UNIVERSITY OF CAPE COAST

MANAGING ROAD TRAFFIC CONGESTION IN THE CAPE COAST METROPOLIS, GHANA

ALVIN KWESI ANDOH

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BY

ALVIN KWESI ANDOH

DISSERTATION SUBMITTED TO THE DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING, FACULTY OF SOCIAL SCIENCES, UNIVERSITY OF CAPE COAST IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF ARTS DEGREE IN GEOGRAPHY

APRIL 3014

DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: ..... Date: .....

Name: Alvin Kwesi Andoh

Supervisor's Declaration

I hereby declare that the preparation and presentation of this dissertation was supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.

Supervisor's Signature: ..... Date: .....

Name: Professor A. M. Abane

ABSTRACT

The backbone of urban activities is the urban transportation network. The transportation network of an urban area is usually designed to accommodate the transportation activities of urban people. With growing population and diversified land-use activities, transportation system needs to be updated or readjusted. Any lag between growing transportation demand and network capacity results in traffic congestion thereby causing economic, social and financial loss and environmental degradation.

The main objective of the study was to explore strategies designed to manage road traffic congestion in the Cape Coast metropolis. The study employed a descriptive survey design to sample 112 drivers and four road management institutions in the Cape Coast metropolis through simple random and purposive sampling techniques. Questionnaires and in-depth interview guides constituted the main instruments for data collection.

The study found that inadequate parking space, bad attitude of drivers, many vehicles on the road, limited parking spaces and poor road designs were the main causes of traffic congestion. It was also revealed that traffic congestion constituted a major challenge to drivers and road management institutions. The study recommends public education, strict enforcement of road traffic regulations, construction of more roads, and provision of adequate parking spaces to help minimise traffic congestion in the Cape Coast Metropolis.

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DEDICATION

To my family and friends for their love and encouragement.

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LIST OF ACRONYMS

BRTS	Bus Rapid Transit System
CCMA	Cape Coast Metropolitan Area
DVRA	Driver Vehicle and Licensing Authority
ECMT	European Conference of Transport Ministers
GHA	Ghana Highway Authority
GPRTU	Ghana Private Road Transport Union
GSS	Ghana Statistical Service
GTTC	Government Technical Training Centre
KTC	Koforidua Training Centre
MMT	Metro Mass Transit Limited
MRH	Ministry of Roads and Highways
MTTU	Motor Traffic and Transport Unit
NRSC	National Road Safety Commission
SPSS	Statistical Product and Service Solution

CHAPTER ONE

INTRODUCTION

Background to the study

The role of transportation in human life cannot be overemphasized. Globally transport plays an important role in the socio-economic development of every nation. According to Intikhab et al (2008), efficient transportation system plays an important role in catering for the daily necessities in the lives of people. These include access to amenities and services that are central to the lives of all individuals, like employment, education, health services and leisure.

At the individual level, Wane (2001: 1) also points out that transportation is crucial 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 of which an individual or a family has to implement his or her tri-dimensional strategy of life (i.e. family, work, residence). Indeed, mobility is at the heart of the challenges faced by all urban dwellers.

Consequently, cities in the world have witnessed tremendous motorisation during the recent century. Since 1988 global car population has exceeded 400 million (Walsh, 1990). The reason for this phenomenon, according to Dimitriou (1991) is that in both the developed and developing countries, urban transport is poorly managed. As such, the failure of public transport to meet the needs of travellers has intensified the demand for private cars.

Road transportation is the mode that has expanded the most over the last 50 years, both for passengers and freight transportation. Such growth in road freight transport has been fuelled largely by trade liberalization (Rodriguez & Slack, 2009). This is the result of growth of the loading capacity of vehicle and an adaptation of vehicle to freight (e.g. perishables, fuel, construction materials, etc.) or passengers (e.g. school bus) demand for speed, autonomy and flexibility. New types of problems, such as a significant growth of fuel consumption, increasing environmental externalities, traffic congestion and a multiplication of road accidents have also emerged.

Rapid urbanisation is a global phenomenon, and like all human induced changes, it is a response to socio-economic, political or environmental conditions, characterized by an unprecedented concentration of humans in cities (Satterwhaite, 1996; Masek et al., 2000; Songsore, 2003). Between 2011 and 2050, the world population is expected to increase by 2.3 billion, passing from 7.0 billion to 9.3 billion (United Nations, 2013). At the same time, the population living in urban areas is projected to gain 2.6 billion, passing from 3.6 billion in 2011 to 6.3 billion 2050. Consequently, demand for services including public transport is rising in response to the quest to meet the growing demands of a continually urbanising population.

Research on the problems of city traffic has become increasingly extensive particularly in the developing parts of the world. The upsurge of interest in city traffic is attributed to a variety of socio-economic developments, not least a rise in

the demand for motorised transport and the need to expand existing infrastructures to cope with the increasing volumes of traffic (Abane, 1993).

Across Africa, high urban growth rate, mostly in an unplanned manner, has outpaced the harmonious provision of infrastructural services in general. This has resulted in negative externalities including congested central areas, which are reflected in long commuting times and journey delays as well as lengthy waiting times both at and between terminals (Jackie, 2008).

In the mist of rapid urbanization, a parallel trend that is emerging is the decentralization of cities. Cities have spread out faster than they have grown in population, with rapid growth in suburban areas and the rise of "edge cities" in the outer suburbs (Oteng-Ababio & Agyemang, 2012). This decentralization creates a growing need for travel together. Cape Coast, the capital of the Cape Coast Metropolitan Assembly, has not been left out of this urban revolution. Ordinarily, the process should not have been antithetical to development if such growth was in tandem with the provision of infrastructural services, especially those related to transportation, which is perceived as part of the daily rhythm of urban life (Addo, 2005; Hoyle & Knowles, 1992). A reliable transport network is also essential to public safety, economic vitality and the overall quality of life.

Statement of the problem

Traffic congestion has been one of the fundamental problems faced by modern cities since the wide usage of vehicles. Just a few minutes trip to the convenience store may take up to half an hour due to traffic jam or slowdown.

According to road traffic managers, congestions are actually the causes of some issues like road rage, road bullies and major accidents (Afukaar, 2003; Armah, Yawson & Pappoe, 2010).

Traffic congestion in the Cape Coast Metropolis is a matter of concern to stakeholders in the transport industry. The traffic congestion seems to have increased over the years due to many factors including increase in both human and vehicle population. This increase has occurred without a corresponding increase in the number of roads. At best most of the roads in the metropolis are in deteriorating condition. In addition to the bad nature of the roads, most houses in the municipality were constructed during colonial times and are also very close to the road. This poses a challenge to motorists in the Metropolis.

The extent to which the Metropolis will be able to meet the challenge of rapid urbanization and continue to offer a favourable environment for further economic development remains a crucial question for planners, engineers and decision makers. Striving for an efficient transportation system is a crucial requirement of the urban development strategy for the CCMA. Flaws in transportation system in the Metropolis are now pronounced. This study is motivated by the traffic congestion prevailing in CCMA as the situation is deteriorating rapidly with increasing urban population and economic activities. The extent of the problem can be assessed from the fact that during peak hours (7:00 am-9:00 am and 4:00 pm-7:00 pm) it takes more than 30 minutes to travel a short distance which hitherto took less than 15 minutes.

The congested situation prevails almost the whole day. In addition to other losses (economic losses, discomfort etc.), traffic congestion worsens the environmental condition, which is already extremely poor in commercial areas like Kotokuraba, Abura, and Kingsway. Several attempts have recently been made by the CCMA, traffic police of the Youth Employment Scheme, Motor Traffic and Transport Unit (MTTU) of the Ghana Police Service and other stakeholders to improve the situation. Most of these measures fall in the category of short-term traffic management, which have been implemented on adhoc basis and in isolated ways, without adequate study. Besides, measures such as increasing the road network system and, encouraging more public transport, which have proved effective in other countries, have not been implemented yet.

Notwithstanding the seeming challenges posed by traffic congestion in the Cape Coast Metropolis, very few studies have been conducted on this phenomenon. A substantial number of studies on traffic congestion in Ghana have focused on the cities with emphasis on Accra, Kumasi and Takoradi (Abane, 2011; Asogwa, 1992; Ehiakpo, 1990; MRH/GHA, 1988; Oteng-Ababio & Agyemang, 2012; Sharpe, 1990; Tamakloe & Adarkwa, 1988). In line with the above observations, this study sought to examine the causes and consequences of traffic congestion in the Cape Coast Metropolis and proposes some remedies that may help to improve the situation.

Objectives of the study

The main objective of the study was to explore strategies designed to manage road traffic congestion in the Cape Coast Metropolis.

Specifically the study sought to:

1. Identify the major causes of traffic congestion in the Cape Coast Metropolis;
2. Examine the perception of drivers on the traffic situation in the Cape Coast Metropolis;
3. Analyse efforts put in place by stakeholders aimed at managing the traffic situation; and
4. Make recommendations aimed at managing the traffic situation in the Cape Coast Metropolis.

Research questions

The following research questions guided the study:

1. What are the major causes of traffic congestion in the Cape Coast Metropolis?
2. How do drivers in the Metropolis perceive the traffic situation?
3. What are the efforts made by stakeholders aimed at managing road traffic situation in the Metropolis?
4. What recommendations can be made aimed at managing the traffic situation in the Cape Coast Metropolis?

Significance of the study

The findings of this study are of immense importance to drivers, motorist and managers of traffic in the Cape Coast Metropolis. The findings will bring to fore the major issues inherent in road traffic management in the Cape Coast Metropolis. In addition, it will provide useful information to stakeholders to adopt strategies aimed at reducing road traffic congestion in the metropolis. Concerns from motorist may be incorporated into the strategies to help curb the situation. The study will also add to the existing literature on road traffic congestion and form the basis for further research on issues that border on road traffic congestion.

Scope of the study

The study is limited to the Cape Coast Metropolis and its immediate environs and focuses on road traffic congestion. Other issues that border on road management such as accidents, access, mobility, driver behaviour and parking difficulties do not form the focus of this study.

