UNIVERSITY OF GHANA
INSTITUTE OF STATISTICAL SOCIAL AND ECONOMIC RESEARCH (ISSER)

The causes and effects of traffic jam on commercial transport operations. A case study of trotro drivers at Awutu Senya East Municipality

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THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF ARTS DEVELOPMENT STUDIES DEGREE

JULY, 2014
Declaration

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

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Certified by

Dr. Fred Dzanku
(Supervisor)
Dedication
This work is dedicated to my lovely daughter Michelle Nyarko.
Appreciation

I first express my deepest gratitude to God Almighty for the grace and strength granted me throughout my studies and work on this dissertation.

I owe a special debt of appreciation to my supervisor Dr. Fred Dzanku, for his intellectual criticism and guidance in the course of my work. To the entire staff and lecturers of ISSER, especially the M.A. programme coordinator Dr. Simon Bawakyillenuo, for his tolerance and matured leadership, the Director, Prof. Felix Asante, Prof. Robert Osei, Prof. George Owusu and Dr. Elizabeth Asante for being a source of inspiration. I am also thankful to the Chief Supt. of Police, Ernest Owusu for his immense support throughout my course of study.

And finally to my wonderful wife, Mrs Doris Boadu Nyarko and my lovely daughter, Michelle Nyarko, I say a big thank you for your support and care. To the family I made at ISSER, the entire members of the MA class of 2013/2014, thank you for the support, knowledge and good times we shared.

God Bless us all.
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<tr>
<td>VAGO</td>
<td>Victorian Auditor-General office</td>
</tr>
<tr>
<td>VCEC</td>
<td>Victorian Competition and Efficiency Commission</td>
</tr>
<tr>
<td>GAAS</td>
<td>Ghana Academy of Arts and Sciences</td>
</tr>
<tr>
<td>GPRTU</td>
<td>Ghana Private Roads Transport Union</td>
</tr>
<tr>
<td>SPSS</td>
<td>Social Package for Social Sciences</td>
</tr>
<tr>
<td>ISSER</td>
<td>Institute of Statistical Social and Economic Research</td>
</tr>
<tr>
<td>ASEMA</td>
<td>Awutu Senya East Municipal Assembly</td>
</tr>
<tr>
<td>LI</td>
<td>Legislative Instrument</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Cooperation and Development</td>
</tr>
<tr>
<td>ECMT</td>
<td>European Conference of Ministers of Transport</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>BRTS</td>
<td>Bus Rapid Transit System</td>
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Abstract
An effective transportation system is important in sustaining economic growth in contemporary economies since it provides linkages between different parts of the country and the global world. An efficient transportation system plays an important role in catering to the daily necessities in the lives of the citizens. A well established transportation system is not only key to national growth but also serves as a catalyst for economic development of a country. However, in recent times, cities in the world have witnessed tremendous motorization. Owing to this high level of motorization, combined with increasing population in the face of inadequate traffic management strategies, modern-day cities have witnessed high traffic congestion. The Kasoa road, in the Awutu Senya East Municipal Assembly, is an example of one of such roads with periodic high traffic congestion. This study was therefore conducted to assess the causes and effects of traffic congestion and also its effect on road users.

The study used a mixed research approach where a survey was conducted to interview both trotro drivers and commuters of trotro cars, and GPRTU officials were engaged in an in-depth interview. While descriptive statistics were used to present the survey findings, content analysis was used to present the interview findings. The results show that traffic congestion is primarily caused by the large number of cars, poor nature of some part of the roads, and bad parking/stopping by drivers among others. The causes and effects of traffic congestion on the activities of private commercial drivers (trotro) were it reduces the number of trips they could make in a day, increase fuel use and reduce daily sales. To passengers, it delays their time, leading to low productivity, and is associated with other health effects, among many others. The results point to the need for the rehabilitation of the road, construction of railway lines to serve as alternative routes and use of other strategies for toll collection that will minimize the traffic on the road.
Chapter One

Introduction

1.1 Background of the study
Improving the social and economic wellbeing of the citizenry is the aim of every nation. The long-term goal of government is to raise the standard of living of all Ghanaians to a level consistent with that of a middle income economy. One basic economic and social necessity that comes into focus when discussing economic and social development is transportation. Transportation is an activity of life processes and seeks to provide access to various activities that satisfy mobility needs of humankind (Arasan 2012).

According to Eddington (2006), an effective transportation system is important in sustaining economic growth in contemporary economies since it provides linkages between different parts of the country and the global world. It links to work, delivers products to market, underpins logistics and supply chain, and supports local and international trade. A well established transportation system is not only key to national growth but also serves as a catalyst for economic development of a country. Thus, there is a positive relationship between transportation and productivity (Lu et al. 2009).

At the individual level, Wane (2001, p.1) also points out that ‘transportation is a crucial vector for urban insertion since it gives access to economic activity, facilitates family life and helps in spinning social networks. It links the different spaces of the city on which an individual or a family has to implement his or its tri-dimensional strategy of life (i.e. family, work, residence). So, urban mobility is at the heart of the challenges faced by any city dweller’.
Consequently, cities in the world have witnessed tremendous motorization during the recent century, especially since 1988 when global car population exceeded 400 million (Walsh, 1990). The reason for this phenomenon, according to Dimitriou (1990), is that in both the Developed and Third World countries, few activities are more poorly managed than urban transport. As such, the failure of public transport to meet the needs of travelers has intensified the demand for private cars.

Owing to this high level of motorization, combined with inadequate traffic management strategies, an aging and ill maintained vehicle stock, as well as inadequate land use and transportation planning, especially in the Developing Economies, modern-day cities have witnessed a very significant proportion of traffic congestion (Agyemeng, 2009). Described as a phenomenon of increased disruption of traffic movement on an element of the transport system, traffic congestion is most visible when the level of demand for movement approaches or exceeds the present capacity of the element (Taylor, 1999). As Taylor et al. (2000) argue, traffic congestion presents a common, if not inevitable, facet of traffic activity in a region, particularly in urban areas.

Although there is traffic congestion in most major cities of the world, there is no standard definition of it. In general, congestion occurs when the number of vehicles using the road is greater than the capacity of the available road space, impeding the efficient movement of traffic (VAGO, 2013). Rodrique et al., (2009) states that congestion can be perceived as unavoidable consequences of scarce transport facilities such as road space, parking area, road signals and effective traffic management. They argue that urban congestion mainly concerns two domains of circulation, passengers and freight which share the same infrastructure. Thus, traffic congestion condition on road networks occurs as a result of excessive use of road infrastructure beyond
capacity, and it is characterized by slower speeds, longer trip hours and increased vehicular
queuing (Takyi et al., 2013)

Traffic is a sign of mobility and of a dynamic economy. However, excessive congestion causes a
range of undesirable consequences. It has equally created an artificial barrier to a cost effective
flow of goods and persons along our highways linking major towns together (Popoola, Abiola
and Adeniji, 2013). It imposes costs on the community and businesses through longer, less
predictable travel times; lost productivity and additional running costs of vehicles; increased
pollution, noise, loss of amenity, driver stress; and reduced time people spend with their families
(VAGO, 2013)

For instance, in 2006, the Victorian Competition and Efficiency Commission (VCEC) estimated
the economic costs of Melbourne's congestion ranged from $1.3 billion to $2.6 billion per year,
and that this was likely to double by 2020. These costs incurred by the community as a whole
generally are not paid for by the road users who have caused them. While some level of
congestion is a signal that existing road capacity is being used, the challenge is to reach an
'optimal' level of congestion where some road users travel on other modes of transport or with
other users; travel at a different time of the day; postpone their trips to another day; or eliminate
the need to travel (VAGO, 2013).

African’s urbanization is variously referred to as ‘parasitic urbanism’, ‘urbanization of poverty’
and ‘premature urbanization’ (e.g. Ravallion et al., 2007; Kinver, 2007), echoing Professor
Mabogunje’s (1968) claim that urbanization has outpaced economic development. To the World
Bank, Africa’s urbanization is runaway, negatively correlated with economic growth and fuelled
by strife in rural areas (World Bank, 2000).
Like the rest of Africa, Ghana has had disappointing experiences with Rural Development and Structural Adjustment Programs aimed at addressing urban problems (Obeng-Odoom, 2007b). Speaking (Kwakye and Fouracre, 1998, p. 1) at a conference in Cape Town, South Africa, the Director of Planning at the Ministry of Transport and Highways, Ghana, and his advisor said:

“The urban transport system in Ghana is characterized by the congested central areas of the cities, poor quality of service from public transport operators, high exposure to road accidents, and poor environmental standards. This is seen in long commuting times and journey delays, lengthy waiting times for public transport both at and between terminals, high accident rates, and localised poor air quality”

The analysis and solution to the urban transportation problem in the GAAS study was provided by Addo (2002) and Tamakloe (1993). They suggested that Ghana is ‘over-urbanized’. Given the country’s technological backwardness and weak management, they argued, satellite towns should be created and linked to the main cities by excellent communication lines. They also argued that the planning gap between highway engineering and Town Planning should be closed and that institutions responsible for transport planning be brought under one umbrella. While these solutions may promote administrative efficiency, it is difficult to see how they could have remedied the root causes of the urban transport problem.

It is argued here, more fundamentally, that the urban transport problem is the expression of a stressed system which is typified by the absence of alternative transport like rail, poor quality public transport, low tech urban roads, the surge in on-street hawking of goods and services and the either weak and/or poorly enforced urban transport regulations. This is a system that claims about 1600 lives and causes over 10000 injuries on an annual basis (Obeng-Odoom, 2009).
1.2 Problem Statement
Urban transportation opens up opportunities to access essential services as well as social activities (Arasan, 2012; Rodrigue et al., 2009; Lu et al., 2009). Business activities depend on urban transportation systems to ensure the mobility of its customers, employees and suppliers. The urban transport services cover a range of important social and economic services such as commuting; shopping; trips to places of education and freight distribution. Effective urban transport fulfills the demand for accessibility within cities (Okoko, 2006).

Economic and social activities of human kind revolve around transportation. It is a link to almost all sectors of an economy. Virtually everything we do relies on transportation. Trade within and between different regions is vital to economic development and directly depends on transportation (Kulash, 1999; World Bank, 2002). Thus the importance of transportation to societal growth cannot be underestimated. Broadstock (2011) and Pacione (2005), state that increasing wealth and high population, and availability of vehicle loan facilities result in more car ownership than current transportation network can handle. It could be inferred from the above statement that there is a relationship between income level and car ownership and that the dominance of private car usage, particularly within cities, is likely to increase even further as a result of rise in household income with its attendant traffic congestion and high consumption of fuel.

Traffic congestion has been one of major issues that most metropolises are facing. Some issues that have been identified as having contributed to this include the rural-urban migration (with its resultant pressures on the planning of the metropolis), the displacement of residents from the central business district (to convert residential facilities there into commercial facilities), the poor road networks, the increasing number of vehicles, poor timing of traffic signals, and attitudes of road users (Ofori-Dwumfu and Dankwah, 2011)
As Taylor et al. (2000) argued, traffic congestion presents a common, if not inevitable, facet of traffic activity in a region, particularly in urban areas. It is also believed that the high volume of vehicles, the inadequate infrastructure and the irrational distribution of the development are the main reasons for increasing traffic jam (O’Toole, 2012).

