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DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

PROBLEMS ASSOCIATED WITH ON STREET PARKING LOTS IN ADDIS ABABA

A CASE STUDY FROM WEREDA 1 NIFASSILK SUBCITY

BY

SOFIA SEID AMEDE

JUNE 2019

ADDIS ABABA

ADDIS ABABA UNIVERSITY

COLLEGE OF SOCIAL SCIENCES

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DECLARATION

I, Sofia seid Amede, do hereby declare to Addis Ababa University School of Graduate Studies that this thesis is a product of my original research work, and it has not been submitted to any other university for any academic degree. Materials and information other than my own are dually acknowledged.

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Supervisor's approval

This is to certify that the above declaration made by the candidate is correct to the best of my knowledge as an advisor.

Approved by: _____ _____ _____

Thesis Advisor Signature Date

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AcronymsandAbbreviations

APAAmerican Psychological Association

AATMBAddis Ababa Transport Minister Bureau

AARTAAddis Ababa Road Transport Authority

CSA CentralStatisticsAuthority

FDREMT Federal Democratic Republic of Ethiopia Ministry of Transport

IHDP International Human Dimension Programme

MUDHCMinistry of Urban Development Housing and Construction

UNECA United Nations Economic Commission for Africa

OAU The Organization of African Unity

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Abstract

Parking and traffic congestion is synonymous to each other because failure to meet parking demand of people in a city lead to on-street parking that results to traffic congestion. Traffic congestion is a condition on road networks that occurs as use increases, and is characterized by slower speeds, longer trip times, and increased vehicular queuing. The availability of less space in urban areas has increased demand for parking space especially in central business area. Inadequate off-street parking in most of our urban centers has metamorphosed to the problem of on-street parking coupled with inadequate traffic management commonly experienced today in city of Addis Ababa. In view of the above, this research work examined the condition of on street parking and its effect on traffic congestion in Addis Ababa. The study was conducted using questionnaires and interview to collect the required data in the city where on-street parking and traffic congestion were prominent. Fifty (50) questionnaires' were administrated for 30 car owners and 10 parking lot coordinators and officialsand interview also made with three 10 officials of Addis Ababa transport bureau and Addis Ababa Road Transport Authority. Finding reveled that for the purpose of running private work, location of shopping areas, location of schools ,lack of enough parking areas, lack of alternative roads, increments of cars and pedestrian, and the imbalance between the amount of cars and roads causes on street parking and traffic congestion in Addis Ababa. To reduce the problem policy recommendations are recommended among which are; Addis Ababa transport administration should adopt stiff penalty measures on on-street parking and traffic offenders, which will be communicated to the people, Police and the traffic Management Authorities are the frontlines in traffic laws. They should be mandated to enforce the rules and regulations binding the vehicular traffic operations without any fear or favour in order to mate out penalties and punishment to defaulters, and Government should develop a mean through which some activities that propel on-street parking in Addis Ababa will be relocated to another area within the city.

Key words: Transportation, on-street parking, traffic congestion, Addis Ababa.

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the study

Parking plays an important role in the transport system since all vehicles require a storage location when they are not being used. One of the crucial issues of Addis Ababa is the scarcity of car parking. Car-parking sector has always been of great importance in terms of urban mobility, since it is a fundamental element in achieving a high level of accessibility in the city centre. In fact, many businesses and municipalities see an adequate supply of parking, especially for visitors, as crucial for their competitive growth. Yet, at the same time parking is, and will remain for most cities, the most powerful means of traffic restraint available. The enhancement of the urban environment is also partly dependent on adequately managing parking (December 2008, Napier University).

As history tell us, cities and traffic have developed parallel side-by-side since human settlements. Though their magnitude or patterns are more complex today, cities still provide access to various social and economic activities, such as services, goods, markets, ideas, network, and these which determines the development of the urban areas (European Conference of Ministers of Transport, 2007).

The role of road transport in our daily activities cannot be overemphasized and without it, the necessities of life would be difficult to achieve. As wonderful as the role of transport may be in our daily activities, it has been noted to possess myriads of negative effects. This is why in the literature transport is describes as the maker and breaker of the cities. Ogunsanya,(2002) confirmed how transport has built cities over the year in Ethiopia and how it has gradually destroyed them. Filani, (2002) and Ikporukpo, (1994) stated that inadequate and poorly maintained infrastructure facilities, accident; the relative immobility of the disadvantage, waiting for a long period at the bus-stop, pollution from transportation; traffic congestion and parking problems are becoming acute in the city. There are two types of parking which is on street parking and off street parking. Mostly the congestion occurs on street parking.

On-street parking is a common phenomenon in Addis Ababa city. It is a form of parking that involves all metered and unmetered parking along the road sides. It is a temporary driving a vehicle or manoeuvring a vehicle in a certain location for different purpose e.g. commercial purposes. On-street parking exists as a result of non-availability of space for off-street parking

and it is known as nearest to destination routes. On-street or surface parking are located and developed on a place of vacant land. On-street parking tends to be safe in case whereby charges are been paid for each parking space occupied otherwise, it is unsafe. There are two forms of on-street parking, official and non-official parking. The official on-street parking includes bank car parks, administrative car parks, religion car parks, office car parks, and recreational car parks and media car parks. However, non-official on street parking is referred as kerbs as its nearness to destination. These include commercial parks, shopping parks, etc. Motor Park in the past was designed for reason of prestige to promote a company's image and to give the passengers a feeling of well-being and safety

Convenient and affordable parking is considered as a sign of welcome, but the case is the opposite in the study area. It is highly discouraging that parking has become a serious problem that confronted the road users in the study area.The newly built smart car parking in Ethiopia's capital, Addis Ababa, has begun trial operation. The car parking building was built at an outlay of million Birr and it is located in the neighborhood commonly known as Megenagna. The parking building is 15 stories and lies on 170 square meters of land. It has the capacity to accommodate a total of 140 cars at once, out of which 50 will be on the ground floor.

According to Transport Program Coordination Office of Addis Ababa City, the smart car parking will go operational in few days. The parking would create job opportunities for 20 people, the Office furthered. The Office also noted there would be 60 smart cars parking that will be built in the capital city. Construction at 3 sites, Anwar Mosque, Churchill road and WelloSefer, had already started (Fana Broadcasting Corporation, 2010).

1.2 Statement of the problem

First, there is a general lack of parking spaces throughout African cities. Despite the rapid pace of construction in South Africa, Nigeria, and many more developing Africa countries, rising car consumption continuously outpaces it. The overall growth of car far exceeds parking infrastructure, particularly public parking. While the total number of vehicles increased in Nigeria by 11% on average from 2001-2011 (Step & Mint 2012), private cars increased by 14% annually on average. Parking standards have not kept up with demand and are outdated. Older infrastructure lacks parking city centres and traditional residential developments were built during the bicycle era; only a minimal amount of parking spaces are available in these areas. Taking Millennium Towers (Lagos, Nigeria) as an example, a 12 story building provincial court building along one of its arterials only had a surface lot of roughly 40 spaces available and having a challenge for car parking service.

Secondly, the parking spaces that are supplied in most African cities are not necessarily used as efficiently as they could be. For example in Nigeria, public parking spaces that are available often do not have time limits. Thus, a space in a high demand area for parking may be taken by some individuals for most of the working hours. This is also tied to put into effect on fair use of the space and fee collection issues.

Addis Ababa is most populous and largest city in Ethiopia. This implies that the city socio economic development is expected to rely on the road transport in conveying goods and services throughout the country. Despite of all these facts the sub sector is trapped by so many complex structural and non-structural factors. The government and private sector are not working together in the right ways. The city in general has not enough transport policy and strategy. There is poor development of public transport and little attention is given to environmental protection. The traffic safety problem is ringing in every citizen's mind.

In Addis Ababa, vehicle traffic congestion is a series phenomenon. It has an economic cost on the productivity of the cities' communities and economy. Despite the lower car ownership levels compared to the other African cities, traffic congestion becoming more serious problems in a day to day activity of all people in all parts of the Addis Ababa city, specifically, in morning and evening peak hours meaning students and workers entrance and exit hours.

Primarily, traffic congestion is an outcome of insufficient traffic management in the city, secondly; insufficient capacity of the roads to cope up with the existing traffic volume, thirdly;

inadequate public transport, fixed entrance and exit time, and poor land-use or transport- land-use planning integration. Fourthly; not permitted on-street parking habit are the major problems that lead to vehicles traffic congestion in the city. In addition, long travel time or delay to reach destination that affect business users time productivity, increasing fuel consumption- wastage, are main impact of vehicles congestion which is still prevail. Therefore, this research has been initiated to assess problems of parking lots and the possible recommendation for on street parking of the study area.

The transport policy of Addis Ababa reviews that: The city's road network, roundabouts, junctions, terminals and parking spaces are basic components of traffic management. However, some of these aforementioned road engineering elements have great influence on the traffic flow. Facilities like taxi stations, parking spaces, and traffic calming measures are not available in many corners of the city. Most of The available bus stops are not constructed to the modeling standard of open street map and without due consideration of proper shades for passengers which, in turn, forced users to wait for the service in open air. Road ways do not give consideration for priorities for buses and mass transport vehicles and are not designed for longer trip lengths. Even the recently constructed ring road faces critical challenges to be used for the intended objective due to implementation problems. Periodic maintenance on some of the roads is not sufficient. There are no sufficient expansion of interlink ages between functional roads.

The policy puts some structural problems of the traffic management problem. However, it doesn't give more concern and evaluation about the parking lots problem it generalizes all the problems. As the policy states in many countries this problem is solved above 50 %. In addition to this, in our country little or no attention has been given to study of the effects of parking lot. The study by Ashenafi tried to analyse the opportunities and challenges of car parking in Addis Ababa which results car parking market become sector of the economy that will increasedthe importance of market where numbers cars has grown. Besides this Ashenafi also analysed car parking has major social, political, and economic impact on the growth of the city. However, the above study emphasized only the opportunities and challenges car parking. And this and other studies did not encompass apparently the effects of car parking in traffic congestion. Hence, this study was tried to fill the gap by providing deep insight in to the condition of parking lots and its effect on traffic congestion.