Organisation of the study

The study covers five main chapters. Chapter one deals with the background to the study, statement of the problem, objectives of the study, research questions, significance of the study, scope of the study and organization of the study. Chapter two reviewed relevant literature on the study with emphasis on themes on managing road traffic and the general impacts of congestion on road users.

Chapter three is the methodology of the study which includes the study area, study design, study population, sample size, sampling procedure, research instruments, data and sources, data processing and analysis and ethical issues that were considered during the field survey. Chapter four focuses on analysis and discussion of results from the field while Chapter five provides the summary, recommendations and conclusions of the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

This chapter reviews relevant literature that informs the study. For the purpose of the study, the chapter is presented under the following sub-topics: definition of congestion; causes of traffic congestion; effects of traffic congestion; and traffic management measures.

The concept and types of traffic congestion

Traffic congestion may be simply defined as the situation that arises when road and rail networks are no longer capable of accommodating the volume of movements that occur on them (Turton & Knowles, 1982). The location of congested areas within a town is determined by the physical transport framework and by the patterns of land use and their associated trip generating activities. The level of traffic over loading will also vary in time, with a particularly well–marked peak during the daily journeys-to-work periods (Afukaar, 2003).

According to Turton and Knowles (1982) although congestion on urban roads is largely attributable to overloading there are other aspects of this basic problem that also require solutions. In industrialized nations increasing volumes of private car, public transport and commercial vehicle traffic have exposed the inadequacies of urban road systems, particularly in city centers where street patterns have often survived largely unaltered from the nineteenth century and

earlier. The intricate nature of many city centers makes motorized movement difficult and long term car parking almost impossible (Turton & Knowles, 1982).

From the perspectives of the European Conference of Transport Ministers (ECMT, 2007), there is no single, broadly accepted definition of traffic congestion. One of the principal reasons for this lack of consensus is that congestion is a physical phenomenon relating to the manner in which vehicles impede each others' progression as demand for limited road space approaches full capacity. Conversely, congestion can be perceived as a relative phenomenon relating to user expectations vis-à-vis road system performance. Consequently, both operational and user perspectives are important in understanding congestion and its impacts. In this respect, the ECMT (2007) recommends that transport policies should be developed on the basis that congestion is related to both the behaviour of traffic as it nears the physical capacity of the road system, as well as the difference between road users' expectations of the system's performance and how the system actually performs.

Traffic congestion may be defined as having more vehicles on the road than it was designed for. For instance, if a section of road was designed to carry 2000 vehicles per hour but that section is now carrying 3000 vehicles per hour, then it can be said that the road has exceeded its capacity and therefore congested. From this basic definition, it is evident that congestion can be temporary or permanent depending on the factors that account for it.

A review of the various definitions reveals that although traffic congestion is human-induced and it is seen as an integral element in any transport system all

over the world, a unanimous definition has defied scholars. This notwithstanding, three basic recurrent themes run through the various definitions. First of all, congestion involves the imposition of additional costs on all users of a transport facility by each user of that facility. Secondly, transport facilities (such as road links, intersections, lanes and turning movements) have finite capacities to handle traffic, and congestion occurs when the demand to use a facility approaches or exceeds the capacity. Finally, congestion occurs on a regular, cyclic basis, reflecting the levels and scheduling of social and economic activities in a given area. This may be termed as recurring congestion (Taylor et al., 2000). On the other side of the coin, special episodes of congestion may occur at different points in a network due to irregular incidents, such as road works, breakdowns or accidents. This may also be referred to as non-recurring congestion (Armah, Yawson, & Pappoe 2010).

Factors that account for traffic congestion

Palma and Lindsey (2002) note that the occurrence of congestion in all transportation facilities may be accounted for by three features that characterise travel demand and supply. The reasons are that demand varies over time, supply is relatively fixed over long time periods and output is not storable. The authors went further to assert that travel demand varies significantly with time. For instance, systematic daily and weekly variations in travel demand are informed by work and school schedules, and by the operating hours of businesses, shopping, and entertainment establishments. Also, annual fluctuations in travel demand are

affected by the timing and length of school holidays and religious festivals, by sporting event schedules, and by the seasonal nature of outdoor recreational activities. Other social activities such as sporting meets, fairs, and other 'special events', may as well cause travel demand to fluctuate.

While demand has been noted to be variable, transportation supply, on the other hand, is static (Agyemang, 2009). Transportation supply consists of infrastructure and mobile plant. Whereas infrastructure generally has a longer life span, involves lots of capital, thus, making it very costly and time-consuming to alter, mobile plant, on the other hand, comes in smaller and cheaper units than infrastructure, and has a shorter lifetime, but still lasts much longer than the time scale of demand fluctuations (Palma & Lindsey, 2002). The scope to alter the supply of vehicle services is limited by the mobility of the plant itself and by the degree to which differences between regions and traveller groups in the timing of peak demands can be exploited.

Simply put, as a direct function of demand fluctuations, rigid supply and the impossibility of storage, the utilization rate of transportation facilities varies over time. Variations in utilization are magnified by intermittent reductions in capacity due to accidents, strikes and bad weather (Agyemang, 2009). However, by virtue of the fact that land is scarce and capacity is expensive, it would be prohibitively expensive to build enough capacity to prevent congestion at all times, hence, the occurrence and perpetuation of traffic congestion in the transport system (Palma & Lindsey, 2002; Ofori-Dwumfuo & Dankwah, 2011; Baffour, 2010).

One other factor contributing to congestion in Third World cities is the uncontrolled intermixing of motorized and non-motorized vehicles (Turton & Knowles, 1982; Springael, Kunsch, & Brans, 2002). In Ghana, the proliferation of pedal and motor cycles causes particular difficulties. This is against the backdrop that no specially designated roads are made separately for motorised and non-motorised vehicles. Consequently, all types of vehicles use the same road. While motorised vehicles are generally fast and can speed off on the road, their non-motorised counterparts are slow and ply the road sluggishly, a situation that causes much traffic build up on the roads.

Ofori-Dwumfuo and Dankwah (2011) identified and discussed a number of factors as being responsible for road traffic congestion in Ghana. These factors were categorised as follows:

Road network effects

A common phenomenon is that, road users shy away from one road link at a time supposing that there is less traffic on another. This sometimes results in the dreaded road being free and traffic congesting on the other. Secondly, all road networks that diffuse traffic from the central business district and must interchange at the Corridor seek the closest possible entry to the interchange, thereby jamming that entry point. This has the end effect that during prime times, traffic is seen to be heavy in one direction and light or empty in the opposite direction.

Timing of traffic lights

Inadequate timings at traffic intersections create temporary build-up of traffic. Traffic does not clear from intersections fast enough for others to have their right of way. Secondly, insufficient timing at pedestrian crossings at double lane roads gets pedestrians caught midway on the road. Sometimes the pedestrian volume is more than the capacity of the signal and all of them want to cross the road at that instance. Drivers have to stop or reduce speed in order to wait for them, a situation that causes vehicles to build up on the road.

Attitudes of drivers

Various bad attitudes of some drivers cause other drivers to reduce speed and thereby cause traffic jams. Examples of these include: disregard for traffic signals (especially by motor cycle riders), use of road shoulders during traffic jams and then attempting to join the traffic, delays in take off, (either through lack of attention at the wheel or the roadworthiness of the vehicle, sluggish takeoff of vehicles when the lights turn green resulting in less number of vehicles crossing than the design capacity), driving in wrong lanes and forbidden turns (e.g., a vehicle in an outer lane attempting to leave the intersection through a left turn resulting in the hold-up of traffic until such a vehicle manages to leave the scene), inter-driver conversation or quarrels, (e.g., drivers stopping side by side on the road to either converse or quarrel), flouting of road regulations and non-adherence to road signs, driving under the influence of alcohol, wrong parking, etc, all these force other drivers to reduce speed thereby causing traffic congestion.

Attitudes of pedestrians

At pedestrian crossings, some pedestrians tend to cross the road when they do not yet have the right of way. To avoid accidents, drivers have to reduce speed and thereby cause traffic jams. In some cases, driver end up knocking some pedestrians, a situation that exacerbates the traffic situation.

Baffour (2010) categorised the causes of congestion on roads in Ghana into two: temporary and permanent. He intimated that a temporary congestion may occur due to such incidents as: an accident on the road; a stalled vehicle (cases of vehicles breaking down in mid-stream traffic, occasional cases of vehicles on fire, etc); two taxi drivers fighting; a malfunctioning traffic control device such as a traffic signal and; disturbances from street hawkers, cart pushers and other commercial activities.

On the other hand, a permanent congestion may occur when the road has simply exceeded its design carrying capacity; when proper traffic control devices are not used; when a traffic control device is wrongly used for instance when a traffic signal is poorly timed and; a terrible design flaw such as the termination of a four lane traffic to a two lane traffic such as the condition at Mallam from Kasoa to Kaneshie (Bafour, 2010). These factors often lead to hold-ups on roads there by increasing the build up on various roads.

In developing countries including Ghana, one obvious characteristic of road transport system is the over-reliance on the use of low carrying-capacity vehicles including taxis, private cars and 'trotros' (Kwablah, 2008). In Accra for instance, available figures indicate that in 2010, 4.3 million passengers

commuted the Central Business District on a daily basis. Out of this figure, 3 million used trotro or taxi. While majority of the trotros are old and badly maintained, their carrying capacities are between 12-15 and 22-33 passengers (Ghana Institution of Road Engineers, 2012). The legal carrying capacity for taxis is 4 passengers. According to Kwablah (2008), whereas trotros and taxis carry 52 percent and 9 percent respectively of the travelling public, they use 27 percent and 18 percent road space. With so many vehicles carrying very few passengers at a time, the obvious consequence is congestion on the roads. This phenomenon is beginning to show up in the Cape Coast Metropolis where taxis and private cars remain the dominant means of transport to and fro the Central Business District.