This phenomenon has resulted in, among other things, longer travel times, additional fuel consumption, high pollution levels, vehicle wear and tear, disutility from crowding; and (in the longer run) the costs of relocating jobs and residences and a deteriorating urban environment that has a direct bearing on sustainable development (Intikhab et al., 2008; Palma & Lindsey, 2001). Aside the economic costs, traffic congestion can have profound adverse impacts on the social (e.g. people unable to physically contact relations on time), environmental (e.g. excessive emission of carbon dioxide to cause global warming) and safety concerns.

Given the enormity of the problem, policy makers all over the world have implemented several measures to cut down or minimise the impacts of traffic congestion by properly maintaining the current road and bridge system; constructing new roads, bridges, and non-highway infrastructure; encouraging an appropriate balance between different modes, especially by developing alternatives such as public transportation and finally, employing transportation systems management and operations strategies to maximize the capacity of the infrastructure already in place (Paniati, 2004). The Government in its attempt to salvage the situation has been expanding road networks in almost all our major cities but the more they expand, the more people import cars for their domestic use (Ghanaian Chronicle, 2007).

When one wants to travel within the city, there are usually two options available: either a private car or public transport. If the person wants to travel between two cities, usually there is a third option, a public bus. The number of private cars in Ghana is increasing. Overall, the number of
registered vehicles in Ghana increased from 511,063 in 2000 to 841,314 in 2006 (National Road Safety Commission, 2008). Private cars in Ghana are generally not available on hire purchase and so it requires significant income to purchase one. Generally, private cars are owned by medical doctors, bankers, lawyers, accountants and politicians. Public transport is the more common means of movement around the cities (Obeng-Odoom, 2009).

A recent study (ABLIN Consult, 2008) found that ‘over 80% of road transport passenger services are predominantly provided by commercial transport services’. Here too, there are two types: taxis (for the middle class) and mini buses called ‘troskis’ or ‘trotros’ (for the rest) (Obeng-Odoom, 2009). There is a relatively new type of public transport, introduced by Kufour government and therefore gave it a name, ‘Kufour buses’. These are cheap in fare but woefully inadequate and riddled with poor management. Though they have helped the transport situation in Ghanaian cities, they are relatively unknown (Obeng-Odoom, 2009).

Apart from stopping to pick a passenger, a ‘trotro’ can stop under three (other) circumstances: first, passengers want to buy from hawkers who have invaded the streets and have caused congestion in the cities (Akamin, 2008). Thus in the course of the journey, one can see traders offering food, water and other wares such as dog chains to passengers. Second, a policeman stops a ‘trotro’ to either query the driver about an offence or extort some few cedis from him. Third, the ‘trotro’ breaks down in the course of the journey. Though some ‘trotros’ are roadworthy, many of them are not. With inscriptions like ‘God is in control; be still’ and ‘Fear not’, the drivers try to persuade potential passengers to ignore their rickety vehicles. An interview by Akoto et al. (2013) tells of a ‘trotro’ driver who goes the extra mile to claim that the pitch black smoke that emits from the exhaust pipe of his ‘trotro’ is abundant proof that the engine of his ‘trotro’ is strong!!
A lot of research has been conducted into the phenomenon of urban transportation across the globe and especially in cities of the developing economies. Most of the research is about travel behaviour (Dissanayake & Morikawa, 2008); pollution (Atash, 2007); regulation and management (Sohail et al., 2004); motorization policies (Willoughby, 2001) and congestion (Daganzo & Cassidy, 2008).

Few authors have shown interest in urban transportation issues in Ghana. These authors have researched on issues such as injuries or traffic accidents (Mock et al., 1999; Jørgensen & Abane, 1999) and modal choice (Abane, 1993). Aside these notable ones, not much has been written on the issue of transportation in the urban setting, especially as it relates to the impacts of traffic congestion on public transport provision.

It can be argued that the mode of operation of ‘trotros’ and the condition in which they operate have worsened the urban transport problem. This study is therefore conducted to assess the effect of traffic congestion on commercial transportation from the perspective of ‘trotro’ drivers who use the Kasoa road in the Awutu Senya East Municipality. This will go a long way to provide the requisite feedback that could influence transportation practitioners, policy makers, transportation geographers and planners in general, to put in practical measures to address the challenge. This will ensure a general improvement in the transport sector which will have several positive impacts on the residents of Awutu Senya East Municipality.

1.3 Research Questions
To achieve the objectives the study, the following research questions guided the researcher in his data collection

- What are the main drivers of traffic jam on the Kasoa road from the perspective of ‘trotro’ drivers?
How does traffic jam affect commercial transport operation in the Awutu Senya East Municipality?

What are the costs of traffic jam to commuters who patronize ‘trotro’ on the Kasoa road?

What possible solutions can help minimize the traffic jam on the Kasoa road?

1.4 Objectives of the study
The main objective of the study is to examine the effect of traffic congestion on commercial transport operation. The specific objectives to be achieved by the study are;

- To examine the main causes of traffic jam on the Kasoa road
- To assess the cost of traffic jam to commercial transport operation
- To examine the effects of traffic jam on commuters who patronize ‘trotro’ on the Kasoa road

1.5 Significance of the study
Research of this nature is intended to be of outmost importance to the government and other policy makers. The issue of traffic congestion is a burden that the government is pooling all knowledge and other resources together to find a lasting solution to the ever increasing traffic jam.

The findings of this study are also intended to inform the Awutu Senya East Municipal Assembly, most especially the Towns and Country Planning Unit about some of the suggestions that can help ease the traffic congestion on the road. It will contribute to creating a strategic line of action in their quest to solve the problem.

To academia, it is intended to contribute to the ongoing discussions on traffic congestions which have become a canker in almost all the urban centers in Ghana. Researchers at all the universities
and institutes in the country are gathering data to help propose policies to stakeholders and other interested agencies that are interested in improving the development standards of the country.

1.6 Population and Sample
The study is designed to examine the effects of traffic jam on commercial transport operations from the perspective of ‘trotro’ drivers and offer some solutions to remedy the situation accordingly. In view of constraints, like computational facilities, finance, time and information resources, the study was restricted to the main Kasoa road in the Awutu Senya East Municipality.

The total sample for the study is 110 comprising of ten (10) GPRTU officials at the main station in the municipality were also selected for the study, 50 trotro drivers and 50 trotro passengers. Thus, the total sample size for the study was 110.

1.7 Type and source of data
The study used primary data gathered from the field using questionnaire and interview guide as well as secondary data gathered from books and literature used for the literature review in chapter two. The survey data was gathered from trotro drivers and passengers whiles the interview data was gathered from GPRTU officials.

1.8 Limitation of the study
The research was not free from limitations. One of the basic issues that confronted the study was how to sample from the population. There was no record on the number of trotro drivers that ply the road. It was therefore a challenge to be able to get a representative sample for the population. However, the choice of sampling methods used did not invalidate the findings of the study.
After sampling, getting the drivers to answer the questionnaire was another challenge. Many of drivers cannot read or write well. So the researcher was forced to employ many research assistants, and this increased the cost margin of the research.

Access to data was not easy, as anticipated. The persons that were assigned to assist the researcher were often not available. In most cases the data was just not available, making the whole process a little difficult.

Given the scope and time frame the researcher had to complete this work, time constraint became a major obstacle to the researcher. Much money was required for the completion of this work. Like every study done, the respondents may not always be truthful in the answers they give.

1.9 Organization of Dissertation
The thesis is organized in five chapters, references and appendix. Chapter one covers a background information to transportation in Africa and Ghana. The problem statement, objectives, research questions as well as the significance of the study are captured in this chapter. The chapter contains information on the scope of the study as well as the limitation of the study. Chapter two reviews the related literature about transportation problems in general. It includes summaries of prior research on road traffic congestion as well as the conceptual framework of the study.

Chapter three covers the methodology of the study, which includes the research design, sources of data, sampling and sample size, data collection and data analysis. The profile of the municipality as well as the ethical issues considered in the study has also been captured in the chapter. Chapter four covers an analysis and discussion of the findings. Chapter five gives the
summary and conclusion of the study. It also makes some recommendations for policy purposes and future studies in this field.
Chapter Two

Literature Review

This section of the work covered a review of relevant literature that has been done in the area of traffic congestion. The chapter contains findings on the definition of traffic congestion, causes of traffic congestion and the effects of traffic congestion. The possible solutions to remedy the issue of traffic congestion have also been captured in this section. The conceptual framework showing the linkages between the factors the researcher considered in terms of cause and effect on one hand and solutions and outcome on the other hand have also been captured in this section.

2.1 Definition of traffic congestion

Like many social terms, traffic congestion does not have a universally accepted definition. Hence, different scholars have offered different definition to what they conceptualize as congestion. Downs (2004) defined congestion as the situation when traffic is moving at speeds below the designed capacity of a roadway. Bovy and Salomon (2002) also defined it as a state of traffic flow on a transportation facility characterized by high densities and low speeds, relative to some chosen reference state (with low densities and high speeds). In the view of Weisbrod et al., (2001), traffic congestion is a condition of traffic delay (when the flow of traffic is slowed below reasonable speeds) because the number of vehicles trying to use the road exceeds the traffic network capacity to handle. Traffic congestion is travel time or delay in excess of that normally incurred under light or free-flow travel conditions (Lomax et al., 1997).

The Joint Transport Research Centre of the Organisation for Economic Cooperation and Development (OECD) and the European Conference of Ministers of Transport (ECMT) provide the following definitions of traffic congestion to reflect the different broad perspectives:
• Congestion is the impedance vehicles impose on each other, due to the speed-flow relationship, in conditions where the use of a transport system approaches capacity.

• Congestion is essentially a relative phenomenon that is linked to the difference between the roadway system performance that users expect and how the system actually performs.

• Congestion is a situation in which demand for road space exceeds supply

2.2 Causes of traffic congestion
In an attempt to acquire vehicles to enable individuals traveling faster and carry out daily activities easily, cities in the world now witness tremendous motorization during the recent times; especially since 1988 global car population have exceeded 400 million (Walsh, 1990). If people in the developing world keep buying vehicles then simple upgrades in fuel-efficiency alone are not going to be enough to stop a steady uptick in global temperatures (Tencer, 2011).

Traffic congestion is a phenomenon of increased disruption of traffic movement on an element of the transport system. It is most visible when the level of demand for movement approaches or exceeds the present capacity of the element (Taylor, 1999).

Downie (2008) also opines that traffic congestion occurs when the volume of vehicular traffic is greater than the available road capacity, a point commonly referred to as saturation. He describes a number of specific circumstances which cause or aggravate congestion. Most of such circumstances are concerned with reduction in the capacity of road at a given point or over a certain length, or increase in the number of vehicles required for the movement of people and goods. Downie (2008) further argues that various economic advancement in most of most countries has resulted in a massive increase in the number of vehicles that overwhelms transport infrastructure, thus causing congestion on roads in cities.
Rodnique et al. (2009), note that congestion in urban areas is dominantly caused by commuting patterns and little by truck movement. They further attribute the causes of congestion to a rise in population densities, road incidents and broken vehicles on the roads which restrict capacity of roads and impair smooth traffic flows.

Another contributing factor to congestion as outlined by Downie (2008) is parking. He is of the view that road parking, which consumes large amounts of space has become a land issue that greatly inflates the demand for urban land, causing congestion in cities. He adds that high urban mobility rates also contribute to the congestion menace. The massive use of cars does not only have an impact on traffic congestion but also leads to decline in public transit efficiency, thereby creating commuting difficulties in cities. Indeed the over-dependence on cars has tremendously increased the demand for transport infrastructure. Unfortunately the supply of transport infrastructure has never been commensurate with the growth of mobility needs. Consequently, several vehicles spend most of the time in traffic as a result of traffic space limitation (Yan and Crooks, 2010).