1.3 OBJECTIVE

1.3.1 General objective

The general objective of the study was to assess the problems associated with parking problems in Addis Ababa city.

1.3.2 Specific objective

The specific objectives of the study were:

1. Examine the condition of street parking lots in Addis Ababa
2. Find out the associated problems of parking lots scarcity in Addis Ababa
3. Identify the results of street parking lots for traffic congestion.

1.4 Research question

This study is intended to answer the following research questions:

- ✓ What challenges is Addis Ababa facing in terms of car parking?
- ✓ What are the main causes for the lack of car parking in Addis Ababa?
- ✓ How parking lots do creates traffic congestion in Addis Ababa?

1.5 Significance of the study

It is believed that the output of this study will add to the existing academic knowledge and enable to understand on the subject matter as it paves the way for further investigation on the issue. Apart from this, it will also benefit other different parties of the societies. First: this research work allows the researcher to assess the current condition and impact of parking lots contribution to vehicles traffic congestion on the economic activities of the city thereby build academic knowledge and provide base for further carrier improvement, second; It is also important to bear in mind that car parking is both for public and private organizations, a key source of revenue, also It throws some lights for innovators for the importance of car parking investment. Moreover, city administration of Addis Ababa, transport authority and Addis Ababa traffic management agency can use the finding of this paper for its social and economic policy formulation and right decision making based on true information, so that, the city administration and transport authority uses their resources efficiently and ensure the sub city sustainability by solving the problem of traffic congestion.

1.6 Scope of the study

The scope of the research is to study the current situation of car parking in the ten sub-city of Addis Ababa by focusing one sample from each. Even though, the scope of the research is limited to specific locations, it is expected to provide the general idea to have convenient public and/or private parking lots and traffic management in Ethiopia particularly in Addis Ababa.

1.7 Organization of the study

The research has five parts. The first part is the introduction, which states the problem, objective, significance, scope and organization of the research. The second part deals with literature review that is relevant to the research. The third part of the research discusses the research design, the sources, instruments, sampling technique, and procedures of collecting data for the study. The fourth part focuses on the analysis and discussion of the data gathered in light of the previous research questions. The fifth part presents limitation of study, summary of the main results on the findings, draws conclusion, recommendations and points out research insights based on the study. The final part presents appendices, references and annexes that are result of questionnaire due to longer table.

CHAPTER TWO

2. REVIEW OF RELATED LITRATURE

This chapter presents a brief synthesis of related literature that deals with car parking issues which are relevant to the development of the city. Although a car is parked in a variety of places for a large part of its life, little or no debate has focused on parking areas as hubs where transport converges. If parking areas are in fact seen as transport hubs where the interchange between a variety of transit means takes place, (e.g. car/bus, car/underground, car/walking, etc.), it can be argued that not much has been done for parking, despite the vital role that it plays (Kelly, 2006). Urban car parks and especially those open to the public, play a fundamental role in encouraging, regulating, restricting access to the city or town in or near to which they are located. These reasons are of a social, financial and policy nature.

The FDREMT (August, 2011) has prepared transport policy for Addis Ababa city. In order to be a competent city on the regional, continental and international levels, the FDRE out lined eleven key policy issues and implementation strategies. Under these policies, expansion of transport infrastructure is included and it further elaborate that : "car parking facilities shall be built by private, government and public private partnership in the city center and in areas with high traffic volume and land supply shall be given special attention by the city administration". pg 22

The practical situation of the city is showing that, all cars use the left and/or right side of the major road for parking and the central part is left to the passage, unless otherwise restricted. The poorly functioning traffic system has resulted in high level of congestion particularly at peak hours. Besides, at some road sides, there is a facility for car wash which has a serious problem for the purpose of the road and the waste water affects the road durability.

2.1 Availability of car parking facility

There are four kinds of carparking facilities(Babatunda, 2012):

The first one is private car park of a multi-story building and underground parking lot. The second Public car park is includes like gateway and railway station parking. On-street parking: is the adequate space for vehicles at the side of the road. The third Bus-stop is a parking space provided for motorists along the road way in the central business districts and also at designated place. Off-street parking: is very near to their destination and close to the carriageway. Terminal:

is a parking space whether at the earth or off-street in a lot, garage, shopping center or private driveway.

2.2 Factors influencing car ownership and car parking demand

The factors influencing car ownership and demands are discussed below.

2.2.1. Dwelling size, type and tenure

Dwelling size and type are major factors in determining car ownership levels. This is logical as larger dwellings are more likely to be inhabited by more people of driving age and/or households with larger incomes. Conversely, smaller dwellings tend to be occupied by singleperson households. The number of bedrooms has often been used as a proxy for size, however this is a coarse measure given the significant variation in car ownership that has been found between, 4 and 5 room dwellings, and the fact that in most flats there is little difference between individual rooms (other than kitchens) and the uses to which they can be put. Thenumber of room subsides the proxy for dwelling size. Donald Shoup's (2005)

Tenure is another influence on household car ownership. In particular, households occupying rented accommodation can have up to 0.5 fewer cars than owner-occupied households in dwellings of similar size and type. Local planning authorities will wish to consider tenure carefully when developing car parking policies given that any future changes in the tenure of dwellings may change the nature and demand for car parking.

2.2.2Dwelling location

In terms of location, local planning authorities may wish to consider the effect on car ownership of the availability of local services that can be reached on foot and by cycle and access to public transport. Basing expected car ownership, implicitly assumes that new housing will have similar car ownership characteristics to the existing housing stock in the area. The availability of public car parking spaces should also be considered. In areas where all on-street parking is controlled by Controlled Parking Zones, it may be acceptable to provide parking below normal levels of demand. Anderson and De Palma (2004) argue that location is an important variable, in particular, when we refer to the city Centre. Since the city Centre is an important destination for drivers, the location of the car parking close to potential customers' destinations becomes an

important factor (Froeb, 2003), especially if we consider the high costs of city Centre land, as noted by Shoup (1999).

2.2.3Availability of allocated and unallocated parking spaces

The allocation of spaces to individual dwellings can have an adverse impact upon the efficiency of car parking provision. Allocated parking spaces include any spaces within the cartilage of a property (e.g. garage or driveway parking) and any spaces in communal areas where the space is reserved for one particular property. On-street spaces upon public highways are always unallocated (i.e. shared) although they can be reserved for a particular purpose such as disabled persons' or residents' parking. Department for Communities and Local Government,2007

2.2.4. Availability of on and off-street parking

In the past, local planning authority approaches to residential car parking have typically focused on off-street provision due to concerns that on-street parking may lead to problems of congestion and road accidents. Whilst these concerns may be well-founded in some existing streets, on-street parking does make a valuable and flexible contribution to the overall supply of parking and need not be problematic, especially when streets are designed so that traffic speeds are kept low and adequate space is allowed for moving vehicles and pedestrians. The well-designed on-street parking in residential areas can explicitly count towards the overall supply of unallocated spaces, regardless of whether the spaces are formally marked or are simply occasional spaces on the highway. DCLG, 2007

2.2.5. Availability of visitor parking

Whilst there are times, such as evenings and weekends, when residents are likely to receive significant numbers of visitors in cars, this demand can to some degree be offset by other residents being away at the same time. This balancing effect is most significant when a high proportion of parking spaces are unallocated (and so available to both visitors and residents). So that no special provision need be made for visitors where at least half of the parking provision associated with a development is unallocated. In all other circumstances, it may be appropriate to allow for additional demand for visitor parking of up to 0.2 spaces per dwelling. DCLG, 2007

2.2.6. Availability of Garage Parking

Local planning authorities will need to consider whether to count private garages as car parking spaces given that they are not used for this purpose by a significant proportion of residents. This is a complex issue, as garage use depends upon a number of factors including the adequacy of storage within the dwelling, the ease of use of the garage and the difficulty (or otherwise) of finding a parking space outside the garage. DCLG, 2007

2.3 Theoretical Review of Parking

Basically scholars and concerned stakeholders investigated the situation of parking and traffic congestion in urban areas under different topic from different perspective; however none of them emerge or pick theories regarding parking rather as analysis.

2.3.1The policy of Car Parks and its Economics

'If only there were enough car parks in the world, then there would be space enough for everyone'. Such were the idealistic utopian ideals of the leading post war car-parking theorist in Europe (Heinrich Von Rectangle, 2010). There have been various aspects of car park sector analyzed over time from various points of view, drawing conclusions and, in some cases, offering recommendations and suggestions by researcher, policy maker and operator. These aspects can be summarized under the headings parking policy, parking economics, onstreet parking economics, off-street parking supply, and quality of service. (Napier University, December 2008).

2.3.2 The Heading Parking Policy

On parking policy, much work in this area concerns discussions about parking policy and its effects. The solutions to correct the distortion between marginal costs paid by the private car commuter during rush-hours and those absorbed by the rest of the community through failure to charge rental (interest and depreciation) for much of the street and highway area used or taxes (property and profit taxes) on the capital invested was investigated by Segelhorst and Kirkus (1973). In another case, the provision of free parking for employees and customers is an additional subsidy that further distorts price below resource cost.

Another important study on the relation between violation and enforcement rates to on street parking regulation was developed by the US DOT in 1982. It summarized the results of experiments in a large number of U.S cities. But the recent study of Willson and Shoup (1992) that describes the incidence of employer-paid parking and its effects on congestion, commuting

patterns, and externalities such as land use and air quality. The authors offer a number of important recommendations, such as changes in federal and state tax policies to influence commuting behavior. Another point of view in parking regulation is the work of Ferguson (Ferguson, 2004). He shows the most important changes in policy in this field during the last half century, in particular the enlargement of the spatial dimension, land-use classification and minimum parking requirements for these different land-uses.

Other publications have concentrated their attention on reviewing the literature on parking policy, highlighting the importance of them in the general framework of transport policy (Shoup, 2005 and Litman, 2006). They underline the necessity to integrate parking policy in transport policy for the future, but the effect of parking policy, as was emerging in several cases in terms of its impact on the vitality of city Centre, was most recently analyzed by Marsden (2006). To fully understand the effects of these policies, he argues that several areas of research need to be deepened, such as on standards for new build residential parking, and the understanding of zoning per impact of parking restraints, walk time and parking behavior. As well as policy dealing with parking problems, the regulatory aspect of parking has been studied on the demand side.