The land use and traffic nexus of cities could also account for the endemic traffic congestion. Addo (2002) notes that the attainment of a vibrant and comfortable city life is a function of land use, transport, cultural values and the imagination and management skills of city officials. However, owing largely to the unplanned nature of Ghanaian cities, coupled with weak local governance and an urban economy which is primarily trading-oriented, the various land use types such as residential, commercial, industrial, recreational, educational, sanitary etc are haphazardly developed. The cumulative effect is the build up of vehicles on the various roads as commuters have to move to and fro the various land use type to undertake one form of activity or the other.

Effects of traffic congestion

Across the globe, increasing reliance on road transport looks set to continue as other means of transportation including, air, sea and rail networks fail to keep pace with continued housing and employment growth. This brings with it other external costs such as congestion, pollution, greenhouse gas emissions, and a rising incidence and cost of road accidents (Centre for International Economics, 2011). The social costs of congestion refers to the impact of each journey on congestion, local air pollution, greenhouse gas emissions, and accidents. Whereas in some developed countries subsidies exist for transport agencies (funding in excess of revenues from travel), the converse exist in developing countries where the cost of creating and maintaining road infrastructure is incurred by government and taxpayers (Springael, Kunsch, & Brans, 2002). The cumulative effect is that government have to allocate funds from the scarce resources to manage the negative effects of congestion on the people.

Environmental pollution and noise pollution have also been identified as one of the impacts of congestion, largely resulting from delays on the road (Aderemo, 2012). This is as a result of discharge of effluents and emission from automobiles. Pollution, including noise generated by circulation is a serious impediment to the quality of life and even health of urban population. Further, energy consumption by urban transportation has increased and so is the dependency on petroleum. The major pollutants by automobiles including carbon monoxide, lead, nitrogen and hydro-carbons are significant sources of eye and respiratory diseases (Aderemo, 2012). The increasing number of old and poorly

maintained vehicles on roads in many developing countries makes the pollution effect to be more serious (Ogunbodede, 2004).

Turton and Knowles (1982) assert that excessive flows where heavy commercial vehicles form a large proportion of the total traffic cause atmospheric pollution, high noise levels, vibration which can progressively undermine older structures and visual intrusion. Alternative measures aimed at reducing traffic congestion in some cases come along with attendant challenges. For instance, construction of new urban highways and some types of rail networks in developing countries have been found to have led to community disruption and excessive noise produced by traffic on the routes they are intended to supplement (Agyemang, 2009).

Traffic congestion also has implications for road safety. In many industrial nations and the third world the greater proportion of serious accidents occurs in urban areas (Afukaar, 2003). Roads in built-up zones display an accident rate up to three times greater than in other road categories. Pedestrians and cyclists are especially vulnerable and 95 percent of pedestrian accidents in Britain are recorded in urban areas with one half of these occurring in town centers (Whitelegg, 1987). In 2010, 718 cars in Ghana were involved in road accidents representing 31 percent of total type of vehicle involved in fatal accidents in Ghana (National Road Safety Commission NRSC, 2010). Most of these accidents occurred in build up areas where pedestrian lives were lost.

Accidents frequently occur on roads in urban centres. Urban environments are the most prone to motor traffic accidents because 75 per cent of traffic

accidents take place in built-up areas or cities (Aderamo, 2012). This is due to the underlying factors of undue concentration of vehicles in urban areas, traffic mix and the resultant flow conflicts. Most of these accidents happen due to the general impatience and ill-tempered nature of road users and the conflict between pedestrians and the different means of road transport in the cities (Aderemo, 2012).

Solutions to urban traffic congestion

Although it is possible to categorize solutions according to their principal objectives and methods of operation, most urban-transport problems are interrelated and plans to solve them are similarly interlinked. The implementation of a scheme to alleviate congestion on one part of an urban-road network may well create difficulties elsewhere the more ambitious plans involving the construction of motor-ways or new rapid-transit systems can have great deleterious effects upon the physical and social structure of urban communities bisected by these new lines of communication (Springael, Kunsch, & Brans, 2002).

Investment in additional road capacity

One of the most commonly adopted methods of combating congestion in small towns or in districts of larger urban centers is the construction of bypasses to divert through traffic. Although an effective bypass will remove a larger part of the traffic from a town center there will usually be some routes carrying through

traffic which continue to cause congestion within the urban area. Orbital routes themselves can also soon become overloaded if the initial forecasts of traffic volumes have been inaccurate. The solution to congestion on intra-urban road networks lies in the provision of additional capacity in the form of new or improved highways. Thus, construction of additional road capacity was generally accepted as the most effective solution to movement problems (Danquah, 2008).

Traffic management

Traffic management has received particular attention within urban residential areas, where excessive numbers of vehicles create problems of noise, vibration, atmospheric pollution and accident risks. As part of measures aimed at effective traffic management, the concept of 'traffic calming' was introduced to many cities in Europe and involved the creation of an environment in which cars may travel but where priority is accorded to the pedestrian. By traffic calming, carefully planned street-width channelling, parking restrictions and speed-control devices such as ramps are combined to secure a safe and acceptable balance between the vehicle and the pedestrian (Springael, Kunsch, & Brans, 2002).

Bus priority roads

Many transportation-planning proposals have been directed specifically towards increasing the speed and schedule reliability of bus services and most large cities have adopted bus-priority plans in an attempt to boost the attractions of public transport (Turton & Knowles, 1982). Bus-only lanes, with or against the

prevailing direction of flow, may be designated in heavily congested roads in order to secure time savings although such savings can be dissipated when buses enter inner-city areas where priority lanes are absent (Danquah, 2008). Buses may be accorded priority turns at intersections and certain streets may be reserved for buses only, particularly in 'pedestrianized' shopping areas Wright (2002).

In Ghana, the Bus Rapid Transit System (BRTS) was introduced in Accra on a pilot basis 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, the government decided to implement the project with the construction of BRT lanes in parts of the city to help mitigate the increasing traffic congestion that is swallowing Accra. In view of the numerous positive characteristics of the BRTS, for instance, the use of high occupancy vehicles to move people en masse, a lot of vehicles would have been taken from the roads than if all of these passengers had driven their own cars, and therefore, the BRTS indeed tackle traffic congestion in a very significant manner (Agyemang, 2009).

Vehicle restraint schemes

Measures designated to enhance the efficiency of bus services can also be combined with plans to restrain the use of inner urban streets by private motorists. A filter system can be applied whereby cars are only allowed into congested inner-city zones if vehicles are fully loaded, thus promoting a more efficient use of cars than is usually the case. Other methods are based upon fiscal restraint and

involve the levying of premium tolls or taxes on drivers wishing to enter inner zones with payment made either on entry or exit (Afukaar, 2003). Another variation is based on an electronic metering programme whereby roadside computers can determine the journey lengths made in restricted zones and dispatch accounts to the drivers (Armah, Yawson, & Pappoe, 2010).

Road transport sector in Ghana

Generally, the Ghanaian transport system has been dominated by the road sector, even though other modes such as air, rail, in-land water and marine are equally important. A survey conducted by the National Road Safety Commission (2008) suggests that about 22 million passengers are moved by road whilst a total of about 122 million tons of freight is moved per annum.

So important is road sector to the development of Ghana that, the Ministry of Transport has been set up for the purpose of planning, construction and maintenance of roads and highways in Ghana. The Ministry works through several Departments and Agencies. These have been categorised as the Road Infrastructure sub-sector and include the Ghana Highway Authority (responsible for the administration, development and maintenance of trunk roads and related facilities in the country); Department of Feeder Roads (provision of access to rural communities and centres of socio-economic activities through rural roads) and the Department of Urban Roads (responsible for administration, development and maintenance of urban roads and related facilities).

The second group is the Road Transport Services and Safety Sub-Sector and include the Driver Vehicle and Licensing Authority (DVLA), the National Road Safety Commission (NRSC) and the Metro Mass Transit Limited (MMT).

The last group is the Road Transport Training category which includes the Government Technical Training Centre (GTTC) and the Koforidua Training Center (KTC). All these agencies and departments work together to ensure that Ghana becomes the transport hub of West Africa. Besides, emphasis is placed on road transport as the main conduit for showcasing the country in the sub-region. It is therefore logical to conceive that urban transport in Ghana 'is synonymous with road transport' (Addo, 2002:1).

Summary

Traffic congestion is a consequence of disparity between transportation demand and supply. Demand for transportation in urban areas is an increasing phenomenon for the continuous increase in urban population and economic activities lagging behind the transportation supply. As a result, traffic congestion has already become a part of urban transportation system. Such traffic congestion not only causes problems to urban transportation activities but also causes degradation to natural environment by increasing the magnitude and intensity of air pollution. Efforts to eliminate traffic congestion completely from the transportation network may be unrealistic; rather the way to minimize traffic congestion is a challenge for stakeholders in the road transport sector.

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

This chapter discusses the various methods and techniques that the study employed in the collection and the analysis of data. It describes the research design, data and sources, target population, sample size, sampling technique, research instruments, data analysis and ethical issues. Preceding the chapter is a brief description of the study area as some of the physical and socio-economic conditions influence traffic, which is a function of activities.

Study area

Cape Coast, or *Cabo Corso,* is the capital of the Cape Coast Metropolis and Central Region of Ghana (Figure 1). It is situated 145 km west of Accra on the Gulf of Guinea. It has a population of 217,032 (Ghana Statistical Service, 2012). In the 16th century the city changed hands between the British, the Portuguese, the Swedish, the Danish and the Dutch. The city's Fante name is Oguaa. Cape Coast is home to some of the best Senior High Schools in Ghana. It is also home to major tourist attractions including forts and castles in the municipality. The housing structure comprises mainly historical buildings most of which were constructed by the colonial masters. The narrow road network divides the various suburbs. Urbanization has increased the problem of urban transport in the Cape Coast metropolis.