Furthermore, according to the Urban Roads (2004) Report traffic congestion in Kumasi (one of the biggest urban centers in Ghana) is attributable to limited road capacity, parking space, dysfunctional road signals, drivers’ behavior, vehicle breakdown on roads and too many cars within the city.

Rao and Rao (2012) broadly categorized the causes of traffic congestion into two main types namely; (a) micro-level factors (e.g. relate to traffic on the road) and (b) macro-level factors that relate to overall demand for road use. Congestion is “triggered” at the “micro” level (e.g. on the road), and “driven” at the “macro” level by factors that contribute to the incidence of congestion and its severity. The micro-level factors are, for example, many people and freight want to move
at the same time, too many vehicles for limited road space. Many trips ends up being delayed by events that are irregular, but frequent: accidents, vehicle breakdowns, poorly timed traffic signals, special events like mass social gatherings, political rallies, bad weather conditions, etc. which present factors that cause a variety of traffic congestion problems. On the other side, macro level factors e.g. land-use patterns, employment patterns, income levels, car ownership trends, infrastructure investment, regional economic dynamics, etc. also may lead to congestion.

It is interesting to note that even though traffic congestion is such a critical problem in some major urban areas of the world, Palma & Lindsey (2001) are of the opinion that it is not a recent phenomenon at all. It is said that the ‘problems of traffic congestion in urban areas were prevalent during the 18th and 19th centuries and also during the heyday of the Roman Empire’ (Stopher&Meyburg, 1975, cited in Ogunjumo&Agbemi (1991, p.391). Indeed, chariot riding was banned in Rome during peak hours because of traffic jams (Gibbs 1997).

However, the current prevalence of congestion in surface travel has been exacerbated by sheer volume of the automobile and other motorized forms of transportation on the roads. The situation is further aggravated by the human population explosion, especially at the urban centres (Agyemang, 2009)

Ghana, like most countries in the Third World, is no exception to the above described phenomenon. Indeed, with its high growth rate and the natural desire among the population to have vehicles of their own, Kwakye and Fouracre (1998, p.1) note with concern that ‘the high urban growth rate in the country is outpacing the provision of services... thereby making it difficult to plan and programme transport in harmony with urban development’.
2.3  Effects of traffic congestion
Traffic congestion is a growing problem in many metropolitan areas as it increases travel time, air pollution, carbon dioxide (CO2) emissions and fuel use because cars cannot run efficiently (Anokye et al., 2013). Congestion - both in perception and in reality - impacts the movement of people and freight and is deeply tied to the history of high levels of accessibility and mobility. Traffic congestion wastes time and energy, causes pollution and stress, decreases productivity and imposes costs on society.

There is a strong emphasis in the literature concerning the effect of traffic congestion on productivity. Many scholars have outlined in their findings that there is a negative relationship between traffic congestion and productivity. Productivity has to deal with the ratio of volume measure of output to the volume measure of input. It measures the extent to which production input is utilized to produce output in the production process (Takyi, Poku and Annin, 2013).

According to a report by the Organization for Economic Co-operation and Development (OECD) in 2006, economic growth and business competitiveness is underpinned by productivity growth. Nadiri and Mamuneas (1996) argue that the input of productivity is a state or national investment in transportation whilst the output is gross domestic product (GDP) growth. An effective transportation system is therefore key in sustaining economic growth in the contemporary economies by its capacity to link people to job, deliver products to markets where there is demand, drives supply chain and logistics and enabling domestic and international trade.

It has also been established in the literature that traffic congestion also has negative implications for the cost of doing business, travel time, forecast reliability, comfort, safety and security of commuters (Takyi, Poku and Annin, 2013). It has therefore been argued that, the direct benefit of an efficient and effective transportation system reflects in the reduced travel time, which translates into cost saving, increase in output and ultimately GDP (Kulash, 1999; World Bank,
2002). Eddington (2006) added that travel reliability is critical to some business sectors, especially those that deal with perishable goods as well as those that rely on just-in-time (JIT) deliveries. That is, to some businesses, productivity growth is underpinned by what they termed as predictable and time-critical deliveries. This view is further shared by Weisbrod and Reno (2009), who believed that effective transportation system increases productivity in terms of job creation, reduction in business operation cost, improved output, expanded market and increase in economic competitiveness.

They continue to suggest that effective transportation system contributes to productivity by improving business ability to provide goods and services, and improving people’s ability to access education and health services, create employment and reduce vehicle operation cost as well as emission and safety benefits. Thus effective transportation system improves productivity which is a key determinant of economic growth and living standards.

In the case of commercial transport operators in Ghana, studies that have been conducted in Kumasi revealed that traffic congestion reduces their expected daily income. Takyi, Fosu and Anin (2013) conducted an assessment of the impact of traffic congestion on productivity in Urban Ghana. The analysis of the study revealed that congestion in the Kumasi Metropolis has negative effects on worker productivity in the informal sector. More than 78% of the mini-bus drivers (trotro) indicated that on the average, they made a maximum of between GH¢35 and GH¢40 daily instead of between GH¢46- GH¢50 expected, representing an average income loss of 21.9% due to the traffic situation in the Kumasi metropolis. The case of taxi drivers was no different. More than 88% of the taxi drivers contacted indicated that, on the average they made a maximum of between GH¢20 and GH¢25 instead of between GH¢30- GH¢35 expected due to the traffic situation in the Kumasi metropolis. This represents an average income loss of 30% to the taxi drivers captured. These statistics revealed that the economic life of the commercial
transport operators are greatly affected by traffic congestions and this also have an indirect effect on the wellbeing of their households.

Weisbodet al. (2003) conclude that congestion leads to reduced productivity through reduced worker access to job and shopper access to stores as a result of excessive delay in traffic. According to Crowther et al (1963), cutting traffic congestion by half will bring huge economic benefit to economies.

Lewis (2008) and Downie, (2008) further delineate that although the digital revolution enables twenty 21st Century industries to adopt just-in-time production, distribution and inventory management system, the challenges in the transportation system such as congestion, makes it difficult for them to be up to the task of ensuring reliable just-in-time deliveries for enhanced productivity and competitiveness. Eddington, (2006) argues that economic cost of congestion takes the form of time wasted through travel delays and unreliable transportation conditions, extra fuel, the environmental damage and related cost to human health.

2.4 Solving the problem of traffic congestion
Rao and Rao (2012) suggested that measures aimed at reducing congestion can be either demand or supply side oriented. It is therefore important to distinguish both types of measures. Three main factors influence the supply side of road travel. Firstly, capacity is one of the most important elements of road space supply. For example, the total kilometres of roads and the number of lanes determine the capacity of the road network. Secondly, the operation of the road network influences supply. Maximising the efficiency of operations, such as optimising signals improves “supply”. Thirdly, the supply of the road transport equation is also affected by incidents such as accidents or road works.
Importantly, the last two aspects can be influenced by traffic management approaches. It is thus the supply-side of the road network that can be optimised by traffic management tools. Supply of road space is mainly determined by past investment decisions and current operations. Changes in the supply side of road space thus involve construction of new road space or reductions in existing road space. Changes in traffic operations are also considered to be supply side measures.

Demand for road space is influenced by a large number of issues. Essentially, demand is created when the need for travel between an origin and a destination arises. Demand therefore strongly depends on socio-economic and population factors. Another important factor influencing demand is the relative cost of road travel as well as the availability of alternative means of transport. Other aspects that influence demand for road travel are availability of parking and the social perception of car versus public transport travel.

Rodnique et al., (2009) outline some measures that could help deal with the congestion menace. They mention traffic signal synchronization, incident management, congestion pricing and the use of public transit as possible effective strategies available in dealing with the congestion situation, although not without their associated challenges.

2.5 Public Transportation in Urban Area in Ghana

Until the recent last two decades of the twentieth century, Accra like many other urban areas in Ghana, like Kumasi, had a well-planned and managed public transport system that was owned by the state. This public transport system operated using big and comfortable buses which were not only safe and regular, but were reliable as well. However, this state-run urban transport system collapsed due to poor performance of the economy and associated mismanagement (Addo, 2002). This provided the impetus for the growth and development of the famous trotro system which has become the major public transport provider in many urban centers like Accra and
beyond. Besides this system, a greater number of residents in the city own and use private cars for their daily transportation needs.

Not only are the vehicles used under the trotro system old and poorly maintained, but they also account for the acute traffic congestion experienced in the city. Therefore, Fouracre et al., (1994) propose a shift to the use of larger vehicles such as buses in order to overcome traffic congestion. Again, it is said that a system of bus service which is convenient, accessible, comfortable, reliable and operating within acceptable levels of noise, vibration and pollution would be such welcoming news to the majority of the people (Guohua et al., 2007).

Following from the above and against the backdrop of Ghana’s desire to achieve a middle-income status by the year 2020, the nation has sought to ‘establish an efficiently and modally complementary and integrated transport network for the movement of people and goods at least cost throughout the country’ (Kwakye&Fouracre, 1998, p.2). In line with this agenda, the Metro Mass Transit system was introduced in October 2003 with a vision ‘to provide an efficient urban mass transport system in Ghana through the use of buses’. The Metro Mass Transit Limited was tasked with the operation of this bus service.

The Metro Mass Transit Limited introduced what was referred to as the Bus Rapid Transit System (BRTS) on a pilot basis in Accra, in September, 2005, to mitigate the traffic congestion phenomenon in the city. Following an overwhelming success that was chalked by the pilot project in the initial phase of its implementation, as seen by the massive public ridership, one would have thought that the operator of the scheme – the Metro Mass Transit Limited – would now be basking in the glory of being the pacesetter in implementing a BRTS in the whole country. However, in just after two years of its operation, the company reverted to the traditional trotro system of stopping at unauthorised portions of the road to solicit for passengers thereby
compounding the traffic situation in Accra. What this simply means is that their buses can now hawk for prospective passengers, just like the private commercial drivers.
2.6 Conceptual Frameworks underlying the study

Fig 2.1: Conceptual Framework on the causes and effect of traffic congestion

Source: Adopted from Takyi, Poku and Anin (2013)

The conceptual framework in Figures 3.1 gives a graphical model of transportation situation in Ghana and its potential outcome. It seeks to explain that a rise in income leads to an increase in automobile ownership which will culminate in increased traffic congestion. Thus, as more and
more people begin to own cars, the volume of cars plying the road will increase till it exceeds the capacity of the road. The potential results of this situation are high energy demand, environmental pollution from exhaust fumes, health implications and reduction in productivity, a situation that adversely affects the national socio-economic development.
Fig 2.2: Conceptual Framework on the solutions to traffic congestions and its outcomes

Source: Adopted and modified from Takyi, Poku and Anin (2013)
The researcher further believes that when stakeholders are able to provide adequate infrastructure (construct new roads and expand old ones), provide an effective traffic management system as well as make provisions for an effective public transportation systems, these systems will act in synergy and will lead to effective transportation system. The effectiveness of the transportation system will lead to an increase in productivity at both individual and national level. The productivity will have an impact on the lives of people and the nation as a whole. It will improve people’s living standards (welfare), improve health systems and as well reduce death (especially maternal death resulting from delay in transportation) and reduce unemployment as companies will be incurring less cost in transportation which will increase their profit margin and cause them to employ additional workforce. To the nation, the profitability on the part of individuals and industries will generate more revenue for the government in terms of taxation and this will subsequently have a positive impact on GDP.
Chapter Three

Methodology
This chapter focuses on the research techniques adopted for this study with the aim of achieving the research objectives. It elaborates the research design and provides details regarding the population, sample and sampling techniques and the research instruments used in collecting data for the study. It also discusses the data collection methods and data analysis plan.