2.3.3 Parking Economics

Part of the literature considers the economic analysis of urban parking policy, even if this is only a recent development in the academic study of parking. Various studies have focused on local problems such as the privatization of the parking management system in some Greek cities, as a consequence of insufficient parking fees to cover the service costs (Matsoukis 1995). The study analyzed the case of the city of Petra's, which is the third most populous city in Greece. The introduction of paid parking in all the parking spaces in the city center and the implementation of an automatic ticket service were carried out by one private operator. The results were the improvement of the parking situation in the city and the emulation of this approach by other Greek cities.

Bonnel (1995) took a different approach to the study of parking in some European countries. In Switzerland he studied the case of the reduction of the amount of car parking space in the city centers of Zurich and Bern, as a means of restraining car traffic so as to reduce the level of pollution and improve living environments. In parallel, improvements in public transport have switching the driver to the public transport. In contrast, in the France cities of Grenoble, Lyon

and Montpellier the provision of new public car parks is considered as a way to give users a choice of mode of transport. Some authors concentrate on the use of parking pricing as a means to charge for road congestion externalities. While Glazer and Niskanen (1992) showed that raising parking prices, by deterring trips to the city Centre, may just encourage more through traffic, the use of a numerical simulation model was also able to show that a second best pricing of all parking spaces can produces higher welfare gains than a simple ring barrier scheme.

There are disadvantages on regulatory parking policies in comparison to a system of road pricing. These are, firstly, that all external costs will, to some extent, depend on trip length and road followed. Secondly, there are the private parking places that are not subject to the public parking policies. Thirdly, there is the risk of adverse spillover effects to adjacent areas. The solution suggested is restrictive parking policies, preferably supported by supplementary instruments such as fuel taxes, as an alternative to urban traffic regulation because road pricing is not likely to be introduced on a large scale in the short run.

They did not consider, in this case, as with the previous works, the specific effects of such policies on the city Centre car parking market, because they are considered to be an unavoidable consequence of such policies. This is one of the main gaps in the literature on the car parking market. The effect of policies on drivers (demand side of the market) is often underlined and analyzed (or it is suggested that the effect on driver behavior must be analyzed).

2.3.4 On-street Parking Economics

The investigation of parking economics in the literature has been almost entirely theoretical rather than empirical. A recent exception to this is from RAC Company (2006), which presents broad data on the economic size of the parking market in the UK. Most of the works are related to the demand side of the car park market, analyzing various aspects. Arnott, De Palma and Lindsey (1991) demonstrate that spatially differentiated parking fees increasing the price from the periphery to the central business district(CBD), can induce drivers to park further from the city Centre, or can concentrate arrival times closer to work start times as workers try to get the best parking places.

Other authors investigate the first best regulation of on-street parking: Vickrey (1959) makes the case for a peak-load pricing of on-street space during rush hour, but it is more recently that the problem of congestion externalities has emerged as very important in most of the CBD. Arnott and Rowse (1999) constructed a model which simulate the stochastic city of vacant on-street

parking space give the policy recommendation that the per time unit parking fee should be set to reflect the value of the parking congestion externalities. With the same objective Calthrop and Prost (2004) developed a model, integrating it into a private off-street market, which alters on-street parking policy and uses time restrictions in the place of meter fees. The result in this case is that when the off-street market is competitive, on-street fees are more efficient than simply time restrictions.

2.3.5 Off-street Parking

Supply Work involving studies of the supply side of the off-street car park are fewer and very recent, and almost all of them deal with policy consideration for public authorities, but not for car parking operators. Most of the recent studies in this area are by Calthrop (2000; 2002). As well as the works cited previously by Calthrop and Proost (2000), his other work considers both the impact on reducing search externalities on the on-street market itself, and the impact on (underpriced) road congestion. The model demonstrates with a numerical simulation the order of magnitude of an optimal parking fee, taking into account effects on other distorted transport markets (off-street parking market and the rail market), when deciding upon price levels for on-street parking.

The results show that reforming on-street parking pricing may have significant impacts on parking search time but the effects on road-congestion levels are marginal (Calthrop 2002). Calthrop and Proost (2000) carried out an analysis of the optimal on-street parking pricing with the presence of an off-street market. In this case, a single off-street supplier was playing the government regulated on-street market.

Which strategy is optimal has been shown to be parameter dependent (search costs, supply of on-street spaces and resource cost of off-street parking). The number of on-street searchers will depend on price and supply conditions in both markets. Relatively low on-street pricing will induce more and more drivers to search on-street until the equilibrium cost equals the off-street price. (Arnott, 2006), considering his newest argument, Arnott used a simple model, to suggest parking policy in the case where there is only off-street parking, followed by the entrance of on-street parking into the market and, finally, with an addition of mass transit.

2.4 Parking Analysis Theory

Parking is one of the major problems that are created by the increasing road traffic. It is an impact of transport development. The availability of less space in urban areas has increased the demand for parking space especially in areas like central business district. This affects the mode of transport choice and has a great economic impact. Before taking any measures for the betterment of conditions, data regarding availability of parking space, extent of its usage and parking demand is essential. It is also required to estimate the parking charges also. Parking surveys are intended to provide all these information. Since the duration of parking varies with different vehicles, several statistics are used to access the parking need. (Traffic Engineering Laboratory, 2014)

2.4.1 Parking Statistics (Dr. Tom V. Mathew, IIT Bombay, 2014)

Parking accumulation: it is defined as the number of vehicles parked at a given instant of time. Normally this is expressed by accumulation curve.

Parking volume: Parking volume is the total number of vehicles parked at a given duration of time. This does not account for repetition of vehicles. The actual volume of vehicles entered in the area is recorded.

Parking load: It can be obtained by simply multiplying the number of vehicles occupying the parking area at each time interval with the time interval. It is expressed as vehicle hours.

Average parking duration: It is the ratio of total vehicle hours to the number of vehicles parked.

Parking turnover: It is the ratio of number of vehicles parked in duration to the number of parking bays available. This can be expressed as number of vehicles per bays per time duration.

Parking index: Parking index is also called occupancy or efficiency. It is defined as the ratio of number of bays occupied in time duration to the total space available. It gives an aggregate measure of how effectively the parking space is utilized.

2.4.2 License Plate Method of Survey

This results in the most accurate and realistic data, in this case of survey, every parking stall is monitored at a continuous interval of 15 minutes or so and the license plate number is noted down. This will give the data regarding the duration for which a particular vehicle was using the parking bay. This will help in calculating the fare because fare is estimated based on the duration

for which the vehicle was parked. If the time interval is shorter, then there are less chances of missing short-term parkers. But this method is very labor intensive. Dr. Tom V. Mathew, 2014

2.5 Empirical Review of Parking and Traffic Congestion

One of the main problems of today's road networks is parking. In most of the cities in developing countries the planning of road networks lacks the provision of the entire basic infrastructure to be provided for the safe and orderly movement of the vehicles (Akhuewu, 2010).An ideal road network should have exclusive lanes to segregate fast moving and slow moving vehicles, cycle lanes, exclusive bus bay and service lanes (Sivabramanian and Malarvizhi, 2007). However, increase in numbers of vehicles without adequate infrastructure, has accentuated the problems of traffic congestion, traffic delay, parking problems, accident, and urban land use severance (Raji and Wasiri, 2008).

2.5.1 Challenges of Car Parking in Addis Ababa

Addis Ababa city located at the center and is among the most important commercial city with a highly concentrated population in Ethiopia. Recently, study shows that the morphology (form) of the city has changed very rapidly beyond the ability of municipalities to recover its original status. For example, the construction of different activities attracts more people with a private vehicle who often visit the areas for leisure, employment and other services. On the contrary, parking space is not enough to accommodate the number of clients visiting the areas. Parking challenges occurring in the capital city will continue to be the major problem due poor parking policies, poor planning of the city, population growth, increase of car to mention in a few (Bundara, 2010).

Rapid Urbanization: The population in Addis Ababa has been changing very rapidly in a rate of 2.1% per year (CSA, 2010). For example, according to Addis Ababa transport branch office 2003 – 2007 strategic plan shows that, human settlement and population in Addis Ababa will estimate to be 4.5 million people in 2012E.C. This increase does not correspond to the capacity of the municipalities for providing reliable service such as parking facilities which has a tendency to reduce the traffic congestion and smoothen the travel time in the city. The increase of the population also will continue to exert pressure on parking spaces and other social and economic services unless deliberate efforts are made to address the problems particularly in the poor parking facilities, management and policy development.

Increased number of Cars: According to the Urban Transport Study, 2004/2005, out of the total number of vehicles in the country about 75% is estimated to be concentrated in Addis Ababa; and different vehicle types are showing different growth: private cars are increasing at rate of 5.02% and commercial vehicles are increasing at a rate of 5.74 % respectively.

Inadequacy of parking spaces: Roadside and illegal parking are common phenomenon in Addis Ababa especially in the central business district, this is due to the limited spaces for parking. The on-street parking narrows the road, cause unnecessary congestion and accidents in the city (Kiunsi, 2011). Shoup (2005) conducted a study in 11 international cities. The study found that on averages 30% of traffic is cruising looking for parking spaces with the average search time being 8.1 minutes. Recent research organized by the RAC Foundation (2004) found that 48% of respondents acknowledged that have parked illegally. Residential areas in parts of many cities are overwhelmed with parking cars (Balcombe and York, 1993) that there are no informal safe crossing points for children. Parking policy should not be developed in isolated but as part of local and region spatial and transportation planning processes (Marsden and May, 2005). The ineffective regulation of parking has accelerated poor mobility in the city. Accident was high in Addis Ababa (10,189 in 2004) and there were 305 deaths due to road accidents in the same year the accidents are increasing at a rate of 12.5% from 2003.

Demand for right of way: streets in Addis Ababa are used in different ways but mostly for movements/mobility (cars, passenger vehicles, pedestrians and motorcyclists), exchange (social interaction and street vending) and storage (parking). Many streets in the CBD (central business district) area, does not freely allow right of way to accommodate all the functions. It is clear that spaces dedicated to parking are unavailable to get service from different shops and offices.