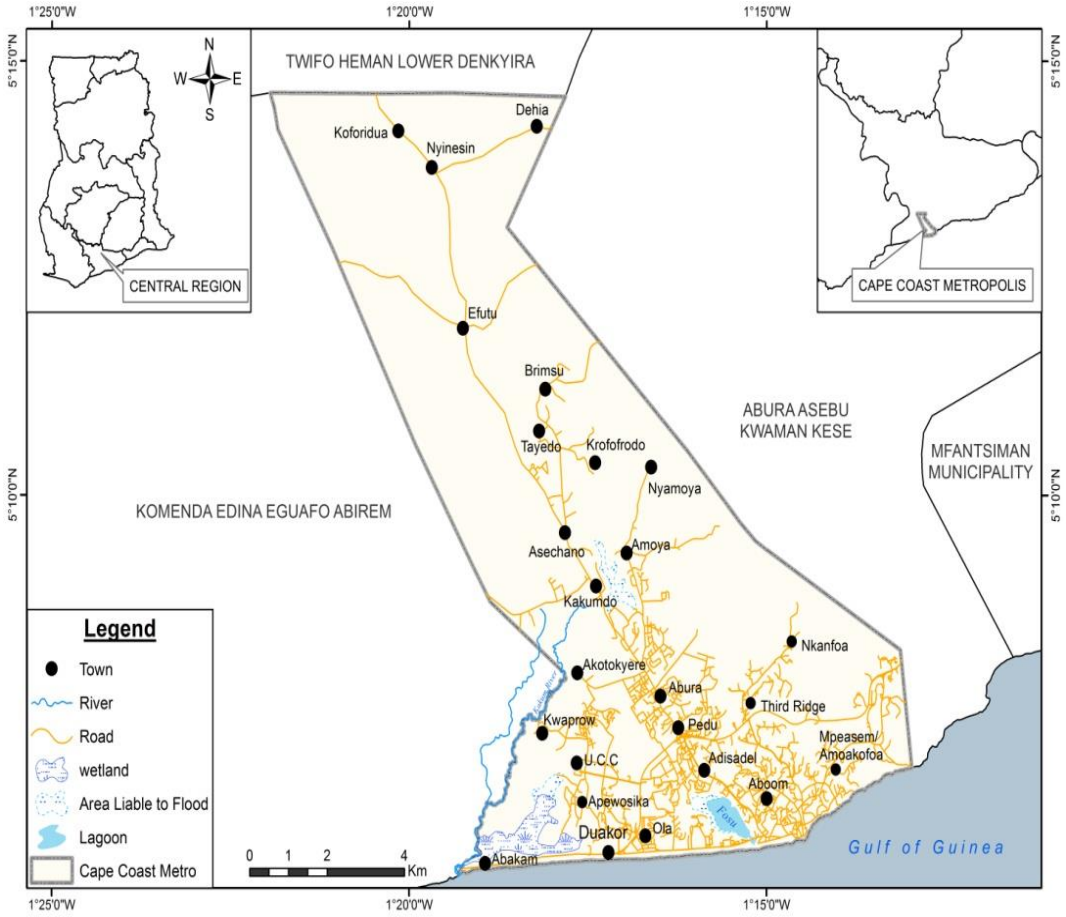

Figure 1: Map of Cape Coast Metropolis

Source: Cartography Unit, Department of Geography and Regional Planning, UCC.

Climate

The Cape Coast Metropolis is located in the littoral anomalous zone of Ghana which makes the municipality experiences high temperatures year round. The hottest months are February and March, just before the main rainy season, while the coolest months are between June and August. The Metropolis experiences double maximal rainfall, with annual rainfall total between 750 mm and 1,000 mm (Ghanadistircts.com, 2012). The conditions of roads in the

metropolis deteriorate during the peak of the rainy season where rainfall conditions create potholes on some major roads.

Topology and drainage

The landscape of the metropolis is dominated by batholiths interspersed with valleys. Located in the valley are several streams, the largest of which is the Kakum. Many of the steams end in wetlands and the Fosu Lagoon at Bakaano. The wetlands serve as barriers to physical development including construction of link roads to link major settlements in the metropolis. In the northern parts of the district, however, the landscape is generally low lying and is suitable for the cultivation of various crops.

Geology and soil

The rock type of the Metropolis is of the Birrimian formation and consists of schist and introduced granites and pegmatite. The hills are generally overlain by sandy and clayey silts while the valleys are overlain by clayey gravel with lateritic soils exposed in a number of areas.

The dominant soils of the Metropolis are lateritic in nature and are derived mainly from the weathered granite and schist. Along the slopes the soil profiles have top soils with depths of about 0.33m while on the hills, loose to dense sandy soil of about 2.36m in depth frequently occur. In the valleys and swampy areas, find sandy deposits occur extensively.

Research design

The study adopted a mixed method approach. This involved triangulation of both quantitative and qualitative methods of data collection concurrently. Triangulation focuses on collecting and analysing both qualitative and quantitative data in a single study (Creswell, 2003). It is employed to overcome the problems associated with researches that rely on only one theory, single method and single data set.

The study used the descriptive cross-sectional survey research design. Descriptive research design is a scientific method which involves observing and describing the situation without influencing it in any way. Neuman (2003) views descriptive design as representing a picture of the specific details of a situation, social setting or relationship. Descriptive designs allow researchers to gain more information about a particular characteristic within a particular field of study. They involve gathering data that describe events and then organizes, tabulates, depicts, and describes the data collected. Krathwohl (2009) supports the use of descriptive design because it helps to describe, explain, and validate findings. It does this by merging creative exploration and organising the findings in order to fit them with explanations, and then test or validate those explanations.

The descriptive design has been criticised for being narrow in scope and limiting analysis of events, concepts and theories to only what they are without exploring their in-depth components (Creswell, 2003). Notwithstanding the criticism labelled against descriptive design, the method was found to be most appropriate for the study. This is largely due to the fact that the design is

considered to be relatively easy to use because data are fairly easy to obtain and interpret by the use of simple descriptive statistics (Sarantakos, 2006). The method also has the advantage of producing a good amount of responses from a wide range of respondents including in this study, motorists and road management experts.

Data and sources

Two main types of data were used in the study. These were primary and secondary data. The primary data were obtained from the field survey through the use of questionnaires and in-depth interviews. Some of the data collected from the field survey were the socio-demographic characteristics of respondents, major causes of traffic congestion in the Cape Coast Metropolis, perception of drivers on the road traffic situation, efforts put in place by stakeholders aimed at managing traffic congestion and measures aimed at managing the traffic situation in Cape Coast. Secondary data that focused on road traffic congestion was obtained from books, journals, newspapers, articles, reports, the internet, as well as conference and working papers. These were used to review literature and also compare and contrast the findings that came up in this study.

Target population

The target population of the study was drivers and stakeholders involved in road traffic management in the Cape Coast Metropolis. These included commercial and private drivers who ply the major roads, the Motor Traffic and

Transport Unit (MTTU) of the Ghana Police Service, Department of Urban Roads, National Road Safety Commission (NRSC) and Ghana Private Road Transport Union [GPRTU]).

Sample size

In order to obtain a representative view of respondents, the Fisher, Laing, Stoeckel and Townsend (1998) formula for determining sample size for the study was adopted. This is expressed as:

$$n = \frac{z^2 pq}{d^2}$$

Where:

n = the desired sample size (when the population is greater than 10,000)

z = the standard normal deviation, usually set at 1.96 which corresponds to 95 percent confidence level;

p = the proportion in the target population estimated to have particular characteristics (similar views on road traffic congestion);

q = 1.0-p; (with 1.0 as constant) and

d = the degree of accuracy desired, usually set at 0.05

With the (z) statistic being 1.96, degree of accuracy (d) set at 0.05 percent and the proportion of the study population with similar characteristics in respect of their views on road traffic congestion in the Cape Coast Metropolis (p) at 70% which is equivalent to 0.70, then the sample size generated was:

$$n = \frac{(1.96)^2 (0.70) (0.10)}{0.05^2}$$

$$= 107.5648$$

A desired sample size of 108 respondents was obtained. In view of this, 108 drivers were targeted. In addition to this, four key informants comprising the heads or representatives of the Motor Traffic and Transport Unit (MTTU) of the Ghana Police Service, Department of Urban Roads, National Road Safety Commission (NRSC) and Ghana Private Road Transport Union [GPRTU]) were purposively selected to participate in the study.

Sampling procedure

In selecting respondents for the study, a number of procedures were employed. First, respondents were categorized into commercial drivers, private drivers and non-motorised drivers. Non-motorised drivers include those who operate motor cycles, tricycles and bicycles. Data available at the Central Regional office of the National Road Safety Commission (NRSC, 2012) shows that in terms of urban road usage, the proportion of commercial drivers exceeds that of private drivers and non-motorised drivers by 40 percent, 35 percent and 25 percent respectively. Consequently, the sample size of 108 respondents was proportionally allocated to the respondents as follows: 40 percent for commercial vehicles, 35 percent for private vehicles and 25 percent for non-motorised operators. Hence, 43 commercial drivers, 38 private drivers 27 non-motorised transport operators (motor cycle, tricycle and bicycle) were sampled for the study.

In getting the shortlisted respondents for the study, the convenient sampling technique was used. In convenient sampling, subjects are selected based on their convenient accessibility and proximity to the researcher. In view of this the sampled respondents were conveniently selected and interviewed until the sample size assigned to each category was obtained.

The purposive sampling technique was used to select key informants from the road management sector operating within the CCMA. The purposive sampling technique was deemed the appropriate means of getting respondents who are knowledgeable and well abreast with the subject matter of interest (Sarantakos, 2006). As such the following key informants were identified for in-depth interview: the heads or representatives of MTTU, Department of Urban Roads, National Road Safety Commission and Ghana Private Road Transport Union (GPRTU) were purposely selected. These respondents were selected on the basis of their level of expertise and the role they play in managing road traffic congestion in CCMA.

Instruments

In line with triangulation as the underlying philosophy guiding the study, questionnaires, in-depth interviews (IDIs) and observations were developed to collect primary data from the field (see Appendices 1 and 2). These three primary sources of data collection instruments were used because it is generally agreed that questionnaires, IDIs and observation are the most appropriate means of primary data collection when information should come directly from 'people'

who are actively involved and are aware of the problems under investigation (Patton, 2002). Thus, employing interviews ensure that the 'local viewpoint' of people is sought to explain things.