3.1 Research Design
The study is based on a case study approach, where among the congested roads in Awutu Senya, the Kasoa - Winneba road was purposively selected as a case study. The choice of the road was suitable for the topic under study due to the economic importance of the road in the economic development of the nation as a whole.

The study also used a structured questionnaire to collect information from respondents. Officials from the GPRTU in the municipality were interviewed using an interview guide. Descriptive statistical analysis was used in the presentation of the data.

3.2 Study Population
Generally, the population of the study should have comprised all commercial transport operators who ply the Kasoa road. However, within the scope of this study, the population was restricted to private commercial mini bus (trotro) drivers who ply the Kasoa-Winneba road, as well as the people who patronize their services. The officials of GPRTU were also part of the population considered for this study. Unfortunately, there is no available data on the number of ‘trotro’ drivers that ply the road or the people who board it. According to an informant in the Assembly, the number of ‘trotro’ keep increasing and there are no registered data on them.
3.3 Sampling techniques and Sample size
The population for this study was purposively targeted with the view that they could provide relevant information in relation to the research question.

There are many road links in the municipality with their respective levels of congestion. It was realised that using all the road links for the study would present practical challenges. In the light of this, the Kasoa-Winneba road link was purposively selected due to the high rate of traffic congestion on the road.

The respondents were stratified into two major groups, namely, trotro drivers and trotro passengers. As stated above, the number of trotro drivers and passengers were difficult to obtain and as such, the researcher decided to select 50 trotro drivers and 50 passengers. Ten GPRTU officials at the main station in the municipality were also selected for the study.

The trotro drivers were selected from the terminals based on their availability and willingness to participate in the study. The same approach was used in the selection of the passengers at the terminal. Since it was practically difficult to get adequate time to interview passengers at the terminal, research assistants board the ‘trotro’ vehicles and while in transit, every third person from the 1st row was randomly selected. Where a selected respondent denied to participate in the study, the next person was chosen to replace him/her.

3.4 Source of Data
The research used both primary data gathered from the field using questionnaire and interview guide as well as secondary data gathered from books and literature used for the literature review in chapter two. The primary data was collected through the use of structured questionnaire and it was obtained from trotro drivers, trotro passengers and GPRTU officials.
3.5 Method of Data Collection
Semi-structured questionnaire were designed for primary data collection. The questionnaires have three main sections. The first sections were designed to elicit information from trotro drivers, the second from passengers and the third part was from GPRTU officials. The majority of the questions were closed ended with a few open ended ones to make room for respondents to explain their choice of answer where necessary.

The questionnaire was first pretested at Kwame Nkrumah Circle main station where ten trotro drivers were sampled as respondent, five passengers and two GPRTU officials. It was realized from the pre-testing that the majority of the respondents, most especially the drivers were illiterate. Some could read but were not able to understand what the questions meant. Others could neither read nor write even though they could speak some English. This prompted the researcher to employ three research assistants to help in the data collection.

Respondents were given the chance to rank the most appropriate response(s). Where necessary, the questions were read out and explained to the respondents whose literacy levels were low and were unable to read and understand the relevant responses.

Each of the GPRTU officials was booked separately. The interview was recorded with their permission using a tape recorder.

3.6 Analysis of data
The data collected from the field were cleaned from any errors and then coded. The coded questionnaires were then entered into SPSS software for data analysis.

As noted earlier, the analysis involved descriptive statistics. This involved the use of frequencies and percentages to present the distribution of responses. Cross-tabs were also used in examining any associations between the variables of interest. In assessing the relationship between traffic
congestion and the activities of trotro drivers, test of means (t-test) was conducted to examine the difference in means with respect to the indicators under study (rounds per day, hours spent on a trip, amount of fuel consumption and sale made in a day). The interview data was transcribed. A content analysis method was used to present the data to support some of the findings from the survey where necessary.

3.7 Field challenges
During the interviews, many of the people who were initially approached to answer questions were not comfortable and therefore not cooperative. Due to the nature of the traffic congestion, many of the passengers were very tired, exhausted and sometimes angry and disappointed. It was therefore not an easy task convincing them to answer the questions. Some of the respondents refused to answer the questions and as such were replaced.

The biggest challenge was the timing of the interviews. It was practically impossible to interview the drivers on the road since they might be distracted and at the station, some of them were busily loading their cars and as such it was practically difficult for them to leave their business to answer the questionnaire. However, it was convenient to interview the drivers in the afternoon when they were less busy since their busy times where in the morning (when people were going to work) and in the evening (when people are from work and are going home). On the part of the passengers, it was impossible to get people to answer the questions when they reached their destinations and as such starting the journey with them was the only way of getting them to participate.

3.8 Ethical Consideration
To begin with, an introductory letter from ISSER was given to the District Chief Executive Officer of Awutu Senya East Municipality and after giving the permission (endorsing the letter),
a copy of the approved letter was given to the GPRTU officials in the station to ask for permission to interview the trotro drivers, passengers and some officials.

After the permission was given, informed consent was ensured, as all the participants were informed about the purpose of the research. It was made known to them that the research was solely for academic purpose and there are no known risks involved in one’s participation. Participants were given a consent form to fill and sign to show their understanding and willingness to participate in the study.

Voluntary participation was another ethical issue that was adhered to. Participants were not forced to participate in the research; they were made aware of their voluntary participation in the research. Again, they were informed about their freedom to withdraw from the study at any point in time.

Another important ethical issue that was considered was confidentiality. Participants were assured that their information would not be disclosed to anyone and for that matter their names and identity will not feature in the research.

Disposal of information was also considered. Participants were assured that all information relating to them will be destroyed after the work had been accepted by the Graduate School.

Finally, all references and information sources have been duly acknowledged in the work.

3.10 Profile of the study area
The Awutu Senya East Municipal Assembly (ASEMA) is one of the newly created Municipalities in the Central Region. The Municipality was carved out of the former –Awutu Senya District in 2012 and established as a Municipality by Legislative Instrument (LI) 2025.
The rationale was to facilitate government’s decentralization programmes and the local governance system. The people of the Municipality are mainly Guans. There are other settler tribes of different ethnic backgrounds; these include the Gas, Akans, Ewes, Walas/Dagartis, Moshies, Basares and other numerous smaller tribes. The main languages spoken are Akan and English as the official language.

Mission Statement

The Awutu Senya East Municipal Assembly exists to facilitate the improvement in the quality of life of the people in close collaboration with the private sector and other development partners in the Municipality through the mobilization and the judicious use of resources and provision of Basic Socio-Economic Development within the context of commitment to Equity, Accountability, Transparency and excellence.

Location and Size

The Awutu Senya East Municipal is located in the Eastern part of the Central Region within Latitudes 5°45 south and 6°00 north and from Longitude 0°20 west to 0°35 East. It shares common boundaries with Ga South Municipal Assembly in the Greater Accra Region at the East, Awutu Senya District at the North and Gomoa East District at the West and South respectively. The Municipality covers a total land area of about 180 sq km about 18% of the total area of the Central Region.
**Major Settlements**

Kasoa, the Municipal Capital, is located at the south-eastern part, about 31km to the Capital Accra. Other major settlements are Opeikuma, Adam Nana, Kpormertey, Ofankor, Akweley, Walantu and Zongo.
Chapter Four

Presentations and Discussion of Findings

This chapter presents the findings of the survey and interview conducted in Awutu Senya East Municipality.

The purpose is to examine the causes and effects of traffic congestion on commercial transport operation. For the sake of clarity, descriptive statistical tools such as crosstabs, frequencies, percentages and charts were used in the presentation of the survey findings. Test of means (T-Test) was also used to examine the significance level of some of the relationships. The qualitative data was presented using content analysis method. Important direct quotations were presented to support some of the findings. Relevant literature was also used to support the findings of the study.

4.1 Demographic Characteristics of Respondent

A total of 100 respondents participated in the survey in which 50 were drivers and 50 were passengers. The analysis of the demographic characteristics of the respondents as captured in Table 3.1 show that the average age of the drivers was 40 while that of the passengers was 33. 98% of the drivers were males and only 2% females but for the passengers, 62% were males and 38% were females. In both cases, the proportion of females was more than the males.

The religious analysis shows that 50% of the drivers were Moslems and 50% were also Christians. For the passengers, 62% were Christians, 34% were Moslems and 4% belonged to other religion. The marital status of the drivers show that 22% were single, 54% were married, 22% were widows and 2% were co-habiting. On the side of the passengers, 60% were singles, 26% were married, 6% were widows and 4% each were either co-habiting or were divorced.
The drivers had driven for an average of 15 years and 5 months. In terms of employment on the part of the passengers, the majority were employed in the informal sector. 52% were employed in the informal sector, 24 were employed in the formal sector and 24% were students.
Table 4.1: Demographic characteristics of respondents

<table>
<thead>
<tr>
<th>Variables</th>
<th>Drivers</th>
<th>Passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean)</td>
<td>40</td>
<td>33</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Male</td>
<td>98</td>
<td>62</td>
</tr>
<tr>
<td>% Females</td>
<td>2</td>
<td>38</td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Christians</td>
<td>50</td>
<td>62</td>
</tr>
<tr>
<td>% Christians</td>
<td>50</td>
<td>34</td>
</tr>
<tr>
<td>% Others</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% single</td>
<td>22</td>
<td>60</td>
</tr>
<tr>
<td>% married</td>
<td>54</td>
<td>26</td>
</tr>
<tr>
<td>% Widow</td>
<td>22</td>
<td>6</td>
</tr>
<tr>
<td>% Co-habiting</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>% divorced/separated</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Years of working as a driver</td>
<td>15.5</td>
<td>-</td>
</tr>
<tr>
<td>Passengers sector of employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% formal sector</td>
<td>-</td>
<td>24</td>
</tr>
<tr>
<td>% Informal sector</td>
<td>-</td>
<td>52</td>
</tr>
<tr>
<td>% student</td>
<td>-</td>
<td>24</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

4.1.2 Passengers frequency of using the Kasoa road

Almost all of the passengers seem to use the Kasoa road every day. Of the 50 passengers, 48 use the Kasoa road every day, and 29 were males and 19 were females. Only 2 males indicated that they use the Kasoa road more than once a week (Table 4.2).
Table 4.2: Frequency of road use

<table>
<thead>
<tr>
<th>sex</th>
<th>Everyday</th>
<th>more than once a week</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>19</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>Female</td>
<td>29</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>2</td>
<td>50</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

4.2 Nature of Traffic congestion on Kasoa road

4.2.1 Passengers and Drivers assessment of the nature of traffic congestion
Both categories of respondents were asked to assess the nature of the traffic congestion on the Kasoa road and the results captured in Table 4.3 below. Of the 50 passengers, 47 describe the nature of the Kasoa traffic as recurrent. Thus, they noted that the traffic occurs frequently while 3 considered it as occasional. The gender analysis shows that of the 31 males, 30 considered as recurrent while 1 considered it as occasional. Similarly, of the 19 females, 17 considered it as recurrent and 2 considered the traffic situation as occasional. Thus, the majority of both male and female passengers considered the traffic congestion as recurrent.