Pedestrian safety and comfort: On some street illegal parking in the CBD hinders the movements of vehicles and walkway which is important for pedestrian comfort and safety. Poor parking on the walkway on pedestrian crossings forces pedestrians into the roadway and affects visibility. This does not attract people to use non-motorized facilities to travel in the city of Addis Ababa.

Traffic Congestion: Addis Ababa street network has a finite capacity, poor parking planning and inadequacy of the policy developed to coordinate the decision on roadway capacity. If no new roadway capacity is planned to the CBD, as seem likely, and therefore it is ultimately futile

to the construction of more parking for all day commuter use in the CBD. This parking would only add to existing congestion and undermine the ridership.

2.5.2 Strategic Direction and Aim

The term multi-stored car park is used in the United Kingdom, Hong Kong and many Commonwealth of Nations countries. In the western United States, the term parking structure is used, especially when it is necessary to distinguish such a structure from the "garage" in a house. In some places in North America, "parking garage" refers only to an indoor, often underground structure. Outdoor multi-level parking facilities are referred to by a number of regional terms:

- ✓ parking garage is used, to varying degrees, throughout the United States and Canada,
- ✓ parking deck is used in the Southeast,
- ✓ Parking ramp is used in the upper Midwest, especially Minnesota and Wisconsin, and has been observed as far east as Buffalo, New York,
- ✓ Parkade is widely used in Canada and South Africa,
- ✓ Parking building is used in New Zealand.

Architects and civil engineers in the USA are likely to call it a parking structure, since their work is all about structures. When attached to a high-rise of another use, it is sometimes called a parking podium. US building codes use the term open parking structure to refer to a structure designed for car storage (not repair). It has enough openings in the walls that it does not need mechanical ventilation or fire sprinklers, as opposed to a "parking garage" that requires mechanical ventilation or sprinklers but does not require openings in the walls. The openings provide fresh air flow to disperse either car exhaust or fumes from a fire should one break out within the structure.

The aim of this research is to show the opportunities by considering the challenges of car parking. The abovementioned deities in Addis Ababa are not yet considered. These strategies which may needs high investment and further study, but in the future the return is high from many perspectives. The other opportunities considers in the parking buildings are beauty salons, entertainment center, car washing service considering water treatment, sport filed, cinema halls and public toilets. The benefit is primarily the investors who invest on this sector, secondly the society as large by reducing car parking lots and unemployment.

2.6 Conceptual Framework

This analytical framework gives the details of independent variables that are examined and their expected relationship/effect with the dependent variable. It identifies the independent variables: rapid urbanization, increments of cars, inadequacy of parking areas, demand of the right way, and Pedestrian safety and comfort has effect on dependent variable: parking lots and the parking lots has influence in return to the other dependent variable: traffic congestion. In order to analyze that ordered logit model was used. The increment of cars in Addis Ababa from time to time, lack of enough parking areas in central business district areas, demand of the right way i.e. street are used to somehow illegal parking in central business district has influence in parking lots and the parking lots in return has effect in traffic congestion.

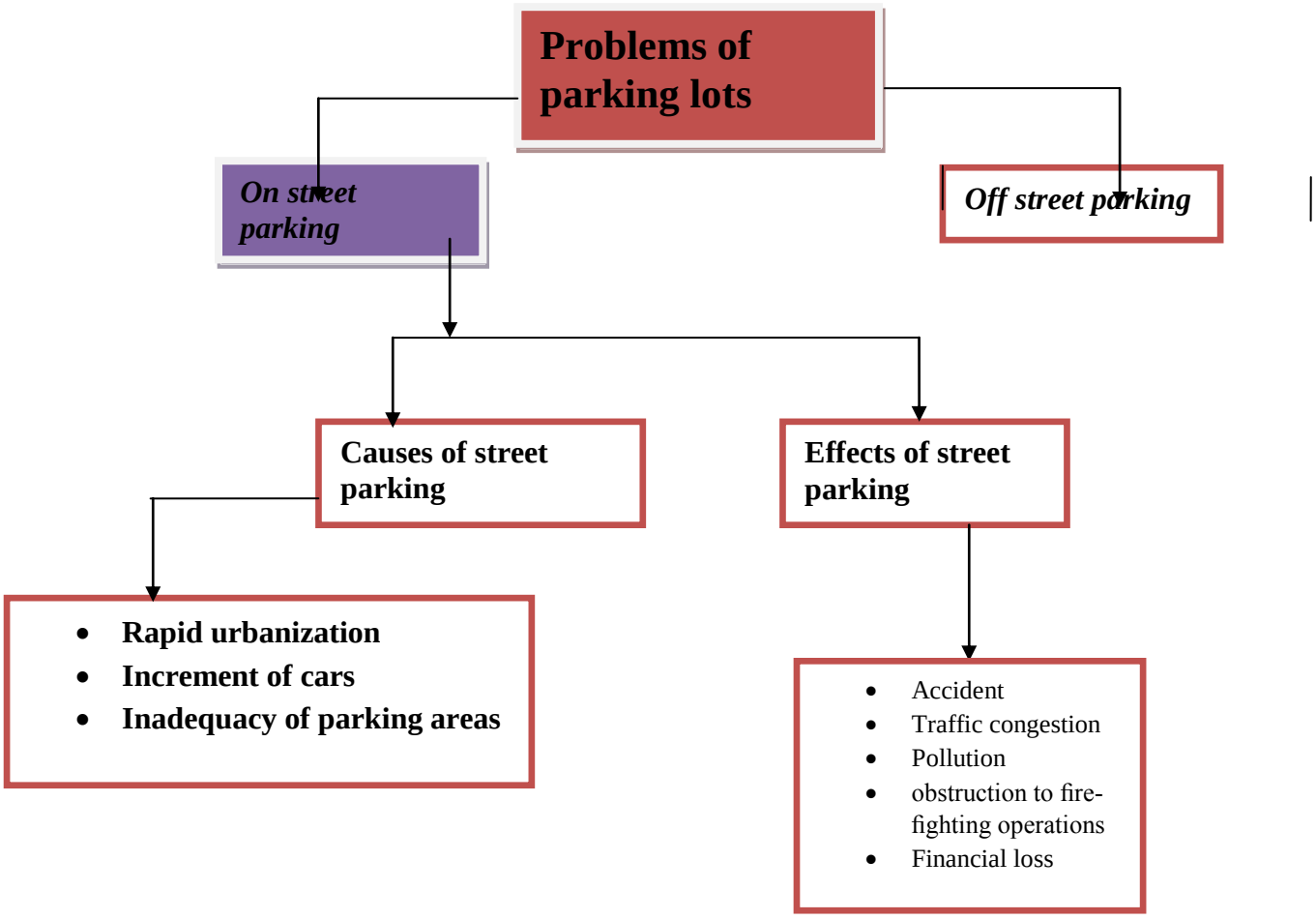

Figure 2.1 Conceptual frame work of the study.

2.7 Future Trends

For the past few decades, African cities have been experiencing huge population increases. This is mainly due to galloping urbanization and rural exodus. It is estimated that by 2020 some 55% of the African population will be living in urban areas. Such fast growing cities face enormous challenges in terms of infrastructure provision and the need to cope with the increasing demand for transport and parking lots. This is especially acute as much of the existing road infrastructures in African cities are far from being appropriate for the actual transport demand. In addition, apart from a few remaining companies, almost all publicly owned and managed public transport enterprises in Africa ceased to exist during the 1990s. Often as a consequence of structural adjustment policies required to comply with aid programs associated with international agencies. (Report on statistical indicator,April 2010).

Particularly, Addis Ababa the capital city of Ethiopia and Africa needs to be considering a business opportunity of car parking for those bring innovative ideas to overcome the serious problem that will encounter. This in returns will create job opportunity for the government works and/or for private investors. In order to implement the 10 years and 20 years planning period of the city development plans, the local development plan is the key instrument. The provision for the development and expansions of car parking building sites didn't get proper attention during the preparation of any local development. Due to this reason, the city encountered to traffic congestion, traffic conflicts and accidents repeatedly occurred at different parts of the city. In Ethiopia no detail research had been made for the socio economic development of the country. For these reasons, the research investigates the challenges and opportunities of car parking industry.

Shoup (1999, 2005) reviewed to some extent the challenges of parking and stated that the parking policies have and will continue to worsen the spread out by requiring the over provision of parking spaces, lowering the resultant density of commercial and residential development and encouraging further car use. With this realization the inability of the cities to cope with unrestricted increases in car traffic planners have emerged to reconsider the degree of parking policy required to contribute to the economic, environmental and social policies in towns and cities (Valleley, 1997). It is argued that the good design of the parking policies in various ways contributes to smooth the transportation networks, lowering emissions, high densities and better

more of urban mobility (IHT, 2005; Shoup, 2005; Stubbs, 2002, Valleley, 1997) while poor design of the cities tends to act otherwise. Litman (2011) conceptualized the parking problem in terms of a paradigm shift which describes a fundamental change in the perception of the problem and solutions evaluation. Parking problems and solutions can be viewed in terms of a shift from the old paradigm to the new one.

The old paradigm assumes that parking should be abundant and free at the destinations. It attempts to maximize supply and maximize the price (Willson and Shoup, 1999). The paradigm also assumes that parking lots should almost never be filled and that parking facilities cost should be incorporated into the costs of buildings or subsidized by governments and that every destination should be satisfied with its own parking needs. The old parking paradigm asserts that parking requirements should be applied rigidly without exception or variations and that parking management should be considered as a last resort to be used only if increasing supply is infeasible.

The new parking paradigm on the other hand aims to provide optimal parking supply and price. It considers too much supply as harmful as too little and price that are too low are as harmful as those are too high. The new paradigm strives to use parking facilities efficiently. The new ideas must reflect the technique to handle the increasing demand for parking by constructing new structures for parking, new parking standards (including a parking at own property), new parking policy regarding short term and long term parking (where parking involves costs) and promotion campaign (information).

It is also important to promote the introduction of parking agents whose times for parking depends on parking supply and the resultant must be equally distributed with the parked cars. Thus, in the absence of adequate policy and effective measures to enforce the stakeholders to comply with the regulations for parking, the increase of vehicles will result to congestion and delays, serious accidents and intense pollution.