Questionnaire

A questionnaire was prepared and administered to the sampled respondents (commercial, private and non-motorised vehicle operators (see Appendix 1). The instrument comprised a mix of open-ended, close ended and Likert scale questions. With respect to questions that required a 'yes' or 'no' response, the instrument provided an opportunity for respondents to explain the response they chose.

The questionnaire was categorised into three sections. Section A focused on the demographic characteristics of respondents such as sex, age, level of education and driver category. Section B centred on the causes of traffic congestion with emphasis on driver category and the factors responsible for congestion on roads in the Metropolis. In section C, the instrument sought the views of respondents on road traffic situation in the Cape Coast Metropolis while section D focused on the efforts put in place by road traffic management institutions to manage traffic congestion in the Metropolis.

In-Depth Interview (IDI) Guide

In-depth interviews were conducted with four key informants. These key actors were purposively selected on the basis of their level of expertise and the

role they play in managing road traffic congestion. The interview guide for the IDIs (Appendix 2) was in a semi-structured format in line with Hockey, Robinson and Meah's (2005) assertion that semi-structured interviews are flexible, and they allow for the exploration of emerging themes and ideas. The IDI guide was divided into two sections. Section A focused on the background information of respondents while section B contained questions on road traffic congestion and the challenges involved in managing the situation.

Observation checklist

The study also made use of non-participant observation. With this method of data collection, observers, on their own, study their respondents or the study area from outside the group without participating in the activities of the respondents (Sarantakos, 2006). Hence, observation checklist was prepared to guide and used to observe road traffic congestion in the study area. In particular, the activities of drivers that cause congestion during peak and off-peak congestion times, road corridors where congestion is dominant and the nature and conditions of existing roads were also observed (Appendix 2). The exhibits helped to provide on-the-spot information without relying on the reports of others.

Fieldwork

The actual field work took one week, between 4th and 10th November, 2013. Three field assistants were trained and used to administer the questionnaires while the interviews were conducted by the researcher. Respondents were

supplied with the questionnaires for them to complete and return them to the research team. For respondents that could not read and write, the instrument was read and interpreted to them in *Fante* and their responses were then recoded on the instrument. With respect to the key informants, initial visits were conducted to book appointments for interviews. On the appointed dates, the researcher met and interviewed the key informants. The interviews, which lasted for barely 40 to 50 minutes were recorded and transferred on a computer to be transcribed for data analysis.

Ethical issues

Issues that border on ethics such as informed consent, confidentiality and anonymity were catered for in the collection of data from the respondents as well as in analysing their responses.

With respect to informed consent, the researcher identified himself to the respondents to avoid any kind of false impression that could be created in the minds of respondents. In addition to this, the purpose of the study was explained to the respondents for them to get a clear understanding of the study. Lastly, the nature of the questionnaire and interview guide was made known to the respondents for them to have a clear picture and idea about how to provide answers to the instruments and participate fully in the study.

In addition, all forms of identification including respondents' names, addresses and telephone numbers on the questionnaire and interview guide were avoided during the study. This helped to maintain anonymity. Regarding

confidentiality, respondents were informed and promised that the information given by them will solely be used for the purpose of the study. Furthermore, respondents were informed that the information that they provided will not be made available to other people for any reason.

Respondents' right to privacy was also respected during the administration of the questionnaire and the in-depth interviews. Questions relating to respondents private matters were avoided. Respondents were also given the liberty not to answer questions that they thought were personal to them.

Data analysis and presentation

The data collected from the field were first cross-checked and edited to ensure that there were no mistakes in the responses and the information given was relevant. The data were then coded and fed into the computer. The Statistical Product for Service Solutions (SPSS version 17) was employed to process and analyse the data. The IDIs were analysed manually. The data from the IDIs were transcribed, then categorised under specific themes and used for the analysis. Frequencies, percentages, averages and proportions were used to present the results from the questionnaires in the form of tables, charts and pictures.

Response rate

Out of the 108 respondents sampled for the study, 77 of them took part by responding to the questionnaires that were sent out to them. Even though 108 questionnaires were sent out, 77 of the sampled respondents answered the

questionnaires. The rest of the sampled respondents did not respond to the questionnaires, notwithstanding several follow ups to entreat them to answer the questions. Thus, the study achieved as response rate of 71 percent, upon which the data analysis has been done.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter outlines and discusses the results of the data collected from the field. Issues covered include socio-demographic characteristics of respondents, causes of traffic congestion within the metropolis, perceptions of road users on traffic congestion and efforts by road traffic management institutions in curbing traffic congestion.

Socio-demographic characteristics of respondents

The study sought to find out the background characteristics of the respondents that have a bearing on the study. Key variables analysed include sex, age, marital status, level of education, driver category and number of years spent as a driver a vehicle. Out of the 77 questionnaires that were returned (Table 1) majority (72.7%) were males whereas a little more than a quarter (27.3%) were females. It was revealed that close to half (49.4%) of the respondents were aged between 20 and 30 years with 22.1% within the age cohort of 31 and 40 years. In addition to the above, those between the age cohort of 41 and 50 years were 18.2% of the total respondents whereas 10.3% were above the age of 50 years.

With respect to level of education, it was realised that majority (62.3%) of the respondents had attained tertiary (college, polytechnic and university) levels, whereas 13.0% had also completed secondary or A' Level.

Table 1: Socio-demographic characteristics of respondents

Socio-demographic characteristics	Frequency	Percentage
Sex		
Male	56	72.7
Female	21	27.3
Age		
20-30 years	38	49.4
31-40 years	17	22.1
41-50 years	14	18.2
> 50 years	8	10.3
Level of education		
No formal education	7	9.1
Basic/Middle Sch.	12	15.6
Secondary/A' Level	10	13.0
Tertiary	48	62.3
Driver category		
Private driver	31	40.3
Commercial driver	26	33.8
Non-motorised driver	20	25.9
Number of years spent as a driver		
1-5 years	29	37.7
6-10 years	25	32.5
11-15 years	12	15.6
> 15 years	11	14.2
License category		
Learner	8	10.4
B	37	48.1
C	20	26.1
D	12	15.6

Source: Fieldwork, 2013

To ascertain the kind of vehicles these respondents operated, 40.3% opined that they were private drivers and as such drive private cars with a third (33.8%) being commercial drivers. In addition, a quarter (25.9%) of the respondents were non-motorised drivers, that is, they use bicycles, tricycles or other forms of non-motorised means for their daily activities.

Furthermore, the study explored the level of experience of respondents, in terms of how long they had been driving. It was found that 37.7% of the respondents had been driving for less than 5 years with more than a third (32. 5%) of them driving for 6 to 10 years. Besides, 15.6% of the respondents had been behind the steering wheel for 11 to 15 years, a period usually considered long enough to gain much experience in driving (Lesch, & Hancock, 2004).

Drivers are obliged to hold a valid licence before they are allowed to use the road. The study found that out of the 77 respondents who participated in the study, 48.1% of them had driving licence 'B', with less than a third (26.1%) possessing driving licence 'C'. Besides these two categories of drivers, 15.6% of them were also holding drivers licence 'D' whereas 10.4 % of the respondents had the learners or 'L' licence. Thus, a significant proportion of the respondents held license 'B', the type often given to first-time vehicle drivers and applicable to vehicles that weigh between 3000 and 5500 kg (DVLA, 2012).

Causes of traffic congestion

This section of the chapter deals with specific objective one which sought to identify the causes of traffic congestion. The literature identifies varied causes

of traffic congestion on our roads (Addo, 2002; Aderemo, 2012; Agyemang, 2009; Ogunbodede, 2004; Wright, 2002). The study sought the views of respondents on the factors that account for traffic congestion (Table 2).

Table 2: Causes of traffic congestion

Cause	Frequency	Percentage
Inadequate parking spaces	61	17.4
Bad attitude of drivers	58	16.5
Too many vehicles on the road	53	15.1
Inadequate road routes	52	14.8
Poor road designs	32	9.2
Bad attitude of pedestrians	31	8.8
Breakdown or accidents	23	6.6
Inadequate timing of traffic lights	22	6.3
Road works	19	5.4
Total	351*	100.0

*Multiple responses

Source: Fieldwork, 2013

The results show that inadequate parking space along the major routes (17.4%), bad attitude of drivers (16.5%) and many vehicles on the road (15.1%) are the main causes of traffic congestion in the metropolis. On the other hand, some of the respondents also attested to the fact that traffic congestion within the metropolis is caused by inadequate branch roads within the metropolis (14.8%) and poor road designs (9.2 %). In addition, 8.8% of the respondents also said that this menace is caused by bad pedestrian attitude such as selling and or hawking

along roads, with 6.3% also claiming that it is caused by malfunctioning traffic lights. The findings from Table 2 confirm the views held by Ofori-Dwumfuo and Dankwah (2011) who identified timing of traffic lights, attitudes of drivers and attitudes of pedestrians as the main causes of traffic congestion.

Traffic congestion on roads does not occur every day and all day, but during specific periods or times of the day (Ogunbodede, 2004). Hence, respondents were asked to indicate which periods of the day they encounter traffic build ups on the roads. As evident in Figure 2, 63.2% of the respondents noted that congestion usually occurs during the morning and evenings. This is due to the fact these periods are usually noted as 'rush hours', the period during which people commute from their homes to their respective place of work (morning) and vice versa (evening).