On the side of the drivers, 45 considered the traffic as recurrent and 5 others considered it as occasional. Inferring from the two results all show that the nature of the traffic congestion on the Kasoa road is more of recurrent than occasional.
In an interview with one of the station officers, he described the traffic situation as “horrible”. In the words of another, “there are times you just can’t describe it. No car goes and comes for a long time”. To the officials, the nature of the traffic in a typical day is highly unbearable.

Table 4.3: Nature of the traffic congestion

<table>
<thead>
<tr>
<th>Sex</th>
<th>Passengers</th>
<th>Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>recurrent (frequently occurring)</td>
<td>occasional</td>
</tr>
<tr>
<td>Male</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>Female</td>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

4.2.2 Periods when traffic are high

Often times, traffic congestion seems to be very high and unbearable while in other times, the reverse is the case. The results as indicated in Table 4.4 below show that the majority of passengers considers working days as periods of high traffic congestion whiles the majority of drivers considered festival seasons as periods of high traffic jam on the road. For the passengers, 26 out of the 50 considered working days as the period of high traffic jam and of this number, 17 were males and 9 were females. 24 of them also considered festival seasons as the period of high traffic congestion and of this number, 14 were males and 10 were females. Of the 50 drivers, 49 of whom 4 were males and 45 female drivers considered traffic to be high during festive seasons. One male driver considered traffic to be high on working days. Thus, the majority of drivers and
passengers all observed that traffic on the Kasoa road is high on festive seasons as compared to working days.

**Table 4.4: Periods of high traffic congestion**

<table>
<thead>
<tr>
<th>Period of high traffic</th>
<th>Passengers</th>
<th></th>
<th>Drivers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td>Male</td>
</tr>
<tr>
<td>Festival seasons</td>
<td>14</td>
<td>10</td>
<td>24</td>
<td>45</td>
</tr>
<tr>
<td>Working days</td>
<td>17</td>
<td>9</td>
<td>26</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>19</td>
<td>50</td>
<td>46</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

**4.2.3 Time of the day with high traffic from passengers’ perspective**

The passengers were asked to outline the times in the day when traffic congestion is high and their responses indicated in Table 4.5 below. The majority of them noted that it is high both morning and evening (29). Some of the explanations they gave to support their position were that in these two times of the day, the number of cars on the road is many (18). Some also believed that many people go to work at the same time in the morning (3). Another 3 also blamed it on the poor roads coupled with the fact that many people also return from work at the same time (1).

On the other side, 15 of the respondents also believed that traffic is high in the morning as compared to the evening since the time of reporting to work seems to be quite uniform among many organizations even in the informal sector the majority of these people blame it on poor roads and the increasing number of cars plying the road.
The result is in line with what the officials said. They acknowledged that the traffic is worse in the morning and evening than in the afternoon and night. One had this to say “In the afternoon, because many of the workers are at work, there is less traffic on the way and in the night too, since many are resting in the homes and even some trotro and taxi drivers have ended their day’s work, there is less traffic. However, in the morning, there is huge traffic because majority of the people in Kasoa work in Accra, Circle, Tema among others. They all come to work between the hours of 7am and 9 am. The traffic is there high in those times. In the same way, people close from 4:30 and as such the traffic is high between 4:30 to 7 am”. One even extended the evening traffic to as late as 10 pm.
Table 4.5: Times in the day with high traffic congestion (Passengers)

<table>
<thead>
<tr>
<th>Reason</th>
<th>Morning</th>
<th>Afternoon</th>
<th>Evening</th>
<th>Both morning and evening</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor roads</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Lot of people go to work at same time</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Too many cars</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>18</td>
<td>25</td>
</tr>
<tr>
<td>Time all go and come back home</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>3</td>
<td>3</td>
<td>29</td>
<td>50</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

4.2.4 Time of the day with high traffic from drivers’ perspective

Drivers were given the leverage to indicate the time when traffic is high and responses shown in Table 4.6 below. All 50 indicated morning and at the same time evening. The major reason for all of them was poor roads. Thus, the trotro drivers believe that the reason for the traffic congestion on the Kasoa road is as a result of the poor nature of the road. Some of the drivers during the field study indicated that the main road is good but some few kilometers to Kasoa, the road is small and this distracts easy flow. Some further elaborated that the small roads leading to
small communities along the main Kasoaroads are so poor that when cars get there they can hardly move fast and this tend to affect movement on the main road.

Other reasons that were given were the large number of cars that ply the road and the fact that many people go to work and return at the same time.

Table 4.6: Times in the day with high traffic congestion (Drivers)

<table>
<thead>
<tr>
<th>Reason</th>
<th>Morning</th>
<th>Evening</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor roads</td>
<td>26</td>
<td>25</td>
<td>28</td>
</tr>
<tr>
<td>Many people go to work at the same time</td>
<td>5</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Workers return from work at the same time</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Too many cars</td>
<td>8</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>Others</td>
<td>7</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

4.2.5 How often passengers get stuck in traffic?
Assessing how often passengers get stuck in traffic, four main scales of measurement were used, namely, very frequently, frequently, often and seldom. The majority of the passengers indicated that they get stuck in traffic very frequently and only a few said they get stuck in traffic seldom.

Out of the 33 who indicated that they get stuck in traffic very frequently, 22 were males and 11 were females. Eight (8) passengers, of whom 4 were males and 4 were females also indicated that they get stuck in traffic frequently. Seven (7) on the other hand also indicated that they get stuck in traffic often and of these, 3 were males and 4 were females. Lastly, 2 others also
indicated that they seldom get stuck in traffic and they were all males as indicated in Table 4.7 below.

\textbf{Table 4.7: How often passengers get stuck in traffic}

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very frequently</td>
<td>22</td>
<td>11</td>
<td>33</td>
</tr>
<tr>
<td>Frequently</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Often</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Seldom</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>19</td>
<td>50</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

4.3 Causes of Traffic Congestion

The first objective of this study is to examine the cause of traffic congestion. The research sought to use the responses to delineate the various causes of traffic congestion and the multiple responses indicated in Table 4.8 below. From the perspective of the drivers, the causes indicated most often are; the poor road network, poor traffic control management, too many cars and lack of poor parking spaces. One-half or more of the respondents indicated that these factors are the causes of traffic congestion. The other causes of traffic congestion according to the drivers are poor driving habit, on-going construction activities on the road, accidents on the road and malfunctioning vehicles.
In the case of passengers, as high as 43 considered too many cars as the major cause of traffic congestion. This was followed by lack of poor parking habits by drivers (41), poor traffic control management (38), poor driving habit (36) and accidents on the road (32) poor road network (29) ongoing construction activities (27), and malfunctioning vehicles (24). Thus, there are variations in what drivers consider as major causes of traffic congestion and what passengers consider as drivers of traffic congestion. Even among the passengers, there are gender variations in what is being considered as major causes of traffic congestion. While a majority of males passengers considers the increasing number of cars on the street (27), lack or poor parking spaces (26), poor traffic management system (24) and poor driving habits (22) as the major causes traffic congestion, majority of female consider lack or poor parking space (15), poor driving habits (14), poor road network (14), increasing number of cars (14) and poor traffic control management systems as the major causes of traffic congestion.

The interview data show that traffic congestion is predominantly caused by three main things: poor roads, increasing number of cars and reckless driving. One of the GPRTU officials noted that “The number of cars in recent times is far more than what existed in the time past”. Another also indicated that “the number of cars using the road seem to increase day-in and day-out”. In their view, as the number of cars increased, the traffic situation became even worse. One explained that “when they were constructing the road, they did not think the population at Kasoa would increase to this level. They constructed a road that cannot take such a huge number of cars”. On poor roads, they noted that “some points on the road are bad and hence drivers have to drive slowly at those points”. One also added that “because the trotro drivers want to make enough money, they stop to pick up people anywhere without thinking whether they are blocking traffic or not.”
The findings in this study support Walsh (1990) and Tencer (2011) that the increasing buying of cars has serious repercussions for traffic congestion in developing countries due to lack of corresponding expansion in our road networks. Taylor (1999) and Downie (2008) explained that traffic congestion occurs when the volume of vehicular traffic is greater than the available road capacity. Downie (2008) further argues that economic surge in various economies has resulted in a massive increase in the number of vehicles that overwhelms transport infrastructure, thus causing congestion on roads in cities. Downie (2008) further cited the poor nature of parking as one of the causes of traffic congestion.

The findings in this study also support the report by the Urban Roads (2004) in Kumasi where they attributed traffic congestion to limited road capacity, parking space, dysfunctional road signals, drivers’ behavior, vehicle breakdown on roads and too many cars within the city. The situation in Kumasi is no different from the one on the Kasoa road.
Table 4.8: Causes of traffic congestion

<table>
<thead>
<tr>
<th>causes</th>
<th>Drivers</th>
<th>Passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>male</td>
<td>female</td>
</tr>
<tr>
<td>Poor driving habit</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Poor road network</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>Accidents on the road</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Too many taxis/buses</td>
<td>32</td>
<td>0</td>
</tr>
<tr>
<td>On-going construction activities</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Lack/Poor parking habit</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>Malfunctioning vehicle</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Poor traffic control management</td>
<td>38</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

4.4 Effect of traffic congestion

Traffic congestion does not affect the commercial transport operators (trotro drivers) alone but the commuters who board the trotro are also affected in diverse ways. This section therefore looks at the effect of traffic congestion on the activities of the trotro drivers and passengers.

4.4.1 Effect of traffic congestion on drivers

4.4.1.1 Effect on overall productivity

Three main scales were used to assess the overall effect of traffic congestion on the operations of trotro drivers: highly negative effect, moderately negative effect and highly negative effect. The analysis of the results shows that 45 of the 50 drivers consider traffic congestion to have a highly
negative effect on their activities and only 5 considered traffic congestion to have a moderately negative effect on their operation as indicated in Figure 4.1 below.

**Figure 4.1: Effect on overall activities of drivers**

![Effect on productivity chart](image)

Source: Field data, 2014

### 4.4.1.2 Effect on drivers operations

Four major indicators were used to examine the effect of traffic congestion on the activities of trotro drivers. These were the rounds/trips they go in a day, hours spent on a trip, amount of fuel purchased in a day and the sales made in a day. These variables were assessed in periods of less traffic and periods of much traffic. The T-test was conducted to assess the significance of the difference between the two cases for each of them.

The results as captured in Table 4.9 indicate that in days of less traffic, drivers are able to go on approximately 5 trips but in a day of much traffic, drivers can go only 3. Thus, there is a difference of approximately 2. The test statistics also indicated in the table show that the difference between the rounds drivers are able to go in a day of less traffic as compared to a day
of much traffic is statistically significant at 1%. It can therefore be concluded that traffic congestion causes drivers to go on less trips as compared to if there was little traffic.

The second indicator was hours spent on a trip. The results show that in periods of less traffic, drivers spend an average of 2 hours and 11 minutes on a trip (either to Kasoa or from Kasoa). However, in a period of much traffic, drivers can spend an average of 5 hours and 37 minutes on a trip, indicating a difference of 3 hours 26 minutes. However, the results of the t-test show that the difference between the hours spent during periods of high traffic congestion and periods of low traffic congestion is not statistically (p=.05) significant.