CHAPTER THREE

3 DESCRIPTIONS OF STUDY AREA AND RESEARCH METHODS

3.1 Introduction

This chapter presents the research method that will be used to achieve the study objectives. In particular, the method will be employed in order to assess the condition of parking lots and its effects on traffic congestion in Addis Ababa city. It presents research design, approach, description of the study case and area, sampling technique and sample size, the source of data, data collection method, procedures, ethical consideration and method of data analysis.

3.2 Description of the study Area

Addis Ababa is the capital city of Ethiopia. It is also the largest city in the country by population, with a total population of 3,384,569 according to the 2007 census. However, it is believed that this number was inaccurate when recorded and underestimated the city's population. The city has through recent years seen a strong annual growth rate, and population counts as of 2017 are growing closer to 4 million. The next census is scheduled for the 2018 to 2019 fiscal year, as it was delayed by security concerns between 2017 and 2018. Addis Ababa is a chartered city and as such, is considered both a city and a state. It is the largest city in the world located in a landlocked country.AddisAbaba Population(2018)

As a chartered city, Addis Ababa has the status of both a city and a state. It is where the African Union is headquartered and where its predecessor, OAU was based. It also hosts the headquarters of the UNECA, as well as various other continental and International organizations. Addis Ababa is therefore often referred to as "The Political Capital of Africa" for its historical, diplomatic and political significance for the continent. The city lies a few miles west of the East African Rift which splits Ethiopia into two. http://worldpopulationreview.com/world-cities/addis-ababa/,2019

3.2.1 Addis Ababa Demographics

Per the population recorded at the last census, the city of Addis Ababa has a higher population of female residents than male residents. Almost one-quarter of all people in Ethiopia that live in urban areas live in the capital city.

Close to half of the population is of the ethnic group Amhara, while the majority of the remaining population is split among the groups Oromo, Gurage and Tigray. 71% of the population use Amharic, Oromo is in use with just over 10% of the population, with four additional languages ranking more than 1% use among the population.Approximately 82% of the population is of the Orthodox Christian religion. 12.7% of residents are Muslim, 3.9% Protestant, less than 1% Catholic, and a smaller percentage following other religions.Adult literacy in the capital city is the highest among all of the country's cities, at over 93% for males and almost 80% for females. The city has a lower rate of infant mortality than the nationwide average and over 98% of homes in the city have access to clean drinking water. http://worldpopulationreview.com/world-cities/addis-ababa/,2019

3.2.2 Geography of Addis Ababa

Addis Ababa lies at an elevation of 2,200 metres (7,200 ft) and is a grassland biome, located at 9°1′48″N-9°1′48″N and 38°44′24″E-38°44′24″E.The city lies at the foot of Mount Entoto and forms part of the watershed for the Awash. From its lowest point, around Bole International Airport, at 2,326 metres (7,631 ft) above sea level in the southern periphery, Addis Ababa rises to over 3,000 metres (9,800 ft) in the Entoto Mountains to the north.

https://www.britannica.com/place/Addis-Ababa

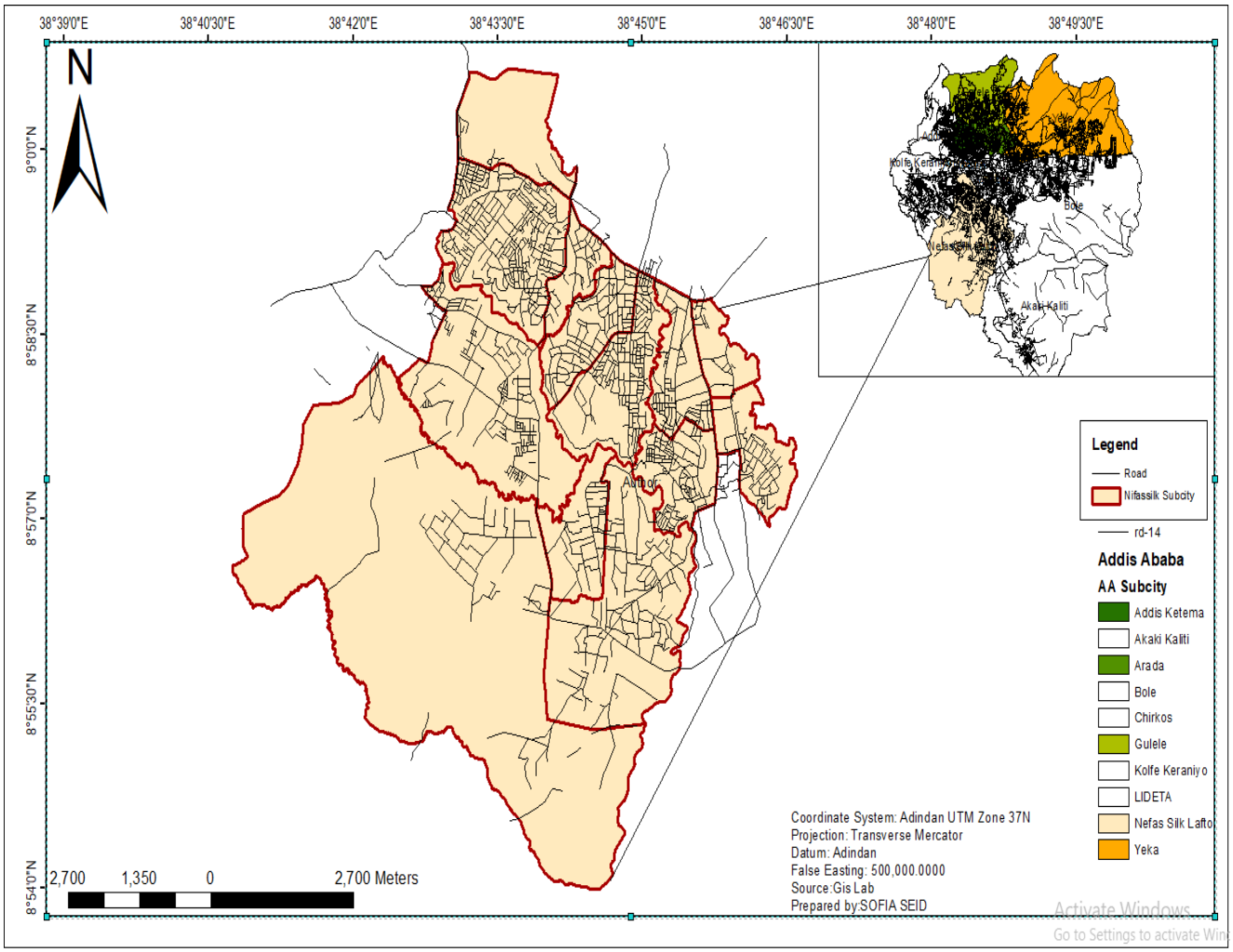

Figure 3.1: Boundary and Road Map of Addis Ababa: Nifassilk Sub city

Addis Ababa city is the political and economic center of Ethiopia. It is also headquarter of the African Union and the base for many international and non-governmental organizations. The city has ten administrative sub-cities. Nifas silk sub city wereda 1 is he target area for these study. It is located at latitude of 8°56'45.96 and longitude of 38°43'21.72".this wereda have a very series problem of on street parking that leads to traffic congestion of the road networks every single day. Following this wereda is economical enter for Addis Ababa city where large number address of companies, business center, and politically engaged agency's located. . As a result there is deep flow of traffic along their main roads. Due to this there is visible lack of parking areas which frequently led to traffic congestion. That's why this study selected this area in order to assess the problems associated with on street parking lots and in Addis Ababa city.

3.3 Research Approach and Research Design

Mixed methods research approach is employed in this study with the assumption that: The mixed method neutralizes the bias and limitation of a mono-method research approach and it is very helpful to generate both reach and breadth results (Creswell, 2009). Among the various mixed method design the researcher employed concurrent mixed method approach. This study concurrently presented the result of the study combining both qualitative and quantitative data while data gathering and then, data were analyzed and interpreted separately (Leech & Onwuegbuzie, 2009). This study was undertaken with descriptive and an explorative approach to achieve the study objectives.

A research design is a blueprint that guides in accomplishing the research under the study. The cross-sectional designs were employed since the data is gathered at one point in time (Creswell et al., 2003; Abbes and Charles, 2002). Thus, it enables quantitative and qualitative data to be collected at once time. Cross-sectional design is employed since it doesn't draw or follow the change at a certain time past and compare with the current situation rather it focuses on what happens or occurs now (Creswell and Clark, 2007).

The concurrent triangulation designs were used while gathering quantitative and qualitative data at the same time. After the data collected, the findings will be analyzed, interpreted separately and the findings presented conjointly. Hence, the results will be compared and corroborated that enable us to generate meaning in the process (Creswell et al., 2003). And this, as Abbes and Charles (2002) stated relative to sequential mixed method design, the concurrent triangulation design were found to be relevant while collecting data using different approaches within a short time span.

3.4 Sampling Technique and Sample Size Determination

The research is designed to present information and data by convenience sampling which is non-probability that conforms to certain criteria or strata. The researcher selects units that are convenient, close at hand, easy to reach. Convenience sampling means that members of such samples are chosen mainly because they are readily available and willing to be involved hence there is a saving of time and money. In this thesis, the researcher believes to use members of the sub citiesas the population and thus, one sample is taken from four sub cities that are Yeka, Bole,

Nifas silk lafto, and Kolfe. Regarding this it's difficult to determine the sample from the population but through attending time where parking and traffic congestion frequently occurs the researcher decided to have 50 samples from the population. These samplesare taken from the sub cites. About 30 car owners and 10 parking lot coordinators were selected only for the questionnaire.10 Officials (AATMB), bureau heads (AARTA) and traffic police selected for interview and questioner.

3.5 Source of data

3.5.1 Primary Source of Data

Primary data is generated by the researcher from the subject of the study or observation unit for the purpose of this research at hand. Primary data are those which are collected afresh and for the first time, and thus happen to be original in character. Accordingly, the researcher will be collected primary data using survey and in-depth interviews, because employing both primary and secondary data on a single research increases the validity, reliability, and comprehensiveness of the research (Kothari 2004).

The following primary data collection tools were used.