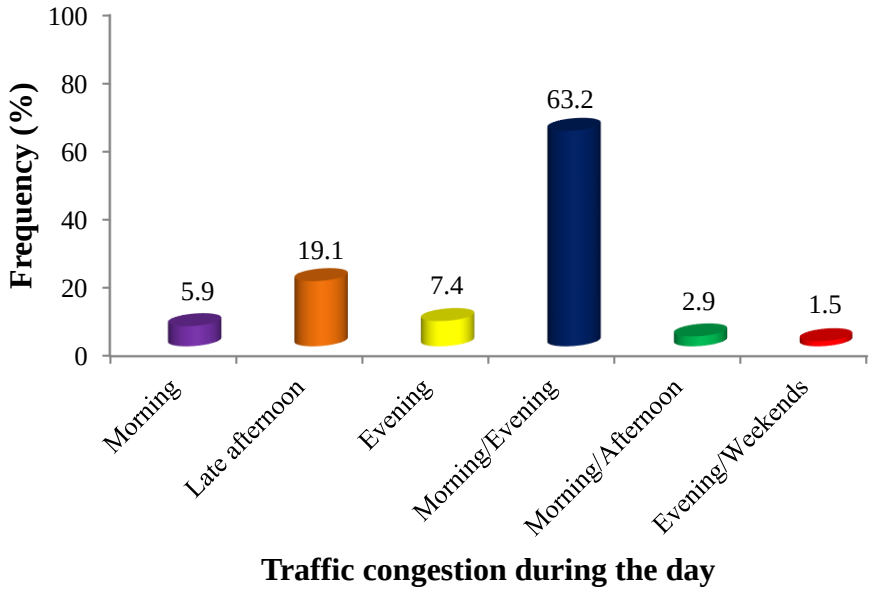

Figure 2: Periods of traffic congestion

Source: Fieldwork, 2013

In addition, nearly a fifth (19.1%) of the respondents also opined that the congestion usually occurs only during the late afternoon. This stems from the fact that, many business activities peak during late afternoons and some workers and school children begin their journey back home. Through personal observation, it was revealed that many traders conducted their businesses by the road sides to catch a glimpse of people who are going home so as to buy their wares for them. Commercial vehicle operators tended to cash in on this by stopping at unapproved places in order to pick and drop commuters who patronise such trading activities. This was prevalent in the Central Business District (CBD), especially between Kingsway and Kotokuraba and also around the Abura Market of the metropolis. This attitude of the pedestrians and or traders results in traffic congestion on the affected roads as most of the sidewalks and shoulders of the roads are taken over by traders and commercial vehicles.

Besides the above findings, some respondents also opined that traffic congestion usually occurs during the evenings (7.4%), mornings (5.9%), between the morning hours and early afternoon (2.9%) and some also noted that it occurs during evenings and weekends (1.5%). Congestion in the evenings might be accounted for by the fact that it is the period of the day in which people who enjoy night life also go out to have fun and this might also cause traffic congestion. Secondly, for those who noted that it usually occurs during weekends, it could be attributed to the period of the week in which many people engage in activities such as funerals, ‘outdoorings’, weddings, keep fit activities and also other sport activities. These activities bring a large number of people on the roads

and by the definition given by Aderemo (2012) the road cannot accommodate the large numbers and the resultant effect is the congestion of the road either by humans/pedestrians or drivers.

In relation to the causes of traffic congestion, the study went further to determine the extent of the occurrence of congestion in the Cape Coast Metropolis by asking respondents to comment of the frequency of occurrence. As indicated in Figure 3, it was established that traffic congestion occurs 'very often' (42.8%) and 'often' (37.7%). Other respondents also noted that it does not occur frequently. For instance, 10.4% of respondents noted that traffic congestion within the metropolis occurs 'seldom' with 9.1% indicating that it is 'not often'. The above finding gives an indication that a substantial proportion of the respondents (80.5%) thought that traffic congestion is a daily affair and occurs "every day, all day".

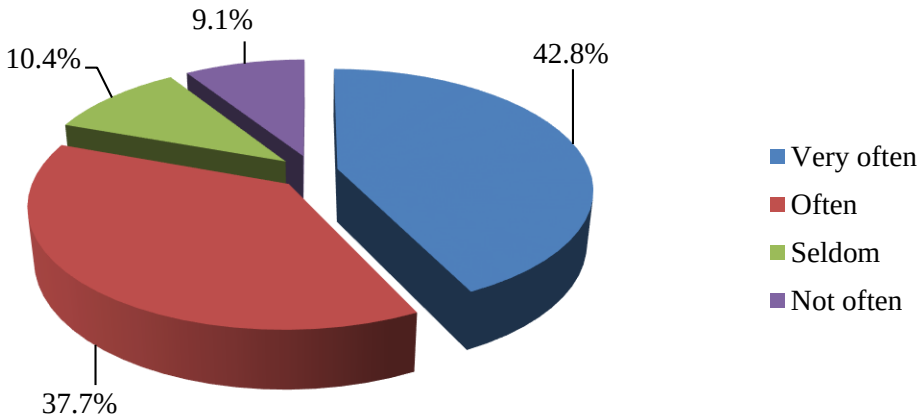

Figure 3: Occurrence of traffic congestion

Source: Fieldwork, 2013

The time that it takes to commute from one point to another has been used as a yardstick to measure the extent to which traffic congestion occurs (Mahama,

2012). Duration of drive through major roads within the metropolis during periods of traffic congestion and also during periods without traffic congestion was also ascertained. From Table 3, it was established that almost half (48.7%) of the drivers noted that it takes them between 15 and 30 minutes to drive through the major roads within the metropolis during periods of traffic congestion. Also, a little over a quarter (28.9%) of them opined that it also takes them approximately 31-45 minutes to move from their point of origin to their destination during 'rush hours'.

Table 3: Duration of drive through with and without traffic

Duration of drive through	Frequency	Percentage
With traffic		
< 15 minutes	2	2.6
15-30 minutes	37	48.7
31-45 minutes	22	28.9
46-60 minutes	10	13.2
> 60 minutes	5	6.6
Without traffic		
< 15 minutes	61	80.3
15-30 minutes	13	17.1
31-45 minutes	1	1.3
46-60 minutes	1	1.3

N=76

Source: Fieldwork, 2013

In addition to the above, 13.2% of the drivers also assert that it takes them on the average 46 to 60 minutes to drive through traffic, with 6.6% indicating that it takes them more than an hour (60 minutes) to drive through traffic and only 2.6% assert that it takes them less than 15 minutes to move through the congestion. Thus, it can be concluded that majority of the drivers spend on the average between 15 and 45 minutes to move through traffic congestions when it occurs. What this means is that during periods of traffic congestion, it could take a driver approximately 15 to 45 minutes to move from Kotokuraba to Abura and vice versa.

On the contrary, the study found that, 80.3% of the drivers claim to use less than 15 minutes to move from their origin to their destination a distance of about 10km, when there is no traffic congestion on the roads. Also, 17.1% of them take approximately 15 to 30 minutes to ply a distance of 10 km of the main roads within the metropolis during periods of no traffic congestion with those who use between 31 and 45 minutes and also between 46 and 60 minutes being at par (1.3%). In this regard it could be deduced that it takes less than 15 minutes to move from one point to the other within the metropolis during periods of less congestion. For instance, it could take a driver less than 15 minutes to move from Kotokuraba to Abura during periods of less congestion.

The study probed further to determine which categories of vehicles are usually associated with congestion on the roads in the metropolis. From Table 4, it could be deduced that from the perspective of commercial drivers, majority (81.9%) of traffic congestions are caused by themselves or commercial vehicles

such as buses, taxis and 'trotos', whereas 4.5% is also caused by private vehicles. In the same vein, 13.6% of commercial drivers also noted that traffic congestions are caused by both commercial and private vehicles.

From the perspective of private drivers, nearly three-quarters (74.1%) of them noted that this menace is caused by commercial vehicles, with 3.7% of them also attesting that it is caused by private vehicles. In addition, 14.8% of private car drivers assert that this menace is caused by both commercial and private vehicles.

Table 4: Driver category by types of vehicles causing traffic congestion

Driver category	Types of vehicles causing traffic congestion				Total
	Commercial vehicles	Private vehicles	Non-motorised transport	Both	
Commercial driver	81.9	4.5	0.0	13.6	100.0
Private driver	74.1	3.7	7.4	14.8	100.0
Non-motorised driver	81.2	12.5	0.0	6.3	100.0

N=77

Source: Fieldwork, 2013

Also, 7.4% of private drivers claim that congestions are caused by non-motorised transport operators (bicycle and 'trucks') and to a large extent, pedestrians. From the view of non-motorised drivers (bicycle riders and 'truck

pushers') majority (81.2%) of traffic congestion is caused by commercial vehicles, with 12.5% of this menace caused by private vehicles.

The results in Table 4 point to the fact that commercial drivers and for that matter commercial vehicles are largely responsible for the traffic build up on roads in the Cape Coat metropolis. The above findings confirm earlier assertions by Mahama (2012), Aderema (2012) and Agyemang (2009) that the attitudes and activities of commercial vehicle operators have resulted in traffic congestion in many cities across the West Africa sub-region.

Perceptions of road users on traffic situation in the Cape Coast Metropolis

The second specific objective sought to examine the perception of drivers with respect to traffic situation in the metropolis. From the study and as indicated in Table 5, majority (96.1%) of the respondents perceived that traffic congestion is a challenge to drivers and other road users. This is because road traffic congestion is known to have negative effects on road users. With respect to drivers, it brings fatigue and also brings about fuel loss (Armah, Yawson, & Pappoe, 2010) and makes the cost of operation of vehicles in traffic congestion areas difficult to operate (Springael, Kunsch, & Brans, 2002). Besides, 94.8% of respondents attested to the fact that traffic congestion impacts negatively on productivity.

Table 5: Perception of drivers on traffic situation in the Cape Coast Metropolis

Traffic situation	Percentage in agreement	Mean	Standard Deviation
Traffic congestion is largely human induced	84.4	2.31	0.730
Traffic congestion is a challenge to road users	96.1	2.06	0.338
Traffic congestion has an impact on daily output	93.5	2.08	0.315
Traffic congestion leads to low productivity	94.8	2.09	0.403
Overall rating	92.2	2.14	0.447

Source: Fieldwork, 2013

From the perspective of stakeholders in the road transport sector in the metropolis, traffic congestion in the Cape Coast metropolis has become a major issue hampering commuter movement and the situation is expected to increase in the future. An official of a road management institution indicated that:

> The traffic situation in this metropolis is largely an attitudinal problem and has to do with the way drivers and other road users disregard basic traffic rules. In particular, the CBD and Abura area have become popular with congestion and the situation is getting out of hand. Something needs to be done about it (Male, 52 years).