The third indicator was the amount of fuel drivers buy. During periods of less traffic congestion, the results show that drivers buy an average of GH¢ 106 fuel in a day. But during periods of high traffic congestion, drivers buy fuel as high as GH¢ 156.10 a day, showing a difference of GH¢ 50.10. The T-Test analysis shows that difference is statistically significant at 1%. This shows that traffic congestion causes drivers to buy more fuel than they will actually buy in periods of less traffic congestion.

The last indicator was daily sales. The results show that during periods of less traffic congestion, drivers are able to make on average a daily sale of GH¢ 262.30. However, during periods of high traffic congestion, the average sale reduced to GH¢ 199.50, showing a difference of GH¢ 62.80. The difference in sale is statistically significant at 1%. It can therefore be concluded that traffic congestion has an effect on the amount of sale drivers make. It reduces the average sales they would have made.

The findings in this study support the work of Anokye et al. (2013) who also found in their work that traffic congestion increases the amount of fuel use by driver because the cars cannot run efficiently.
**Table 4.9: Test statistics of effect**

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>rounds a day with less traffic - rounds with much traffic</td>
<td>1.74</td>
<td>.97</td>
<td>.137</td>
<td>12.68</td>
<td>49</td>
<td>.000</td>
</tr>
<tr>
<td>hours on a trip with less - hours on a trip with much traffic</td>
<td>-3.26</td>
<td>22.02</td>
<td>3.11</td>
<td>-1.05</td>
<td>49</td>
<td>.300</td>
</tr>
<tr>
<td>fuel with less traffic - fuel with much traffic</td>
<td>-50.10</td>
<td>50.35</td>
<td>7.12</td>
<td>-7.04</td>
<td>49</td>
<td>.000</td>
</tr>
<tr>
<td>sales with less traffic - sales with much traffic</td>
<td>62.80</td>
<td>61.47</td>
<td>8.69</td>
<td>7.22</td>
<td>49</td>
<td>.000</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

**4.4.1.3 Health Effect of traffic congestion on drivers**

The researcher tried to assess if there are any health implication of traffic congestion on drivers and the various responses shown in Table 4.11 below. Out of the 50 drivers 45, representing 90% indicated that there are various health effects associated with traffic congestion. 39 of them representing 86.7% indicated that they suffer stress and this stress sometimes leads to depression which is not healthy for driving. 17 of them representing 37.8% indicated that they suffer from various cardiovascular diseases. In the view of 7 of them may, the fumes may cause cancer while 3 indicated that they may suffer from dehydration leading to dizziness. 2 indicated that they may get Asthma and as high as 31 indicated there are various forms of health implication that can affect them which they may not even know about due to the stress, long sitting, and smoke, among other factors.
Table 4.10: Health effect on drivers

<table>
<thead>
<tr>
<th>Health Effect</th>
<th>Freq.</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fumes may cause liver cancers</td>
<td>7</td>
<td>15.6%</td>
</tr>
<tr>
<td>Stress may lead to depression</td>
<td>39</td>
<td>86.7%</td>
</tr>
<tr>
<td>Dehydration may lead to dizziness</td>
<td>3</td>
<td>6.7%</td>
</tr>
<tr>
<td>Asthma</td>
<td>2</td>
<td>4.4%</td>
</tr>
<tr>
<td>cardiovascular disease</td>
<td>17</td>
<td>37.8%</td>
</tr>
<tr>
<td>Other</td>
<td>31</td>
<td>68.9%</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

4.4.2 Effect of traffic on Passengers

4.4.2.1 Effect on overall productivity
Of the 50 passengers, 47 indicated that traffic congestion has high negative effect on their overall productivity and 2 also indicated that it has moderate negative effects. One person indicated that it has less negative effect on his or her overall productivity. These results are captured in Figure 4.2 below.
4.4.2.2 Hours spent in traffic before getting to work
A majority of the passengers as depicted in Table 4.11 indicated that when there was much traffic, they spent much time on their way to work as compared to when there was less traffic. When there is much traffic, as high as 26 passengers indicated that they spent 1 to 2 hours in trotro before getting to their destination and the males were 17 and females were 9. 12 indicated that they spend 3 to 4 hours on the way before getting to their destination, 11 passengers spend 2 to 3 hours before reaching their destination and 1 female spent 4 to 5 hours in traffic before reaching her destination.

On the other hand, when there is less traffic, 32 of the passengers indicated that they spend 15 to 30 mininutes in a car before reaching their destination. Out of this number the males were 21 and females were 11. 10 people, 5 each being males and females indicated that they spend between 30 to 45 minutes to reach their destination and 1 person indicated that she spends 1 to 2 hours...
before reaching her destination. Thus, traffic congestion really delays passengers from reaching their destination early.

**Table 4.11: Hours spent in car before getting to destination**

<table>
<thead>
<tr>
<th>Time of much traffic</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 2 hrs</td>
<td>17</td>
<td>9</td>
<td>26</td>
</tr>
<tr>
<td>2 - 3 hrs</td>
<td>4</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>3 - 4 hrs</td>
<td>10</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>4 - 5 hrs</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>19</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time of less/no traffic</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-30mins</td>
<td>21</td>
<td>11</td>
<td>32</td>
</tr>
<tr>
<td>30-45mins</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>46-60mins</td>
<td>5</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>1-2hrs</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>19</td>
<td>50</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

**4.4.2.3 Effect on health of passengers**
The passengers were asked whether they think traffic congestion may have any effect on their health and results indicated in Table 4.12. The results show that 41 out of the 50 passengers suffer some health implications from the traffic congestion. Majority of them indicated that they suffer cardiovascular diseases from the exhaust fumes they inhale during traffic congestion (24).
indicated that they are more likely to suffer from lung cancer whiles 7 think they can suffer from asthmatic attacks. 6 indicated that they can suffer from diabetes and 14 think that they can suffer other health implications. Both male and females pointed cardiovascular disease as the major health effect of traffic congestion.

Table 4.12: Health effects on passengers

<table>
<thead>
<tr>
<th>Health Effects</th>
<th>sex</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>cardiovascular disease</td>
<td>18</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>Asthma</td>
<td>2</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>8</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Diabetes</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>other</td>
<td>8</td>
<td>6</td>
<td>14</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

4.4.2.4 Other effects of traffic congestion on passengers

The passengers were asked to indicate any other effects of traffic congestion they face and the results shown in Table 4.13. 46 of the respondents indicated that they waste a lot of time in traffic and this affects their daily activities. 33 indicated that they get queried at work because of lateness. 32 each indicated that traffic congestion delays them leading to low productivity. 31 indicated that they are unable to plan and forecast their travel times well due to traffic congestion. Traffic congestion seems to cause pollution (30), make people lose their work (29), increase transportation cost (29) and causes stress (25). It can cause people to relocated from the places of residence (25), can cause accidents (22), cause global warming (21) and lastly lead to
dehydration and hunger (18). All these tend to affect both social and economic wellbeing of people.

The results on the effects of traffic congestion support the work by Anokye et al., (2013) who found that traffic congestion increases travel time, air pollution and carbon dioxide (CO2) emissions. They noted that traffic congestion wastes time and energy and eventually decreases productivity and imposes costs on society. The results further support the report by the Organization for Economic Co-operation and Development (OECD) in 2006, in which it was noted that economic growth and business competitiveness are negatively impacted by traffic congestion. Nadiri and Mamuneas (1996) argue that an effective transportation system is a key to sustaining economic growth in contemporary economies by its capacity to link people to jobs, delivering products to markets where there is demand, driving supply chain and logistics, and enabling domestic and international trade.

Literature has further established that traffic congestion has a negative effect on the cost of doing business, travel time, forecast reliability, comfort, safety and security of commuters (Takyi, Poku and Annin, 2013). It has therefore been argued that, the direct benefit of an efficient and effective transportation system is reducing travel time, which translates into cost saving, and increases in output and ultimately in GDP (Kulash, 1999; World Bank, 2002).
Table 4.13: Other effects of traffic congestion on passengers

<table>
<thead>
<tr>
<th>Other Effects</th>
<th>male</th>
<th>female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>waste of time</td>
<td>27</td>
<td>19</td>
<td>46</td>
</tr>
<tr>
<td>dehydration and hunger</td>
<td>9</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>Stress</td>
<td>15</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>Pollution</td>
<td>15</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Accidents</td>
<td>10</td>
<td>12</td>
<td>22</td>
</tr>
<tr>
<td>loss of work</td>
<td>14</td>
<td>15</td>
<td>29</td>
</tr>
<tr>
<td>global warming</td>
<td>12</td>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td>low productivity</td>
<td>19</td>
<td>13</td>
<td>32</td>
</tr>
<tr>
<td>inability to forecast travel time</td>
<td>18</td>
<td>13</td>
<td>31</td>
</tr>
<tr>
<td>increased transport cost</td>
<td>19</td>
<td>10</td>
<td>29</td>
</tr>
<tr>
<td>delayed movement</td>
<td>17</td>
<td>15</td>
<td>32</td>
</tr>
<tr>
<td>Query at work</td>
<td>18</td>
<td>15</td>
<td>33</td>
</tr>
<tr>
<td>Relocation</td>
<td>15</td>
<td>10</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: Field data, 2014
4.5 Solution to the problem of traffic congestion

4.5.1 Action by government to solve the problem of traffic congestion

Both drivers and passengers were asked to indicate the actions they want the government to take to help reduce traffic congestion and the results shown in Table 4.14. The majority of the passengers want the government to enlighten the general public on the need to work together towards reducing traffic congestion (35) and rehabilitate all the poor and deteriorated roads (34). Others too want the government to provide more public transport such as metro mass transport (MMT) to ease the tension on the trotro (33) as well as ban all road side trading and shops along the roads (31). Some also want the government through the Ministry of Roads and Highways to reduce the number of bus stops on Kasoa road and if possible construct railways to serve as an alternative source of transportation (28). A few others believe that the slow movement of heavy tracks on the highways causes traffic so they should be provided with alternative routes (26).

To the drivers, creation of alternative routes for heavy trucks was what majority of them identified as the solution to the traffic congestion (36) before thinking about rehabilitation of the bad roads (35). Others also considered public education (32) as cardinal as well as construction of railways (20) and banning roadside trading or hawking (19). A few others also indicated the provision of more public transport (13) and reducing the number of bus stops on the Kasoa highway (6).
Table 4.14: Government solution to the Kasoa traffic

<table>
<thead>
<tr>
<th>Solution</th>
<th>Passengers</th>
<th>Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq.</td>
<td>Percent</td>
</tr>
<tr>
<td>Public enlightenment/traffic education</td>
<td>35</td>
<td>72.9%</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>66.7%</td>
</tr>
<tr>
<td>Provide more public transport service</td>
<td>33</td>
<td>68.8%</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>27.1%</td>
</tr>
<tr>
<td>Ban all form of road side trading/hawking</td>
<td>31</td>
<td>64.6%</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>39.6%</td>
</tr>
<tr>
<td>Hack down all illegal buildings/shops built</td>
<td>31</td>
<td>64.6%</td>
</tr>
<tr>
<td>on the right of way</td>
<td>6</td>
<td>12.5%</td>
</tr>
<tr>
<td>Reduce the number of bus-stop where necessary</td>
<td>30</td>
<td>62.5%</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>12.5%</td>
</tr>
<tr>
<td>Rehabilitate all roads needing attention</td>
<td>34</td>
<td>70.8%</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>72.9%</td>
</tr>
<tr>
<td>Construction of many railway for public</td>
<td>28</td>
<td>58.3%</td>
</tr>
<tr>
<td>transportation</td>
<td>20</td>
<td>41.7%</td>
</tr>
<tr>
<td>Create a separate/alternative root for</td>
<td>26</td>
<td>54.2%</td>
</tr>
<tr>
<td>trucks and heavy vehicles</td>
<td>36</td>
<td>75.0%</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

4.5.2 Possible ways drivers can reduce traffic congestion

Both drivers and passengers were also asked to indicate ways in which drivers can also contribute towards reducing traffic congestion and results shown Table 4.15. According to the passengers, drivers should avoid wrong parking (41) especially when they want to pick up passengers. They also indicated that drivers should avoid slowing down for people to buy things
(39). Some also indicated that drivers should learn to obey traffic regulations (38) as well as avoid wrong overtaking and over speeding (25).