Interview

The in-depth interview is an effective technique that would provide the researcher to get the deeper feeling, perception or else view of the interviewee about the issue under the discussion. Add to the above relevance of in-depth interview, interviewee feels comfortable while answering for the question raised since it is held in one-on-one discussion and there is no space to have the group tendency (Milena, 2007).

For this research purpose, ten in-depth interviewees were selected based on nonprobability purposive sampling technique. Five Traffics and five officials and bureau heads were selected which are directly or indirectly have experienced the effect of parking lots in traffic conditions.

Survey Questionnaires

In line with the objectives of the study, the purpose of the questionnaire is to obtain information mainly about the view and opinion of the respondents who are drivers and persons who experienced with parking lots and traffic congestion. It had the concern of to what extent the problem of parking and traffic congestion affects their daily activity and city development. The questionnaire was administrated by the researcher.

The questionnaire had four parts:

a) Part I: is simply about personal information
b) Part II: is intended to seek information about the condition of parking lots in Addis Ababa.
c) Part III: intended to assess the causes of traffic congestion in Addis Ababa.
d) Part four IV: attempted to examine the effect of street parking on traffic congestion.

3.5.1.1 Pre-testing or Questionnaire Pilot Test

It is important to undertake pilot test the data gathering instrument questionnaire before starting the actual data collection process. This was done to assure if the questionnaires were understood by the respondents and there were no problems with the wording or measurement. Conventional wisdom suggests that pre-testing not only is an established practice for discovering errors but also is useful for extra training the research team. To this point, a questionnaire pilot test with 5 participants was done so as to identify if any question that might not make sense and inconvenient to participants, or potential problems and logics with the questionnaires that might lead to biased answers. As a result the participants pointed out important editorial, order arrangement, flow of ideas and jargon avoidance valuable comments. The participants were not told about the purpose to test the questionnaires. It was also commented by two of my work place research professionals before administering the questionnaires for pilot test to the perceived respondents.

3.5.1.2 Data validity and reliability

Mahlet (2013) cited many scholars‘perspectives stating that every scientific research should recognize the validity and reliability of data, as they were ways to establish a truth in a multiple way (Golafshani, 2003). From social positivist perspective Aguinaldo (2009) argued thata research is valid to the extent that its findings offer access to an objective reality. As Dooley (2003) noted the conceptualization concern in validity and reliability given by APA (1985) stated that reliability refers the degree to which observed scores are free from errors of measurement that can be gauged by consistency of scores while validity refers to the appropriateness, meaningfulness and usefulness of the specific inferences made from a given measurements. As mentioned by Gomm (2009) reliability is the extent to which our measuring instruments measure and yield a consistent output and Knapp and Mueller (2010) validity is the usefulness of our instruments in addressing our research objectives and research questions. Therefore, the

researcher attempted to keep theoretical principle of validity vested on literatures, to assure the validity of the research, and to incorporate major respective coping and adaptive strategies undertaken by MUDHC and regional concerned institutions to accomplish the objective targets that have been set under the Integrated Housing Development Programme. So as to keep the extent validity of the research, the researcher has reviewed many conceptual andempirical literatures on the issues of IHDP in order to incorporate major issues in all-inclusive way in data generating instruments that enable to investigate true information. In addition to this to assure the study data, the researcher observed methodological aspects on previous researches and scholarly articles written in Ethiopia and abroad to keep constructive validity of the study (Marczyk et al., 2005; Gomm,2009), and to select accurate data generation tools and techniques that help to acquire complete data of IHDP. Moreover, the researcher tried to reassure internal and external validity of the research (Reinar& Bradley, 2007), and to assure its legibility, formats and logical sequences of data analysis. The researcher is also familiarized himself in good interpersonal relation with the research subject matter and the consultants to keep the reliability of the study during data collection process.

3.5.1.3 Ethical consideration

To maintain the validity of data, ethical consideration has been taken into account. All the respondents were told the purpose of the study and not and intended outcomes of the research before embarking on the real data collection process. In addition, they were informed that the concerns, integrity, anonymity, consents and other human elements of data providers, would be protected and not be exposed to the third party. So as to build more confidence in the heart of the respondents, he showed them his student ID card and letter for cooperation from the University. In such a way they were made feel free to explain what they feel and know about the subject matter while answering the questionnaires.

3.6 Method of Data Analysis

The data were mainly analyzed using quantitatively and qualitativethat generatedthrough open ended questioners, in-depth interview andPersonalobservation. look at the characteristics. The method that was used for analysis has discussed as follows.

1. 3.6.1Quantitative analysis

Quantitative analysis is often associated with numerical analysis where data is collected, classified, and then computed for certain findings using a set of statistical methods. Data is chosen randomly in large samples and then analyzed. The advantage of quantitative analysis the findings can be applied in a general population using research patterns developed in the sample. This is a shortcoming of qualitative data analysis because of limited generalization of findings.

2. 3.6.2 Qualitative analysis

Qualitative analysis is concerned with the analysis of data that cannot be quantified. This type of data is about the understanding and insights into the properties and attributes of objects (participants). Qualitative analysis can get a deeper understanding of "why" a certain phenomenon occurs. The analysis can be used in conjunction with quantitative analysis or precede it. Unlike with quantitative analysis that is restricted by certain classification rules or numbers, qualitative data analysis can be wide ranged and multi-faceted. And it is subjective, descriptive, non-statistical and exploratory in nature.

In qualitative analysis, the data is collected in small, unrepresentative samples in an unstructured way. Typical data collected include color, race, religion, nationality, and many more. In quantitative analysis, on the other hand, data is collected in large, representative samples that can generalize the entire population.

Qualitative analysis methodology is exploratory where the analysis seeks to get a deeper understanding of why a certain phenomenon occurs. The methodology in quantitative analysis can be conclusive such as how much or how many times a certain phenomenon occurs not why it does occur.In qualitative analysis, researchers often ask open-ended questions, conduct interviews, and observations whereas in quantitative analysis researchers take measurements, conduct surveys, experiments and observations.

3.7 Descriptive Statistics

The quantitative data analysis were presented based on descriptive statistics using frequency, percentage, mean, and standard deviation techniques and econometrics analysis. To organize the collected data quantitative software packages SPSS version 20 and Stata/SE 13.1 were used. The result of the quantitative findings have presented and analyzed concurrently that takes different forms including, graphics, Table, and pie chart. For open ended questions of the survey content analysis will be conducted.

CHAPTER FOUR

4. DATA PRESENTATION, INTERPRETATION AND ANALYSIS

4.1 Introduction

In this chapter, the data collected through different data collection methods and tools are discussed and analyzed carefully in order to show and assess problems associated with on street parking lots in Addis Ababa city.

The data presentation is done in such a way that the response questions and data were grouped according to the respective research questions. In the view of that, responses are presented as follows.

4.2 Identification of respondents

In this part, the study provides the details of sex, age, marital status and educational status of the respondents.

4.2.1Demographic Characteristics of Respondents

Table2. Sex and Age of Respondents

Sex	Number of respondents'	Percent	Age	Number of respondents'	Percent
Male	48	96.0	20-35	28	54.9
Female	2	4.0	35-50	14	27.5
Total	50	100.0	50-75	8	17.6
			Total	50	100.0

Source: own survey, 2018

Since sex is one of the characteristics of, respondents were asked about their sex. Table 2 indicates for about 96.0% of the respondents were males while 4.0% were females. These shows the users of parking lot and affect the congestion were the Male population.

Age category of the participants i.e. 54.9% of them were at the age of productive age or 20-35, 27.5% of them were at the age of 35-50, and 17.6% of them were under the age of 50-75.

4.2.2Social characteristics of Respondents

Table 3. Marital and Educational status of respondents

Marital Status		Number of respondents,	Percent %	Education Status	Number of respondents'	Percent %
	Single	1	2.0	Preparatory	2	4.0
	Married	45	90.0	Diploma	5	10.0
	Divorced	3	5.9	Degree and Above	43	86.0
	Widowed	1	2.1	Total	50	100.0
	Total	50	100.0			

Sources: own survey 2018.

According to table 3, depict 90% of participants were married, 5.9% divorced, and 2.0% single and 2.1 widowed.

Table 3 shows, educational status of respondents i.e. 86% of the participants were Degree and above educational achievement, 10% of them were diploma, and 4% of the respondents were preparatory status of education. In this case, almost all of the respondents were to somehow educated and they are expected to be more aware of parking lots and traffic congestion.

4.3 Condition of street parking lots in Addis Ababa.

Drivers in dense urban areas like Addis Ababa frequently found, that desirable parking close to their destination is unavailable or prohibitively expensive. On-street parking constitutes one major problem that makes traffic situation chaotic in Addis Ababa.

4.3.1. Parking on streets.

When vehicles are parked on the street, along with the sidewalk or anywhere on the street is called On-street parking. In some streets, you can always park your vehicle on the street, but sometimes there are restrictions. There are also on-street parking situations where you need a parking permit to park.

Table 4. Respondents practice of Parking on streets.

On street park	Number of respondents'	Percent %
yes	46	92.0
no	4	8.0
Total	50	100.0

Source own survey, 2018

As table 4 indicates that for about 92% responds that, they always used to park their car on streets while 8% of the responds indicated that they don't park their cars on streets. So the finding indicates that there is a tendency of parking on streets becoming as a culture in Addis Ababa city. Following this, it's clear that parking on streets will lead to traffic congestion.

4.3.2 Reasons of parking on streets.

A parking violation is the act of parking a motor vehicle in a restricted place or for parking in an unauthorized manner. It is against the law virtually everywhere to park a vehicle in the middle of a highway or road; parking on one or both sides of a road, however, is commonly permitted. However, restrictions apply to such parking, and may result in an offense being committed. Such offenses are usually cited by a police officer or other government official in the form of a traffic ticket.

Table 5. Respondents' Reasons for parking on streets.

