has a positive relationship with drivers' decision to agitate for increase in fare. This means that the more fuel prices increase, the higher the probability of drivers agitating for an increase in transport fares. This is consistent with a study conducted by Poku-Boansi (2008) who found a positive relationship between cost of fuel and vehicle operating

cost since cost of operating a vehicle is what influences drivers to agitate for increase in transport fares It has a significant influence at 1% significance level.

Drivers' agitation for increase in transport fares is positively related to how important drivers consider spare parts prices. This relationship is statistically significant at 1% level. This also means that the more spare parts become expensive, the higher the probability of drivers' agitating for an increase in transport fares. This is also consistent with studies done by Poku-Boansi (2008) who found a positive relationship between cost of spare parts and vehicle operating cost since cost of operating a vehicle is what influences drivers to agitate for increase in transport fares.

From the results, nature of road has a significant relationship with drivers' decision to agitate for increase in fare and it is statistically significant at 1% level. According to the drivers that participated in the study, bad roads affect the vehicle hence cost of maintaining it increases since they have to maintain it more frequently than on good roads. Bad road increases the probability of agitating for fare increment.

4.3.2 Marginal effects

Table 8: Marginal effects of probit regression model on factors that influences drivers' decision to agitate for increase in transport fares

Decision to agitate for increase in transport fares	Df/dx	Standard error	z	p> z
Fuel	0.092459***	0.018993	4.76	0.000
Spare parts	0.055803***	0.0168467	3.32	0.001
Travel time	0.003118	0.017204	0.18	0.713
Road	0.046043***	0.0104991	4.24	0.000
Lubricants	0.019537	0.018776	1.04	0.255

Note: ***significant at 1%. ** significant at 5%. * significant at 10% level

Source: Author's computations based on Field Survey

Table 8 indicates the marginal effects of the independent variables on the dependent variable. Marginal effect measures the expected instantaneous change in the dependent variable as a function of a change in a certain explanatory variable while keeping all other covariates constant. From the table, an increase in fuel prices will increase drivers' decision to agitate for an increase in transport fares by 9.2%. Secondly, an increase in prices of spare parts will increase drivers' decision to agitate for an increase in transport fares by 5.5%. Thirdly, if the perception of deterioration in the nature of roads increases, it will increase drivers' decision to agitate for an increase in transport fares by 4.6%.

4.4 Chapter Summary

The objective of this chapter is to analyse the relevant field data which would provide the basis for the discussion and recommendation of policies with regards to the choice of public transport to work and the factors drivers consider in their decision to agitate for an increase in transport fares. Key variables have been discussed with reference to the objective and research issues of the study. Some of the salient issues discussed in this chapter include the household socioeconomic characteristics, factors that influence public transport participation, and factors drivers consider before agitating for an increase in fare so that policies can be recommended to make public transport affordable. The issues discussed in this chapter will be used in the next chapter where policies are recommended.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter, which is the final chapter of the study, is in three sections. Section one presents the summary of findings in relation with the study objectives and research questions. These findings emanate from the analysis of field data and the review of relevant literature. The second section draws conclusions based on the findings of the study. The final section presents the study recommendations. These recommendations made based on the findings of this study, aim at providing important solutions needed increase the use of public transport to work to help reduce traffic congestion as well as making public transport affordable. In addition, issues with implications for policy formulation as well as questions for future research have been presented in this chapter.

5.1 Summary of Main Findings

5.1.1 Research objective 1: Choice of public transport to work

The literature identified some of the factors that influence transport mode choice, demand for public transport and transport mode choice to work across the globe. The factors include income, household size, occupation, accessibility, reliability, convenience, safety of a transport mode and travel time. The study was conducted with a sample of 210 households for the first objective thus, analysing determinants of choice of public transport to work.

The research question that guided the analysis of factors that influence choice of public transport to work was:

–What are the factors that influence choice of public transport to work?”

The study examined the factors that influence choice of public transport to work using a double-hurdle model. The first hurdle was related to the factors influencing participation in public transport market while the second hurdle was related to estimation of factors that influence households' expenditure on public transport. Key findings from the study with regards to the first research question stated above includes the following:

First of all, the results of the study showed that, choice of public transport to work by households that live in the Kasoa in the Awutu Senya East District was influenced by the factors perceived safety, reliability and convenience of public transport as well as the income of household head. This means that, when households perceive public transport to not be safe, reliable and convenient, it is less likely that the household will choose public transport to work. Also, households whose heads earn income between GH¢ 4000 and above are less likely to choose public transport to work.

Also, affordability which is a proxy for public transport fares influences households' expenditure on public transport. The more household perceive public transport to be affordable, the more household will increase expenditure on public transport.

5.1.2 Research objective 2: Factors influencing drivers' decision to agitate for increase in transport fares

The second objective of the research was to identify the factors that drivers consider before they agitate for an increase in transport fares so that public transport can be made affordable. This will help the researcher bring out helpful policy recommendations that can help improve pricing of public transport services which will make public transport affordable.