The above findings attest to the definitions of traffic congestion given by Springael, Kunsch, and Brans (2002) and the European Conference of Transport

Ministers (ECMT, 2007) which largely perceives traffic congestion as human-induced. This is because many of the issues that bring about traffic congestion are as a result of human factors such as the attitude of drivers including parking at unapproved places, disregard for basic traffic rules and regulations, and driving in wrong lanes.

Role of road management institutions in at managing traffic congestion

Road traffic institutions play varied roles in their day to day operations. Institutions such as Motor Traffic and Transport Unit (MTTU) of the Ghana Police, National Road Safety Commission (NRSC) and Department of Urban Roads play diverse roles in ensuring that the roads in urban areas are safe for users. The roles played by these institutions include but not limited to educating road users (NRSC), rehabilitating existing roads (Department of Urban Roads) and the enforcement of road traffic regulations (MTTU). The third objective sought to find out how the various driver categories perceived the roles played by these institutions.

In the first place, respondents were asked to indicate whether or not these institutions were effective in helping to deal with the road traffic congestion in the metropolis. As evident in Figure 4, majority of the drivers opined that these road management institutions are not effectively playing their roles as expected. Specifically, majority (86.4%) of commercial drivers indicated that road management institutions in the Cape Coast metropolis are not playing their

traditional roles as they should. Only 13.6% of them alluded to the fact that they are really playing their traditional roles as required of them.

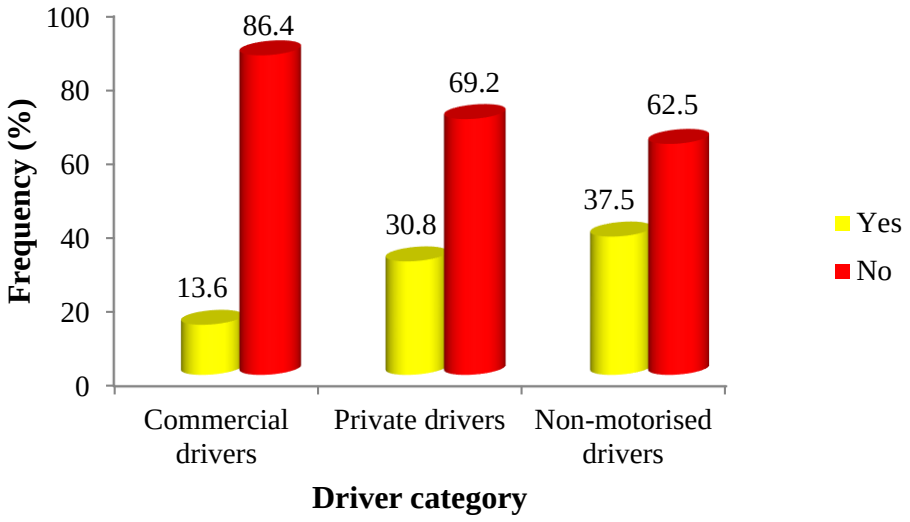

Figure 4: Road traffic institutions performing their desired roles

Source: Fieldwork, 2013

From the perspective of private drivers, about two-thirds (69.2%) felt that road management institutions were ineffective, whereas approximately a third (30.8%) noted that these institutions have effectively played their roles. In addition to the above, more than half (62.5%) of non-motorised drivers lamented that these road management institutions have not effectively played their desired roles. Overall, the results indicate that drivers in the municipality perceive road management institutions to be largely ineffective in performing their roles including helping to minimise the incidence of traffic congestion.

The study proceeded to examine the extent to which respondents were satisfied or otherwise with the roles played by the various institutions. This is in

view of the fact that most respondents generally agreed that, the various stakeholders have played key roles-educating road users, rehabilitating existing road and the enforcing of road traffic regulations -to deal with the traffic situation in the Cape Coast metropolis. The results are presented in Table 6.

Table 6: Level of satisfaction with measures implemented by road traffic institutions

Level	Frequency	Percentage
Very satisfied	3	9.4
Satisfied	13	40.6
Undecided	6	18.8
Dissatisfied	9	28.1
Very dissatisfied	1	3.1
Total	32	100.0

Source: Fieldwork, 2013

As evident in Table 6, out of the 32 respondents that responded to this question, 40.6% noted that they were satisfied with the roles played by these road management institutions. In addition, 9.4% noted that they were very satisfied with what these institutions are doing to keep the roads safe for human and vehicular movement. On the other hand, more than a quarter (28.1%) of the respondents were dissatisfied with the activities of road management institutions, whereas 3.1% were very dissatisfied. Approximately a fifth (18.8%) of the respondents also opined that they were undecided, as to whether they are satisfied or dissatisfied with the activities of road management institutions.

On the part of road traffic management institutions, the study revealed mixed results in respect of satisfaction with their roles. Some of them were confident and satisfied with the roles being played to help reduce congestion on the roads. The head of one of the institutions indicated that:

> By our mandate, we are supposed to undertake a number of activities aimed at making sure that our roads are safe for both human and vehicular movement and that is what we have been doing. Specific to congestion, we have educated roads users and also enforced traffic laws. At the moment we are conducting an operation to clear the roads within the municipality and as we talk now, we have clamped and towed away more than 120 vehicles that parked at unauthorised places. Owners of such have to pay a penalty before the vehicles are returned to them. This has helped to minimise congestion in the CBD, Abura and other parts of the metropolis (Male; 48 years).

Other institutions admitted that they were not very effective in implementing measures aimed at addressing traffic congestion in the metropolis. They attributed this to key challenges including finance, logistics and human resource. An official of a road management institution lamented:

> We know our roles and duties and we try as much as possible to perform them. But we are constrained by some challenges and this affects our capacity to perform these duties to the satisfaction of

> our clients well. From time to time, we are required to mark all roads within the Municipality and provide the required road signs at designated places. Due to limited logistics in terms of vehicles and personnel, we have not been very effective at doing this. The year is almost ended but we are yet to receive our second quarter budgetary allocation. How can we perform our duties effectively? (Male, 52 years).

Faced with such financial and logistical challenges, most of the institutions involved in road management are unable to perform their duties as expected. Consequently, the menace of traffic congestion continues to grow and is likely to spill over to other roads that are currently not experiencing the problem.

Measures to ensure effective traffic management

To ensure the effectiveness of these institutions, respondents were asked to propose some measures to be implemented so as to reduce traffic congestion on roads in the Cape Coast municipality. The results are summarised in Table 7. In all, more than a quarter (27.4%) of the respondents suggested that roads within the metropolis have to be expanded to accommodate the growing number of vehicles on the roads. This finding supports the view held by Armah, Yawson and Pappoe (2010) that the best solution to curb congestion on intra-urban road networks lies in the provision of additional capacity in the form of road expansion or constructing new roads. Nearly a quarter (23.3%) of the respondents suggested

that road management institutions should intensify public education to ensure that the roads are congestion free.

Table 7: Measures to ensure effective traffic management

Measures	Frequency	Percentage
Roads to be expanded	20	27.4
Educate road users	17	23.3
Adequate parking space	9	12.3
Enforce road traffic laws	9	12.3
Traffic wardens should be at post regularly	8	11.0
Co-operation between road traffic institutions	7	9.6
Removing hawkers from the road	3	4.1
Total	73	100.0

Source: Fieldwork, 2013

Besides, respondents suggested that adequate parking spaces should be provided (12.3%) and road traffic laws should be enforced (12.3%). In furtherance to this, 11.0% of the respondents also opined that traffic wardens should be stationed at designated parts of the metropolis to direct traffic. This will ensure that there is free flow of traffic on the major roads within the metropolis. Earlier, Agyekum (2008) have asserted that traffic management through the deployment of the police on the roads is an effective means of minimising congestions in cities and other urban settlements.

With respect measures to reduce traffic congestion in the municipality, the views expressed by road management institutions were similar to those of the drivers. For instance, the head of one of the institutions said:

> The roads in the municipality must be expanded to accommodate the increasing volume of vehicles. Most of the existing roads were constructed during the colonial era and have not seen any expansion since. A typical example is the link from Kingsway to Kotokuraba which was constructed by Europeans in the 1890s. That stretch is very narrow and can hardly contain the volume of traffic. Until we expand that road, we will continue to have congestion in the CBD (Female; 34years).

Another official from a road management institution called for intensive public education coupled with enforcement of traffic laws. The official said:

> I think we need to intensify public education and target not only drivers, but all road users. Over the period we have focused too much on drivers to the neglect of pedestrians, hawkers and non-motorised users. We have to expand the net to cover all these people and also enforce the laws. In particular, enforcement should come immediately following public education so that people would not use ignorance as an excuse (Male, 52 years).

The above findings point to the fact that, even though road management institutions are working to help curb traffic congestion, a number of

measures needs to be implemented to minimise the incidence. It is worth noting that, some of these measures are being implemented already, but requires modifications in order to ensure that they become very effective and achieve the desired results.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents the summary, conclusions and recommendations of the study. It summarises the main findings of the study, draws conclusions on the findings and makes recommendations towards the reduction of traffic congestion on roads within the Cape Coast metropolis.

Summary of main findings

The socio-demographic characteristics of the respondents revealed that majority (72.7%) of the participants were males, also, more than half (49.4%) of these participants were also between the age cohort of 20 and 30 years. With respect to their educational level, majority had attained tertiary levels. It was also found out that 40.3% of the respondents were private car drivers whereas a third (33.8%) were commercial drivers. Close to 40 percent (i.e 37.7%) of the respondents had driven for less than 5 years, with most of them having acquired driving licence 'B' (48.1%).

On the causes of traffic congestion on roads within the metropolis, the respondents noted that the causes ranged from inadequate parking space (17.4%), bad attitude of drivers (16.5%), many vehicles on the road (15.1%) through to inadequate branch roads (14.8%) and poor road designs (9.2%). In terms of the periods in which congestion occurs, majority (63.2%) of the respondents noted

that it usually occurs in the early mornings and evenings, that is, during the 'rush hours' with 19.1% of them also attesting that it usually occurs during the late afternoon.