Reasons	Number of respondents'	Percent %
For private work purpose	20	27.8
For education	10	13.9
For recreation	15	20.8
For shopping	15	20.8
When cars get damaged	4	5.6
Lack of enough parking areas	8	11.1
Total	72	100.0

Source own survey, 2018

According to table 5, 27.8% of the respondent reason to park on streets is while running for work or private purposes, 20% of them for shopping and recreation i.e. the place where they park is along main streets, or commercial activities found,13.9% of the respondents reason to park is for educational purpose, 11.1% of them reason to park is they believe there is lack of enough parking areas in the city. i.e. to attend class since there is not enough parking areas in the school where they attend, and finally 5.6% of the respondents reasons to park is if and only if the car get damaged. Based on the finding, the main reason of parking on streets in Addis Ababa city is when people are running for work or private purposes.

4.3.3 Duration of parking on streets.

The parking duration can also be found using parking surveys done like in-out method, license plate method and fixed period sampling. The data is collected regarding the vehicles count for time intervals. Average duration for a vehicle on parking lot is calculated with all collected data.

Table 6. Respondents' duration for parking on streets.

Time Duration	Number of respondents'	Percent %
30min-45min	5	10.0
30min-1hr	3	6.0
1hr-2hr	21	42.0
2hr-4hr	12	24.0
4hr-6hr	9	18.0
Total	50	100.0

Sources own survey, 2018.

As table 6, shows that 42% of the respondents park their car an average of 1hr-2hr next to 24% 2hr-4hr, 18% 4hr- 6hr, 10% 30 min-45min, and 6% 30min-1hr. This indicates that most respondents park their car on streets for more than 1 hour. Due to the address or location of commercial centers, government agency and others found in down town people tend to park their cars on streets for more than one hour.

4.3.4 Traffic congestion when cars park on streets.

The causes of traffic congestion (or "traffic jams") tend to be complex, but they all come down to having too many cars on the same streets at the same time. Recurring traffic congestion is most frequently the result of roadways having insufficient capacity for the volume of cars…too many cars or too little road. Alternatively, accidents, breakdowns, parking on street, construction and other events that randomly restrict traffic flow are the typical cause of non-recurring traffic jams.

Table 7. Respondents' response oftraffic congestion when parking a car on street

Traffic congestion when park a car	Number of respondents'	Percent %
Yes	43	86.0
No	7	14.0
Total	50	100.0

Source own survey, 2018

Table 7 shows that almost 86% of the respondents agreed the idea of parking on streets will led to traffic congestion while 14% of the respondents don't agree that parking on streets will not become the cause for traffic congestion in Addis Ababa. The respondents also added that parking cars on street not only led to traffic congestion but also further accidents.

The respondents were asked whether current traffic congestion of Addis Ababa is satisfactory or not. In the above table all of the respondents or 100% responds that current parking condition of parking in Addis Ababa city is unsatisfactory.

4.3.5Reasons for being unsatisfactory of current condition of parking in Addis Ababa.

Table 8. Respondents' response of the reasons for being unsatisfactory of current condition of parking in Addis Ababa.

Unsatisfactory reasons for condition of parking	Number of respondents'	Percent %
Lack of drivers awareness	27	54.0
Lack of quality roads	17	34.0
Lack of parking areas	6	12.0
Total	50	100.0

Sources own survey, 2018.

As it's indicated in table 8, that current condition of parking in Addis Ababa is unsatisfactory, due to this the respondents in the above table 5, raised major reasons those are lack of drivers awareness that accounts 54% next to 34% lack of quality roads, and 12% lack of parking areas. It's obvious having modern parking areas, quality roads and good awareness towards parking areas will never led to traffic condition however, in absence of those factors will defiantly led as its visible in Addis Ababa city.

4.3.6Parking cars along curved roads.

Be aware that not all parking by-laws are posted on signs. ... Never park on a curve, hill or anywhere you do not have a clear view for at least 125 metres in both directions. Do not park where you will block a vehicle already parked or where you will block a sidewalk, crosswalk, pedestrian crossing or road entrance.

Table 9. Parking cars along curved roads.

Parking on curved roads	Number of respondents'	Percent %
yes	48	96.0
no	2	4.0
Total	50	100.0

Sources own survey, 2018.

Table 9 shows that almost all of the respondents 96% respond that there will be accident parking cars along curved roads while cars are passing by, while 4% of the respondents respond that there will not be accident parking cars along curved roads.

4.3.7 Reason of parking cars in curved roads.

Table 10. Respondents' response for reason of parking cars in curved roads.

Reasons of parking on curved road	Number of respondents'	Percent %
Lack of parking areas	30	40.0
Parking in curved areas	10	13.3
Prohibited	5	6.7
For shopping	9	12.0
Lack of awareness	18	24.0
When accident occurs	3	4.0
Total	75	100.0

Sources own survey, 2018.

As the table 10, shows that, accident will be occurred when cars are parking along curved roads. Following this the above table indicates the reasons of parking along curved roads. So that 40% of the respondents respond that lack of parking areas is the main reason for parking cars in curved roads,24% of them responds that lack of awareness, while 12% of them park cars in curved roads is because of shopping, 6.7% of the respondents respond that its must be prohibited parking cars in curved roads and 4% of the respondent respond that people's park their cars in curved roads is when accident occurs. Even though they are natural kind reasons like accidents but lack of awareness is still hinder for parking lots and traffic congestion.

4.3.8 Parking cars on boxes.

The draft strategic plan, dubbed as the Addis Ababa Non-Motorised Transport (NMT), aims at ensuring efficient use of roadside parking employing an On-street Parking Management System, which enables cars to pay and park on the painted boxes of street. It also targets to reduce traffic accidents as well as protect the environment by encouraging the use of bicycles and walking. The

revenue collected from the parking will be used to maintain roads and sidewalks and greening the area. The Bureau plans to pilot the new system during the next Ethiopian year.

Table 11. Respondants' practice of parking cars on boxes.

Parking on boxes	Number of respondents'	Percent %
yes	19	38.0
no	31	62.0
Total	50	100.0

Source own survey 2018.

In recent time administration of Addis Ababa came up with the solution of parking problem i.e. parking cars in boxes. So the above table 11 shows that, 62% of the respondents respond that such mechanism of parking cars on box do not brought change or solution. While 38% of the respondents respond that parking cars on boxes brought such solutions.

4.3.9 Relationships between parking cars in boxes and traffic congestion?

The completion of the on-street and off-street parking lots, painted boxes in 3,525 places across the city will temporarily serve to alleviate the congestion. But these boxes are not permanent solution for the problem that the city was facing.

Table 12. Respondants' response indicating how parking cars in boxes minimize traffic congestion

How parking cars in boxes minimize traffic congestion	Number of respondents'	Percent %
Through traffic management	18	31.1
Through increasing awareness	30	51.7
Through practice	10	17.2
Total	58	100.0

Source: own survey, 2018

It known that Addis Ababa city administration started a mechanism to minimize car parking problem through boxes however this solution is not enough to minimize parking problem in Addis Ababa. So the above table shows that how it will be minimized i.e.51.7% of them responds that through increasing awareness,31.1% of them responds that through traffic management and 17.2% of them agreed that through practice parking cars on boxes will minimize traffic congestion in Addis Ababa.

4.3.10 Preference of parking cars on streets than inside buildings.

Table 13. Respondents' response on the preference of parking cars on streets than inside buildings.

Preference of parking cars on street	Number of respondents'	Percent %
Lack of attitude	14	15.7
Buildings security is unsecured	40	44.9
Building owners reserved it for those who	5	5.6
Rented inside buildings.	5	5.6
Reserved for minorities	15	16.9
Fear of congestion	10	11.3
Total	89	100.0

Source: own survey, 2018.

Lack of enough parking area tends to be major problem in developing countries where there's inadequate access to standard roads. Based on this fact Addis Ababa city is also victim of such problems. So the respondents were asked why peoples prefer to park their cars on streets rather on buildings indeed they respond different reasons i.e. for about 44.9% of the said being insecurity of the building,16.9% as reserved for minorities inside of the building, 15.7% of them agreed that lack of attitude is the main reason next to 11.3% of them responds there might be

congestion inside the building, and 5.6% conclude that building administrations reserved it for those who rent inside the building.

4.3.11 The Accidents of parking on street.

A large number of car accidents occur in parking lots. Accidents that occur parking lots and accidents that occur on public streets, roads and highways are similar in a number of ways.

Table 14. Respondents response on the relationship between parking on streets and car accident

Relation between parking on street and car accident	Number of respondents'	Percent %
yes	43	86.0
no	7	14.0
Total	50	100.0

Sources: own survey, 2018.

As shown on table 14 parking on streets will lead to accident. So, 86% of the respondents respond that parking cars on street will definitely lead to accident. While 14% of the respondents don't favor the idea that parking cars on streets will not cause accidents.

4.3.12 How parking on street will lead to accidents.

Table 15. Respondents' response for how parking on street will lead to accidents.

Parking on street results an accident	Number of respondents,	Percent %
When congestion occurred	50	73.6
Lack of roads	16	23.5
Lack of attitude	2	2.9
Total	68	100.0

Sources: own survey, 2018.

It's well-known that parking on streets has effect even though their cause varies across different countries. In the case of Ethiopia particularly Addis Ababa how parking on street led to accident is clearly stated on the table 15, i.e. for about 73.6% of the respondents agreed that the time when congestion occurred parking on street leads to accident while 23.5% of the respond lack of quality road, and 2.9% of them stated that lack of attitude is also led to accident when cars are parking on street.

4.3.13 Situation of current parking problem

Currently in Addis Ababa there are so many problems which are mainly concerned with shortage of parking space such as congestion of roads due to imbalance between on-street parking capacity and number of vehicle, emission of to the environment due to searching of parking space and idle of the drivers by waiting parking spot

Table 16. Respondents' response on situation of current parking problem.

Current parking problem	Number of respondents'	Percent %
Yes	43	86.0
No	7	14.0
Total	50	100.0

Sources: own survey, 2018.

As stated on table 16situation of current parking problem in Addis Ababa. 86% of them respond that I still face parking problem while 14% of the said I don't that much face parking problem in Addis Ababa.

4.4 Contribution of car parking lots

During the urban sprawl movement, residential population wasn't the only factor to relocate as businesses, jobs, and capital spilled out of the cities. Parking is directly correlated to economic development, as one open on-street parking space is valued revenue to local businesses and the local government.