This study identified some of the factors that influence transport pricing, cost of operating public transports and pricing of urban transport services from empirical literature. Fuel prices, prices of spare parts and maintenance costs, prices of lubricants, insurance premium, travel time, cost of tyres and sales are the factors drivers consider before agitating for an increase in transport fares.

Studies conducted in Ghana identifies that factors such as percentage increase in fuel is not the only factor that determines pricing of urban public transport services. Cost of spare parts, cost of tyres, cost of lubricants all influence pricing of public transport.

The sample size for analysing the second objective is 200.

The research question that guided the study to identify factors that influences drivers' decision to agitate for increase in transport fares was:

–What are the factors that influences drivers' decision to agitate for increase in transport fares?"

In order to answer this question, the probit regression model was estimated. The results of the second objective of the study indicate the extent to which drivers consider fuel prices, prices of spare parts and the nature of road to be important in their decision to agitate for an increase in transport fares are significant.

5.2 Conclusions

A major conclusion from the study with regards to the first objective is that, transport service quality plays an important role in public transport participation. Reliability, safety and convenience which are all service quality features have a positive influence on the decision to choose public transport to work and that if household find public transport affordable, they will increase expenditure on public transport. This implies

that, when public transport is reliable, convenient and safe, there will be an increase in the choice of public transport to work rather than choose their private modes. This will help reduce traffic congestion especially during the peak hours on the Kasoa-CBD corridor.

The major conclusion made from the second objective is that fuel prices, prices of spare parts and the nature of the road play an important role in drivers' decision to agitate for increase in transport fares in Ghana. Thus, according to the study, they are the significant factors drivers consider in their decision to agitate for increase in transport fares. The implication is that, when the prices of fuel and spare parts increase, they influence drivers' decision to agitate for an increase in transport fares. As drivers agitate for an increase in transport fares, it will lead to an increment in transport fares thereby making public transport less affordable.

5.3 Policy Recommendations

To encourage the use of public transport to work in order to reduce traffic congestion, the government through the Ministry of Roads and Transport should set a standard of service quality to the various unions of public transport such as the Ghana Private Road Transport Union (GPRTU) to be provided by public transport service members in the union. Such qualities include making public transport convenient, reliable and safe. This will increase the choice of public transport to work instead of private transport modes therefore reducing traffic congestion during peak hours. It will also help labour to get to work on time and be able to produce more in a day since individuals are able to get to work early as well as not exhausted when they get to work. In addition, the government through the ministry of roads should impose higher

tariffs on private cars during working days discourage high income earners who own private cars from using their private cars to work.

Also, the government through the customs department of the Ghana Revenue Authority (GRA) can help reduce prices of spare parts by offering spare parts dealers import tax waivers. Also, the government through the ministry of energy should reduce petroleum tax and levies to help reduce prices of fuel. This will help to decrease the costs of operating public transport thereby reducing drivers' agitation for increase in transport fares. This will help make public transport more affordable for those households who cannot afford public transport as well as increase households public transport expenditures.

Finally, the government through the Ministry of Roads and transport roads should be well maintained and rehabilitated on a regular basis. This will help reduce cost in maintaining public transport vehicles and public transport drivers' agitation in increase in transport fares

5.4 Limitations of the Study

When the sample size is large, especially across other regions in Ghana, the results may slightly differ. The study was conducted in Kasoa to meet the first objective and with the second objective, it was conducted in Swedru, Mankessim and Kasoa and therefore findings may not be applicable to other towns or cities based on diversities in environmental climate and culture. Some respondents were reluctant to give information during the research even though they were briefed about the purpose of the study.

The first objective of the study is to analyse household transport choice to work and their level of transport expenditures, the study is confined to Kasoa in the Central Region of Ghana. Data was collected on only household heads who travel to the Central Business District (CBD) in Accra to work. Besides, the second objective was to analyse factors that influence drivers' decision to agitate for increase in transport fares but only drivers from Kasoa, Swedru and Mankessim bus terminals were considered. Again, the use of cross-sectional data approach will not help make a general inference because, the population that did not participate in the study may have different characteristics and perspectives and if that were to be added, may change the results of the study.

5.5 Suggestions for Further Research

Due to the limitations of the study, lack of adequate financial assistance, time factor among others, the research suggests that further research is being conducted to investigate more into factors that can influence choice of public transport to work and pricing of public transport.

The focus of this study was on choice of public transport to work by household heads and factors that influence drivers' agitation for increase in transport fares. Even though the study involves an important analysis of choice of public transport to work, the scope was limited to households at Kasoa who use the Kasoa-CBD corridor. Further research should consider other traffic corridors of cities in the country in order to make a more comprehensive analysis.

Besides, on the analysis of factors that influence drivers' decision to agitate for increase in transport fares, the study centred on some selected towns in the central region with views solicited from only drivers. Further studies should focus on

soliciting the opinions of other key stakeholders such as the Ministry of Transport, Ministry of Roads and Highways and Ghana Highway Authority.