According to the drivers themselves, they should avoid wrong parking or stopping to pick up passengers (42), obey traffic regulations and avoid slowing down to buy things (24). 11 of them also indicated that drivers should avoid wrong overtaking and over speeding.

Table 4.15: Drivers' solution to reducing traffic congestion

<table>
<thead>
<tr>
<th>Solutions</th>
<th>Passengers</th>
<th>Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq.</td>
<td>Percent</td>
</tr>
<tr>
<td>Avoid wrong parking/stopping</td>
<td>41</td>
<td>87.2%</td>
</tr>
<tr>
<td></td>
<td>42</td>
<td>85.7%</td>
</tr>
<tr>
<td>Avoid wrong overtaking and over speeding</td>
<td>25</td>
<td>53.2%</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>22.4%</td>
</tr>
<tr>
<td>Obey traffic regulations</td>
<td>38</td>
<td>80.9%</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>63.3%</td>
</tr>
<tr>
<td>Avoid slowing down or stopping to buy things</td>
<td>39</td>
<td>83.0%</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>49.0%</td>
</tr>
<tr>
<td>Other</td>
<td>12</td>
<td>25.5%</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2.0%</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

4.5.3 Possible ways the general public can help in reducing traffic congestion

The research also sought to examine the ways in which the general public can also help reduce traffic congestion and the result shown in Table 4.16. From the perspective of the passengers, people should use only designated areas for crossing the road (37). This is because, often time’s people cross the road anyhow and drivers’ have to stop or slow down for them to pass. The general public was advised of avoiding stopping and boarding vehicles at wrong places (36), avoiding trading or hawking along the road (32) as well as encourage more passengers to board public transport(32). They were also to help in the education of others to work towards reducing
traffic congestion (30) and avoid indiscriminate dumping of refuse in the roads especially at night (23).

These views were not different from what the drivers also advised the general public to do. However, the priority of many of the drivers was for people to reduce the use of private cars and board public transport to help minimize the number of cars on the road. They also pleaded for people to stop hawking along the roads.
Table 4.16: Ways general public can help reduce traffic congestion

<table>
<thead>
<tr>
<th>Solutions</th>
<th>Passengers</th>
<th>Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq</td>
<td>Percent</td>
</tr>
<tr>
<td>Stop trading/hawking along the road</td>
<td>32</td>
<td>72.7%</td>
</tr>
<tr>
<td>Use only designated areas for crossing the road</td>
<td>37</td>
<td>84.1%</td>
</tr>
<tr>
<td>Avoid stopping and boarding vehicles at wrong places</td>
<td>36</td>
<td>81.8%</td>
</tr>
<tr>
<td>Encourage more passengers to board public transport</td>
<td>32</td>
<td>72.7%</td>
</tr>
<tr>
<td>Educate each other to refrain from others leading to traffic congestion</td>
<td>30</td>
<td>68.2%</td>
</tr>
<tr>
<td>Avoid indiscriminate dumping of refuse along the road especially at night</td>
<td>23</td>
<td>52.3%</td>
</tr>
<tr>
<td>Other</td>
<td>26</td>
<td>59.1%</td>
</tr>
</tbody>
</table>

Source: Field data, 2014

The officials in at the stations also noted that they have instituted a complaint mechanism where passengers can come and inform them of the activities of drivers on the way. When a driver is reported, he is sanctioned appropriately to serve as an example to others. As part of their sanctions “the driver can be asked to leave the union indefinitely or can be fined” (GPTRU official). They further added that they continue to hold periodic meetings to educate their drivers on the need for professional driving on the road. However, two of the officials noted that the
station officers really have limited leverage on improving the traffic congestion. Much of the work rest in the domain of government and the road ministry.
Chapter Five

Summary of Findings, Conclusion and Recommendation

5.0 Introduction
The study sought to examine the effects of traffic jam on commercial transport operations in the Awutu Senya East Municipality. The study used a total sample size of 110 which comprised 50 trotro drivers, 50 trotro passengers and 10 GPRTU officials. The study was both quantitative and qualitative. Questionnaires were administered to both drivers and passengers in a survey and an interview guide was used to collect data from GPRTU officials in an in-depth interview. Descriptive statistical tools were used to present the findings from the survey while content analysis was used to present the interview findings. This chapter presents the summary of the key findings as well as the conclusion that was drawn from the findings. Possible policy recommendations that can contribute towards minimizing the traffic congestions are also captured in this chapter of the work.

5.1 Summary of Key findings
The research sought to achieve four main hypotheses namely: to examine the main causes of traffic jam on the Kasoa road; to assess the cost of traffic jam on commercial transport operation; to examine the effects of traffic jam on commuters who patronize ‘trotro’ on the Kasoa road; and to discuss the possible solutions to minimize the traffic jam on the Kasoa road.

The analysis of the nature of the traffic congestion on the Kasoa road indicates that congestion is a recurrent one. Congestion is very high during festival seasons and working days. The peak hours are in the mornings and evenings. It is the period majority of workers (those using their own cars and those boarding public transport) go to work. At these times, there are many cars on
the road and the poor nature of some of the subsidiary roads linking the main road cause the cars to slow down, thus affecting the entire movement of cars along the main road.

On the causes of traffic congestion, the perspective of drivers is not different from that of passengers. By order of importance according to the variable with high frequency, drivers consider the following as the cause of traffic congestion: poor road network, poor traffic control management, too many cars and lack or poor parking spaces. Other minor causes are poor driving habit, on-going construction activities on the road, accidents on the road and malfunctioning vehicles. To the passengers, apart from malfunctioning vehicles, all these are major causes of traffic congestion.

The second objective was to assess the cost of traffic jam on commercial transport operation. The results indicated that traffic congestion has an effect on the overall productivity. The results indicated that congestion significantly reduces the trips drivers can make in a day by 2. It also significantly increases the amount of fuel bought in a day by GH¢50.10 and significantly reduces daily sale by GH¢62.80. Even though it increases the hours spent on a trip, it was not statistically significant. It was also found that traffic congestion has health effect on the lives of the drivers, sometimes resulting in depression, dizziness, cardiac arrest among others due to the inhaled smoke and stress.

In the case of the passengers, it was realized that traffic congestion has highly negative effect on their overall productivity. They spend more time before reaching their various destinations on days of high traffic congestion and they are more likely to suffer health effects from spending too much time in traffic. On other effects, the traffic congestion waste, a lot of time, gets them queried at work, delayed trips leads to low productivity, increase transportation cost and sometimes employees lose their job because they report late for work among others.
In assessing possible solutions toward traffic congestion, both drivers and passengers asked for government intervention to enlighten the general public on the need to work together to reduce traffic congestion and rehabilitate all the poor and deteriorated access roads and provide more public transport system such as metro mass. They further asked that government should ban all road side trading and shops along the road, reduce the number of bus stops and, if possible, construct railways to serve as an alternative form of transportation.

To the drivers, it was suggested that they should avoid wrong parking, avoid slowing down for people to buy things, learn to obey traffic regulations and avoid wrong overtaking and over speeding. The general public was to use only designated areas for crossing the road, avoid stopping and boarding vehicles at wrong places, avoid trading or hawking along the road and reduce traffic. They were further asked to help in the education of others towards reducing traffic congestion and to avoid indiscriminate dumping of refuse in the roads especially at night.

5.2 Conclusion
It is quite clear from the analysis of the data so far that traffic congestion indeed has serious negative consequences for the overall growth and development of people. Not only does it affect the activities of commercial transport operators, it also has serious repercussions on the passengers who board it. There are ripple effects of traffic congestion on industry, education, health, governance, and trade and commerce, just to mention but a few. It is clear that all sectors of the economy are affected in the events of high traffic congestion.

The Kasoa road is a major road that links the central corridor to the nation’s capital. It serves many immeasurable purposes not only to the residents and organizations around but also to both national and international corporations. It is quite clear that the expansion of the road was a step in the right direction, but the inability of the contractors to rehabilitate the subsidiary roads
linking the various communities to the main road is the major cause of the traffic congestion coupled with the wrong attitude of drivers. To help minimize the traffic congestion, policies should be directed towards expansion of the road, well as changing the attitude of drivers. That notwithstanding, the increasing population of the country and increasing wealth base of Ghanaians have recently seen an unprecedented increase in the use of private cars. Many people instead of taking public transportation prefer to ride in their own cars to work and this in a way increase the nature of traffic congestion on the road. It is therefore imperative that stakeholders take into critical assessment ways of reducing traffic congestion on our roads as a measure towards increasing productivity

5.3 Recommendations

Based on these findings of this study, the following recommendations are made.

The first recommendation of this study is that government should rehabilitate the Kasoa road. The major reason outlined as the cause of the traffic congestion was the lack of subsidiary roads in the Kasoa township. To ease traffic congestion, the government has to rehabilitate all access roads connecting the main road. It was also observed that the traffic is very high at Kasoa Township. An overhead interchange needs to be built the Kasoa-Nyanyano traffic light intersection to help ease the traffic situation in the Township.

Respondents also suggested for the provision of a more reliable public transport systems. In many of the advanced nations, the effectiveness of public transport system has reduced the tension on roads. Bus Rapid Transit System can therefore be enhanced and resourced to help ease the traffic situation.

A railway system needs to be constructed to serve as an alternative form for public transportation. This will ease the tension on the roads. Ghana’s railway lines have always been a
dream. The existing railways lines are not properly functioning. There is therefore the need for government to partner with development agencies and private organizations in the construction of railway lines to ease the tension on the roads.

An important aspect in the fight against traffic congestion is public education. There is the need for an effective public education and campaign against street hawking and trading in the middle of highways. During the evening, many of the sellers pack their things to sell in the middle of the roads, under the street lights at Kasoa and this is really not a good practice. The law enforcement agencies can help in this direction. Drivers and passengers should be well educated. Laws should be enacted and enforced in order to prosecute wrongful parking and stopping and reckless driving and speeding on the highways.

Much of the traffic on the Kasoa road seems to center around the toll booth. Even though the toll is serving as an income generating activity, it should not be at the expense of national development. There can be innovative ways of collecting toll without causing much traffic. The Assembly can construct more than one toll center at regular intervals so that drivers do not pay at one point. This can help reduce the traffic congestion on the road.

If these policy actions are taken into consideration, they will help reduce the nature of traffic congestion on the way thereby contributing to national development.
References

ABLIN Consult (2008). A study on the conditions of service of commercial vehicle drivers and impact on road safety conditions. ABLIN Consult.