On the issue of the frequency of the occurrence of the congestion, 42.8% noted that it occurs very often whereas 9.1% noted that it does not occur often. On the average, the respondents noted that it takes them between 15 to 45 minutes to drive through the metropolis during traffic congestion whereas a significant proportion of the respondents (80.3%) also claimed that it takes them less than 15 minutes to drive through the metropolis without traffic congestion. Nearly 82 % of commercial drivers claimed that congestion is caused by themselves.

In terms of the perceptions of drivers on traffic congestion, a significant proportion of respondents (96.1%) agreed that traffic congestion is a challenge to road users that needs to be addressed promptly, whereas 94.8% of the respondents perceived traffic congestion to have impacted on productivity.

With respect to those who claim that road traffic management institutions are playing their roles as expected of them, 40.6% opined that they are satisfied with what they have been doing, whereas 28.1% also lamented that they are dissatisfied with the little that they have been doing so far to address this menace. On the expectations from road traffic management institutions, more than a quarter (29.4%) of the respondents noted that they expect them to enforce road traffic regulations.

On measures to be implemented to curb the issue of road traffic congestions within the metropolis, more than a quarter (27.4%) noted that the

roads within the metropolis are too narrow and need to be expanded. Also, 23.3% noted that road users should be educated on road signs and road usage to ensure that there is less traffic congestion on the roads.

Conclusions

The study concludes that there is a problem of traffic congestion within the metropolis. This is shown in various forms including inadequate parking spaces, bad driver attitudes, increasing number of vehicles plying the roads, poor road designs and bad pedestrian attitudes among other causes.

Drivers and road management institutions in the Cape Coast metropolis perceive traffic congestion as largely human induced and as a challenge that needs to be addressed promptly, largely because it is impacting negatively on productivity.

Conclusions could also be drawn with respect to the fact that road traffic management institutions are not playing their roles as expected of them. This notwithstanding, drivers in the municipality are satisfied with the few measures implemented by road management institutions, including, public education, and enforcement of traffic regulations. Besides, road traffic management institutions are expected to strengthen the existing measures being used to address traffic congestion in the municipality.

Recommendations

In connection with the key findings, the study suggests the following recommendations:

1. Since traffic congestion is largely attributed to human-induced phenomena, road traffic management institutions such as the MTTU of the Ghana Police Service should ensure that road traffic regulations are enforced and offenders should be punished to serve as a deterrent to other road users;
2. The presence of the MTTU officers should be seen along major roads within the metropolis to be monitoring activities of road users especially drivers and hawkers to ensure a congestion free road;
3. Roads within the metropolis are very narrow thus, cannot accommodate vehicles coming from the opposite direction. Hence, more link roads and slip roads should be constructed by the Department of Urban Roads. This would help to accommodate more vehicles and provide slip roads to help decongest the roads.
4. The Cape Coast Metropolitan Assembly (CCMA) in collaboration with the Department of Urban Roads should also create more 'one way' roads within the metropolis so that vehicles can move freely to and from the central business district. The current system does not allow for free flow of traffic and hence the need to demarcate the roads in the CBD to cater for the needs of road users and others engaged in commercial activities.

5. The CCMA should also create more parking spaces within the metropolis where drivers could park for a fee to avoid parking on the shoulders of the roads which brings about traffic congestion within the metropolis and;
6. The NRSC should intensify public education of road users on how to effectively use roads within the metropolis to ease congestion. There is the need to redesign the current strategy and categorise road users into different groups including, commercial drivers, private drivers, non-motorised drivers, traders, school children, etc. The education should be tailored to the needs of specific groups. This would help to ensure that education goes down well to the various groups and eventually inculcate in them positive attitude towards the use of roads.

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APPENDICES

APPENDIX 1

QUESTIONNAIRE FOR RESPONDENTS

UNIVERSITY OF CAPE COAST

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

The main objective of the study was to explore strategies designed to manage road traffic congestion in the Cape Coast Metropolis. This questionnaire is designed to elicit information regarding this research work. There are no "correct" or "wrong" answers. Information given will solely be used for this research. You are also assured of full confidentiality, privacy and anonymity of all the information that will be given by you. You should therefore feel free to give the right information to ensure the success of this work.

Please make a tick [√] in the box against your response. Thanks for your cooperation.

Section A: Socio-demographic characteristics

1. Sex
    a. Male [ ]
    b. Female [ ]
2. Age.....
3. Marital status
    a. Single [ ]
    b. Married [ ]
    c. Divorced [ ]
    d. Separated [ ]

e. Widowed [ ]

4. Level of education

   a. No formal education [ ]

   b. Basic/Middle [ ]

   c. Secondary/A' Level [ ]

   d. Tertiary [ ]

   e. Other [ ]

      Specify.....

5. Driver category

   a. Commercial Driver [ ]

   b. Private Driver [ ]

   c. Non-motorised driver [ ]

6. Number of years spent as a driver……

7. License category……

Section B: Causes of traffic congestion in Cape Coast Metropolis

8. In your opinion, what do you think causes traffic congestion in the metropolis? [Tick as many as possible]

   a. Too many vehicles on the road [ ]

   b. Inadequate road routes [ ]

   c. In adequate parking spaces [ ]

   d. Road works [ ]

   e. Breakdowns or accidents [ ]

f. Inadequate timing of traffic lights [ ]

g. Bad attitude of drivers [ ]

h. Bad attitude of pedestrian attitude [ ]

i. Poor road designs [ ]

j. Others (specify).....

9. Which times of the day do you experience much traffic congestion?.....

10. How often do you get trapped in traffic?

    a. Very often [ ]

    b. Often [ ]

    c. Seldom [ ]

    d. Not often [ ]

11. With traffic, how long does it take you to drive from one place to another within the Metropolis?

    a. Less than 15 minutes [ ]

    b. 15-30 minutes [ ]

    c. 31-45 minutes [ ]

    d. 46-60 minutes [ ]

    e. More than 60 minutes [ ]

12. Without traffic, how long does it take you to drive from one place to another within the Metropolis?

    a. Less than 15 minutes [ ]

    b. 15-30 minutes [ ]

c. 31-45 minutes [ ]

d. 46-60 minutes [ ]

e. More than 60 minutes [ ]

13. In your opinion, which category of vehicles is responsible for traffic congestion in Cape Coast Municipality?

a. Commercial vehicles [ ]

b. Private vehicles [ ]

c. Non-motorized transport [ ]

d. Both [ ]

Section C: Perception of road users on traffic situation in cape coast

14. To what extent do you agree that traffic congestion in the Metropolis is largely human induced?

a. Strongly Agree [ ]

b. Agree [ ]

c. Undecided [ ]

d. Disagree [ ]

e. Strongly Disagree [ ]

15. To what extent do you agree that traffic congestion in Cape Coast Metropolis is a big challenge to road users?

a. Strongly Agree [ ]

b. Agree [ ]

c. Undecided [ ]

d. Disagree [ ]

e. Strongly Disagree [ ]

16. To what extent do you agree that traffic congestion has significant impact on your daily output?

a. Strongly Agree [ ]

b. Agree [ ]

c. Undecided [ ]

d. Disagree [ ]

e. Strongly Disagree [ ]

17. To what extent do you agree that traffic congestion leads to low productivity?

a. Strongly Agree [ ]

b. Agree [ ]

c. Undecided [ ]

d. Disagree [ ]

e. Strongly Disagree [ ]

Section D: Efforts by stakeholders to manage traffic congestion

18. Do you think institutions responsible for managing traffic (such as MTTU, National Road Safety Commission, Department of Urban Roads, etc) are performing their roles as expected?

a. Yes [ ]

b. No [ ] (skip to 20)

19. If yes, indicate your level of satisfaction with the measures put in place by road traffic management institutions to reduce traffic congestion.

a. Very satisfied [ ]

b. Satisfied [ ]

c. Undecided [ ]

d. Not satisfied [ ]

e. Not satisfied at all [ ]

20. Are there established mechanism(s) for you to channel complaints regarding traffic congestion to traffic management institutions?

    a. Yes [ ]

    b. No [ ]

21. What are your expectations from road traffic management institutions (MTTU, Road Safety Commission, Municipal Assembly, Urban Roads, etc) in respect of reducing traffic congestion?

22. In your opinion, what measures do you think should be put in place to ensure effective traffic management in Cape Coast Metropolis?.....

    ……..

    …….

THANK YOU

APPENDIX 2

INDEPTH INTERVIEW GUIDE FOR KEY INFORMANTS

UNIVERSITY OF CAPE COAST

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

The main objective of the study was to explore strategies designed to manage road traffic congestion in Cape Coast Metropolis. This interview guide is designed to elicit information regarding this research work. There are no "correct" or "wrong" answers. Information given will solely be used for this research. You are also assured of full confidentiality, privacy and anonymity of all the information that will be given by you. You should therefore feel free to give the right information to ensure the success of this work.

Section A: Background information

a. Date of interview:
b. Place interview was conducted:
c. Duration: From..... To.....
d. Name of institution:
e. Position/ Status:
f. Sex of respondent (Just observe)
g. Level of education

Section B: Issues of traffic congestion

1. Could you share with us your views on road traffic congestion in Cape Coast metropolis?

2. Which areas (road networks) within the metropolis is traffic congestion more serious? Please explain.
3. In your opinion, what factors account for road traffic congestion?
4. Could you explain some of the negative effects traffic congestion on people and businesses?
5. What is the mandate of your institution in traffic management?
6. What policies and programmes you put in place to minimise traffic congestion in the Metropolis?
7. Could you explain some practical measures your institution have put in place to manage traffic congestion in the Metropolis?
8. In your opinion, have you been able to play your roles as expected? Explain.
9. Outline some of the challenges your institution face in managing traffic congestion?
10. What is the extent of collaboration between your institution and stakeholders in the road sector in managing traffic congestion in Cape Coast Metropolis?

THANK YOU