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APPENDICES

APPENDIX A

Questionnaire for Household

UNIVERSITY OF EDUCATION, WINNEBA

DEPARTMENT OF ECONOMICS EDUCATION

THE USE OF TRANSPORT SERVICES BY URBAN COMMUTERS IN GHANA: A CASE STUDY OF KASOA IN THE CENTRAL REGION

Dear Respondent

This survey aims at examining the use of public transport among commuters from outside the city of Accra to Accra. Please, you are assured that any information provided will be treated confidential. This data is collected mainly for academic purposes. Thank you.

1. Age (yrs):
2. Occupation:
3. Gender, Please tick Male Female
4. Marital Status, Please tick Single Married Divorced
Separated
5. How many children do you have?
6. Apart from your children, how many other dependents do you live with?
7. What is your place of residence? Please tick Rural Urban
8. What district or municipal is your residence located?
9. Educational Background, please tick your highest educational level.
 - Basic Education
 - Secondary Education
 - Tertiary Education
 - No Education

10. How many years did you spend in school?
11. Do you own a private car? Please tick [] Yes [] No []
12. What mode of transport do you normally use to travel to Accra? Please tick []
Public commercial Transport [] Staff Bus [] Private Transport []
13. If it is public transport, how much do you pay as fare on a return trip each day?
.....
14. If it is private transport, how much do you spend on fuel on a return trip each day?
.....
15. What is the distance from home to work? (in kilometers).....
16. How long does it normally take you to your workplace? (in Minutes)
.....
17. What is your monthly income range. Please tick []
500-1000 [] 1001-2000 [] 2001-3000 [] 3001-4000 [] 4001-5000 []
5001 and above []
18. Do your family use public transport? Please tick [] Yes [] No
19. What is your household's weekly expenditure on public transport?
.....
20. What is your household's weekly expenditure on private transport?
21. Has the introduction of public transport system helped reduce your financial burden on transportation? Please tick [] Yes [] No []
22. If your response to question number (12) is Private Transport, will you want to use public transport to work?
Please tick [] Yes [] No []

23. How many times do you normally travel to Accra to work in a week?.....

24. Are you satisfied with services provided by the public transports? Please tick []

Yes [] No []

25. Do you perceive public transport to be Reliable Yes [] No[]

26. Do you perceive public transport to be Affordable Yes [] No[]

27. Do you perceive public transport to be Accessible Yes [] No[]

28. Do you perceive public transport to be Safe Yes [] No[]

29. Do you perceive public transport to be Convenient Yes [] No[]

30. Do you perceive public transport to be Available Yes [] No[]

31. What was the purpose of the household's trip to Accra? Please tick []

Trade[] Report to work[] Attend Hospital[] Visit[] Attend school[]

Others (Please, specify):

On a scale of 1-5, (where 1=very bad and 5= very good) how will you measure the quality of service offered by public transport?

32. service quality 1[] 2[] 3[] 4 [] 5[]

33. How many times do you travel to Accra using public transport to work within a week?

34. How many times do you travel to Accra using private transport to work within a week?

APPENDIX B

Questionnaire for Driver

UNIVERSITY OF EDUCATION, WINNEBA

DEPARTMENT OF ECONOMICS EDUCATION

FACTORS THAT DETERMINE TRANSPORTATION FARE IN GHANA: A CASE STUDY OF WINNEBA, SWEDRU AND KASOA IN THE CENTRAL REGION

Dear Respondent

This survey aims at examining the determinants of public transport fares according to drivers. Please, you are assured that any information provided will be treated confidentially. This data is collected mainly for academic purposes. Thank you.

FOR THE STATION

Name of Union.....

Location of Union.....

1. Is your union involved in determining transportation fares in the country?

Yes [] No []

2. Does the current transport fares help you cover your cost of running your vehicle?

Yes [] No []

2. Have you decided to agitate for increase in transport fares?

Yes [] No []

3. On a scale of 1-10, (where 1= least important and 10= very important) indicate the extent to which these factors are important in deciding transport fares?

	1	2	3	4	5	6	7	8	9	10
Fuel										
Travel time										
Nature of road										
Spare parts and maintenance										
Insurance Premium										
Cost of changing tyres										
Trip length (km)										
Lubricants costs										
Sales to car owners										
Profit										
General cost of living (economic condition)										

B. VEHICLE OPERATION/ MAINTENANCE COST (Fuel, Oil, Tyres, Spare Parts, etc.)

4. what is your cost for the following activity and how often do you do it?

Activity	Cost (in cedis)	Frequency
Fuel		
Tyre		
Spare parts		
Insurance Premium		
Lubricants		

5. What is your destination?.....
6. What is the transportation fare for your destination?.....
7. How many round trips do you make per day?.....
8. What is the distance between your origin and destination?.....
9. What is the average travel time used from origin to your destination of your route?
10. How much do you receive as salary for the day/week/month?.....
11. How much does your mate receive as salary for the day/week/ month?.....
12. What is the total number of passengers carried per trip?.....

SUPPLY OF THE SERVICE

13. What is the number of vehicular trips made in a day?.....
14. Do you work on weekends?.....
15. What is the price of your vehicle?.....
16. What is your total revenue in a day?.....
- 17 How many vehicles are at the station?.....