Dissanayake, D., & Morikawa, T. (2008). Impact Assessment of Satellite Centre-based Telecommuting on Travel and Air Quality in Developing Countries by exploring the link


[Assessed: 25/5/14]


Appendix A: Questionnaire for drivers

UNIVERSITY OF GHANA

INSTITUTE OF STATISTICAL, SOCIAL AND ECONOMIC RESEARCH (ISSER)

QUESTIONNAIRE ON “THE EFFECTS OF TRAFFIC JAM ON COMMERCIAL TRANSPORT OPERATIONS. A CSE STUDY OF TROTRO DRIVERS AT AWUTU SENYA EAST MUNICIPALITY”

This questionnaire has been developed to examine the effects of traffic jam on commercial transport operations using trotro drivers as a case study. Please be informed that this study is purely academic and that all information obtained shall be kept with utmost confidentiality. The outcome of this research may be used for academic and general purposes such as research reports, conference papers or books. Please tick/state where appropriate.

Thank you for your acceptance

QUESTIONNAIRE FOR TROTRO DRIVERS

A. Biodata

A1. Age …………………………..

A2. Sex
1. Male [ ]  2. Female [ ]

A3. Marital Status
5. Divorced/Separated [ ]

A4. Religion

A5. How long have you worked as a driver ? ……………………………


B. Season and period of traffic congestion

B1. How would you describe the nature or type of traffic congestion on this corridor?

1. Recurrent (frequently occurring) [ ]
2. Occasional [ ]
3. Both recurrent and occasion [ ]
B2. At what periods in the year is traffic congestion very high?

1. Festival seasons (e.g. Christmas, funeral) [ ]
2. In times of accidents [ ]
3. Working days [ ]

B3. In which time of the day is traffic high


B4. Give an explanation to the choice of your answer

........................................................................................................................................................................

C. Causes of traffic congestion

In your opinion what causes Traffic congestion? [Tick as many as applies]

1. Poor driving habit [ ] 5. On-going construction activities [ ]
2. Poor road network [ ] 6. Lack/Poor parking habit [ ]
3. Accidents on the road [ ] 7. Malfunctioning vehicle [ ]
4. Too many taxis/buses [ ] 8. Poor traffic control management [ ]

Other (Specify) ........................................................................................................................................

D. Effect of traffic congestion

D1. How will you describe the effect of the Kasoa traffic on your overall productivity

1. Highly negative consequences [ ] 2. Moderately negative consequences [ ]
3. Less negative consequences [ ]

D2. Use the following indicators to assess the effect of traffic congestion on your driving activities

<table>
<thead>
<tr>
<th>Indicator</th>
<th>A day with less traffic</th>
<th>Day with much traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rounds a day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours spent on a trip</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel consumption (Amount)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales made (Average)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
D3. Does traffic congestion has any effect on your health?
   1. Yes []  2. No []

D4. If yes, what health implications can traffic congestion has on you? (Tick as many as possible)
   1. Fumes can cause liver cancers []
   2. Stress leading to depression []
   3. Dehydration leading to dizziness []
   4. Asthma []
   5. Cardiovascular disease []
   6. Diabetes []
   7. Other (specify) ..............................................................

E. Solution to Traffic congestion

E1. What roles does the government have to play in solving the traffic congestion in the Kasoa road? (Tick as many as possible)
   1. Public enlightenment/traffic education []
   2. Provide more public transport service such as the Metro Mass Transport services (MMTS) []
   3. Ban all form of road side trading/hawking []
   4. Hack down all illegal buildings/shops built on the right of way (ROW) []
   5. Reduce the number of bus-stop where necessary []
   6. Rehabilitate all roads needing attention []
   7. Construction of many railway for public transportation []
   8. Create a separate/alternative root for trucks and heavy vehicles []
   9. Other (specify) ..............................................................
E2. What roles do drivers have to play to remedy the situation? *(Tick as many as possible)*

1. Avoid wrong parking/stopping [ ]
2. Avoid wrong overtaking and overspeeding [ ]
3. Obey traffic regulations [ ]
4. Avoiding slowing down or stopping to buy things or for passengers to buy things when it is not a bus stop area [ ]
5. Other (specify) .............................................................

E3. What roles do individuals (general public) have to play in solving the problem of traffic congestion on the Kasoa road? *(Tick as many as possible)*

1. Stop trading/hawking along the road [ ]
2. Use only designed areas for crossing the road [ ]
3. Avoid stopping and boarding vehicles at wrong places [ ]
4. Reduce the using of private cars to board public transport [ ]
5. Educate each other to refrain from others leading to traffic congestion [ ]
6. Avoid indiscriminate dumping of refuse along the road especially at night [ ]
7. Other (specify) ..............................................................................

*This is the end*

*Thank you*
Appendix B: Questionnaire for passengers

UNIVERSITY OF GHANA

INSTITUTE OF STATISTICAL, SOCIAL AND ECONOMIC RESEARCH (ISSER)

QUESTIONNAIRE ON “THE EFFECTS OF TRAFFIC JAM ON COMMERCIAL TRANSPORT OPERATIONS. A CASE STUDY OF TROTRO DRIVERS AT AWUTU SENYA EAST MUNICIPALITY”

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Thank you for your acceptance

QUESTIONNAIRE FOR PASSENGERS

F. Biodata

A1. Age ........................................

A2. Sex
1. Male [ ] 2. Female [ ]

A3. Marital Status

A4. Religion

A5. Where do you live? ............................

A6. What sector of employment do you work?
1. Employed (Formal sector)
2. Self Employed (Informal sector)
3. Student
4. Others ................................................

A7. How often do you use the Kasoaroad
Everyday More than once a week
Once a week More than once a month
Every religious programme          Other

**TRAFFIC CONGESTION**

B1. How would you describe the nature or type of traffic congestion on this corridor?

2. Recurrent (frequently occurring) [ ]
3. Both recurrent and occasion [ ]

B2. At what periods in the year is traffic congestion very high?

4. Festival seasons (e.g. Christmas, funeral ) [ ]
5. In times of accidents [ ]
6. Working days [ ]

B3. In which time of the day is traffic high

2. Morning [ ]
3. Afternoon [ ]
3. Evening [ ]
4. Night [ ]

B4. Give an explanation to the choice of your answer

........................................................................................................................................
........................................................................................................................................

B5. How often if at all do you get trapped in traffic?

1. Very Frequently [ ]
2. Frequently [ ]
3. Often [ ]
4. Seldom [ ]

**G. Causes of traffic congestion**

In your opinion what causes Traffic congestion? [*Tick as many as applies*]

5. Poor driving habit [ ]
6. Poor road network [ ]
7. Accidents on the road [ ]
8. Too many taxis/buses [ ]
5. On-going construction activities [ ]
6. Lack/Poor parking habit [ ]
7. Malfunctioning vehicle [ ]
8. Poor traffic control management [ ]

Other (specify) ..................................................................................................................
H. Effect of traffic congestion

C1. How will you describe the effect of the Kasoa traffic on your overall productivity

2. Highly negative consequences [ ]
   2. Moderately negative consequences [ ]
   3. Less negative consequences [ ]

C2. With traffic, how long does it take you to get to work?

1. 1 – 2hrs [ ]
2. 2 – 3hrs [ ]
3. 3 – 4hrs [ ]
4. 4 – 5hrs [ ]
5. More than 5hrs [ ]

C3. Without traffic how long does it take to get to work?

1. 15-30mins
2. 30-45mins
3. 45m-60mins
4. 1-2hrs
5. 2-3hrs

C4. Do you think traffic congestion has effect on your health? 1. Yes [ ] 2. No [ ]

C5. If yes, what are some of the health hazards you think are associated with traffic congestion?

1. Cardiovascular disease,
2. Asthma,
3. Lung cancer,
4. Diabetes.
5. Other (specify) .................................................................

Other Effects

C6. How does traffic congestion affect your life in any other way?

1. Waste of time
2. Dehydration and hunger
3. Stress
4. Pollution
5. Accidents
6. Loss of work
7. Global Warming
8. Low productivity
9. Inability to forecast travel of time
10. Increased transport cost due to use of taxis
11. Delay movement
12. Query at work
13. Relocation

Other (specify) ........................................................................

I. Solution to Traffic congestion
D1. What roles does the government have to play in solving the traffic congestion in the Kasoa road? *(Tick as many as possible)*

10. Public enlightenment/traffic education [ ]
11. Provide more public transport service such as the Metro Mass Transport services (MMTS) [ ]
12. Ban all form of road side trading/hawking [ ]
13. Hack down all illegal buildings/shops built on the right of way (ROW) [ ]
14. Reduce the number of bus-stop where necessary [ ]
15. Rehabilitate all roads needing attention [ ]
16. Construction of many railway for public transportation [ ]
17. Create a separate/alternative root for trucks and heavy vehicles [ ]
18. Other (specify) …………………………………………………………………………………

D2. What roles do drivers have to play to remedy the situation? *(Tick as many as possible)*

6. Avoid wrong parking/stopping [ ]
7. Avoid wrong overtaking and overspeeding [ ]
8. Obey traffic regulations [ ]
9. Avoiding slowing down or stopping to buy things or for passengers to buy things when it is not a bus stop area [ ]
10. Other (specify) …………………………………………………………………………………

D3. What roles do individuals (general public) have to play in solving the problem of traffic congestion on the Kasoa road? *(Tick as many as possible)*

8. Stop trading/hawking along the road [ ]
9. Use only designed areas for crossing the road [ ]
10. Avoid stopping and boarding vehicles at wrong places [ ]
11. Reduce the using of private cars to board public transport [ ]
12. Educate each other to refrain from others leading to traffic congestion [ ]
13. Avoid indiscriminate dumping of refuse along the road especially at night [ ]
14. Those who private cars can use the road very early in order to minimize traffic at day time where appropriate [ ]
15. Other (specify) …………………………………………………………………………………
Appendix C: Interview guide for GPRTU officials

UNIVERSITY OF GHANA

INSTITUTE OF STATISTICAL, SOCIAL AND ECONOMIC RESEARCH (ISSER)

QUESTIONNAIRE ON “THE EFFECTS OF TRAFFIC JAM ON COMMERCIAL
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transport operations using trotro drivers as a case study. Please be informed that this study is
purely academic and that all information obtained shall be kept with utmost confidentiality. The
outcome of this research may be used for academic and general purposes such as research
reports, conference papers or books. Please tick/state where appropriate.

Thank you for your acceptance

INTERVIEW GUIDE FOR GPRTU OFFICIALS

1. What role do you play in the Union?

2. How long have you being working here?

3. Can you discuss with me which segments of roads in the Awutu Senya East Municipality
   are the hot spots for traffic congestion?

4. Is the traffic congestion on the Kasoa road different from what is on the roads in the
   municipality?

5. If yes, please explain

6. From which year did the traffic on the road started becoming heavy?
7. What seasons in the year is traffic situation on the road so high and what accounts for that?

8. What time in the day is traffic congestion on the road very high? What account for that?

9. What in your professional opinion are the main causes of the heavy traffic congestion on the Kasoa road?

10. Which of these actors will you say is the major underlying cause of the traffic congestion problem on the Kasoa road: Government, drivers and individuals.

11. What effect does the traffic congestion has on GPRTU?

12. Has the union in any way tried to put in measure to help remedy the situation on the road? If yes, what are these measures?

13. What have been the outputs of these initiatives?

14. What do you think drivers can do to help minimize the traffic situation on the road?

15. What role can the government as well as the general public, especially those who use the road play to help minimize the traffic situation on the road?

This is the end of the interview.

Thank you for your time