4.4.1 Employment creation

Table 17. Respondents' response on parking create job opportunity

Employment creation by parking lot	Number of respondents'	Percent %
yes	49	98.0
no	1	2.0
Total	50	100.0

Source: own survey, 2018

The concept of parking is wide in terms of economic, social, and political. In terms of economic its source of income for employees and government. So the respondents were asked whether parking creates job opportunity or not. Regarding this almost all of the respondents or 98% of them responds parking defiantly creates job opportunity while 2% said that it does not.

4.4.2 Reduction of car accidents

Table 18. Respondents' response on modern parking systems will decrease accidents

Accident reduction	Number of respondents'	Percent %
Completely decreases	27	54.0
Somehow decreases	2	4.0
Decreases	21	42.0
Total	50	100.0

Sources: own survey, 2018.

As table 18indicatesthe attitude of the respondents on whether modern parking system will decrease accidents. Following this for about 54% of them agreed that modern parking systems will decrease accidents, 42% of them agreed it will decreases, and 4% of the respondents somehow accidents will decrease if modern parking system are found in Addis Ababa.

4.4.3Parking areas reduce traffic congestion

Table 19. Respondents' responseon parking areas that decrease traffic congestion.

Parking lot decrease traffic congestion	Number of respondents'	Percent %
commercial areas	10	20.0
out of main streets	14	28.0
in buildings	19	38.0
every part of the city	7	14.0
Total	50	100.0

Sources: own survey, 2018.

Lack of enough parking areas is one of the major problems that led to traffic congestion in Addis Ababa city. Based on this fact respondents were asked if where parking areas are built that traffic congestion would decreased. So for about 38% of them respond if parking areas built inside buildings traffic congestion would decrease, next to 28% out of main streets of the city, 20% in commercial areas, and 14% of them said parking areas must be built in every part of the city in order to decrease traffic congestion.

4.4.4Places whereparking problem is frequently found in Addis Ababa

Table 20.Places where parking problem is frequently found in Addis Ababa.

Parking problem frequently occurring places	Number of respondents'
Kality	4
Kera	4
Merkato	13
Commercial areas of the city	1
Everywhere in the city	8
4 kilo	2
Bole	3
Saris	2
Hayahulet	1
Megenagna	3
Piassa	4
Kolfe	1
Dembel	2
Asko	2
Total	50

Source: own survey, 2018

In table 20 parts of Addis Ababa are described in terms of parking problem. So Merkato tends to be dominant that accounts 26% of that responds Merkato has always parking problem. Next to 16% everywhere in the city, 24% Piassa, kality, and kera, 12% Megenagna and bole, 4% saris, and 2% commercial areas of the city, Asko, Demnbel, kolfe and Hayahulet. In this case more of commercial area centers and main roads of the city are victims of parking lots.

4.4.5Why is on this places parking problem frequently found

Table 21.Respondents response of places were parking problem frequently found

Parking problems frequently found	Number of respondents'
Lack of quality roads	11
Lack of parking areas in buildings	15
Center for commercial activities	24
Total	50

Source: own survey, 2018.

As it's indicated in table 21, there are places where frequently parking problem found. So the above table clarified the reasons for parking problem in those areas of Addis Ababa. Based on this, 48% of the respondents respond being they are center of commercial activities, 30% of them respond that there is lack of parking areas in the buildings, and 22% of them agreed there is lack of quality roads that are not suitable for parking that's why parking problem is more frequent on those places.

4.5 Causes of traffic congestion

Most roads in Addis Ababa are narrow and lack pedestrian lanes. There are cases of double parking along these narrow roads thereby causing traffic congestion. This is due to the no availability of off-street parking facilities along the transportation routes coupled with inadequate traffic management. And also increase in numbers of vehicles without adequate infrastructure, has accentuated the problems of traffic congestion, traffic delay, parking problems, accident, and urban land use severance.

4.5.1 Traffic congestion in Addis Ababa

Table 22. Is there any traffic congestion in Addis Ababa?

Traffic congestion	Number of respondents'
yes	49
no	1
Total	50

Source: own survey, 2018.

Its fact that there is traffic congestion in large cities and Addis Ababa is one of the victims. So the respondents were asked if there is traffic congestion in Addis Ababa and almost all of them or 98% respond that there is traffic congestion in Addis Ababa while 2% of them respond there is no traffic congestion in Addis Ababa city.

4.5.2. Reasons of traffic congestion in Addis Ababa

Table 23. Respondents response on reasons of traffic congestion in Addis Ababa.

Reasons for traffic congestion	Number of respondents'
lack of alternative roads	29
increment of cars	13
increments of pedestrians	2
improper railway construction	3
illegal trade on streets	20
Total	67

Source: own survey, 2018.

As it's stated in the table 23, there is traffic congestion in Addis Ababa and table 22 shows the reasons behind traffic congestion Addis Ababa city. So 43.3% of them respond lack of alternative roads in Addis Ababa city is the main reason for traffic congestion followingboth illegal trade on streets 29.8%, 19.4% increment of cars, improper railway construction accounts 4.5% and the respondents respond that increment of pedestrian is 3% that give reason for traffic congestion in Addis Ababa city.

4.5.3. Causes of traffic congestion when students and workers are on their way

Table 24. Respondents response on Addis Ababa traffic congestion is high when students and workers are on their way to school and work place.

Traffic congestion on peak hours in morning and evening	Number of respondents'
Car owners use to drive their own cars	9
Improper parking of public transport service bus	8
Lack of city traffic regulation or system	11
Being entrances time for education and work is equal	20
Imbalance of cars and population	9
Total	57

Source: own survey, 2018.

In Addis Ababa traffic congestion increases the time when students and workers are on their way to school and work place. So for about 35.1% of the respondents respond that the entrance time for school and19.3% of them responds lack of city regulation or system work at the same timethe reason for increment of traffic congestion in Addis Ababa city is 15.8% since car owners uses to drive and imbalance of cars and population, 14% improper parking of public transport serviceare the reason why traffic congestion increases during students and workers are on their way to school and work place.

4.5.4 Places where traffic congestion always has occurred

Table 25. Places where traffic congestion always has occurred.

Frequently occurring places traffic congestion	Number of respondents'
Kera	8
Merkato	9
Saris	2
Kality	3
AutobisTera	3
Megengna	5
Mexico	2
Meskel square	6
Bole	1
Everywhere	9
Kolfe	1
Jemo	1
Total	50

Source: own survey, 2018.

As table 25 indicated the places of Addis Ababa where most of the time traffic congestion occurred. So 18% of the respondents respond areas of Merkato and every part of the city is always experienced traffic congestion next to 16% Kera, 12% Meskel square, 6% kality and AutobisTera, 4% saris and Mexico, and 2% bole, Kolfe, and Jemo. As it's indicated in table 18, Merkato is the place in Addis Ababa where lots of parking lots occurred following this, areas of Merkato became more of victim of traffic congestion.

4.5.5 Why is traffic congestion existed on those places?

Table 26. Respondents' response on traffic congestion existence on those places.

Traffic congestion existed places	Number of respondents'
Imbalance between amount of cars and roads	31
Lack of awareness	24
Under construction of roads	6
Location of air port	3
Main areas of commercial activities	6
Total	70

Source: own survey, 2018.

In the table 26, areas are described where traffic congestion has occurred. Due to this the above table shows the reason why traffic congestion is frequently occurred on the listed places of Addis Ababa city. So 44.3% of the respondents respond imbalance between cars and road is the reason why traffic congestion frequently occurred next to 34.3% lack of awareness, 8.6% under construction of roadsand since they are main areas commercial activities of the city, and 4.2 % of the respond location of international airport. In this case, Addis Ababa is the city where a lot of cars found and less quality roads occurred. Due to this parking lots and traffic congestion is experienced than any other cities.

4.5.6What is the reason for increasing traffic congestion in Addis Ababa from time to time?

Table 27. What is the reason for increasing traffic congestion in Addis Ababa from time to time?

Reasons behind traffic congestion in Addis Ababa	Number of respondents'
Increment of population and migration	15
Increment of trucks	16
Lack of quality roads	49
Lack of traffic management	8
Total	88

Source: own survey, 2018.

Traffic congestion in Addis Ababa is increasing from time to time. So the above table 27 shows how congestion increasing in Addis Ababa from time to time. For about 55.7% lack of quality roads.Next to 18.2% of the respondents respond that increment of trucks is the main reason for increasing traffic congestion from time to time, 17% the increment of population and migration to Addis Ababa city, and 9.1% lack of traffic management are also the reason why traffic congestion is increasing from time to time in Addis Ababa city. Still the increment cars with less quality roads and rapid migration to the city are the main reasons for the increment of traffic congestion.

4.5.7Do you think parking cars on streets causes traffic congestion?

Table 28. Respondents' response about parking cars on streets causes traffic congestion?

Parking cars on streets causes traffic congestion	Number of respondents'
yes	46
no	4
Total	50

Source: own survey, 2018.

Table 28indicates whether parking cars on street will cause traffic congestion. So 92% of the respondents were agreed that parking cars on street will cause traffic congestion while 8.0% of them don't accept the idea that parking on street will cause traffic congestion.

4.5.8How parking cars on street cause traffic congestion?

Table 29.Respondents' response how parking cars on street cause traffic congestion

On street parking results traffic congestion	Number of respondents'
lack of awareness	22
lack of quality standard roads	19
parking coverage	5
Total	46

Source: own survey, 2018.

Table 29 shows that how parking cars on street causes traffic congestion. In this case, 44% of the respondents respond lack of awareness next to 38% lack of quality standard roads, and 10% the size of parking coverage tend to become the reason when cars are parking on streets that led to traffic congestion in Addis Ababa.

4.5.9The accident when city bus and taxi dropping and lifting pedestrians on streets

Table 30. The accident when city bus and taxi dropping and lifting pedestrians on streets.

Accidents when dropping and lifting	Number of respondents'
Yes	42
No	8
Total	50

Source: own survey, 2018.

Table 30 indicated that whether there is accident while city bus and taxi park to drop and lift up pedestrians. So 84% of the respondents believed that there is accident when city bus and taxi is park to lift up and drop pedestrians, while 16% of them don't agreed.

4.5.10Causes of traffic congestion.

Table 31. Respondents' response about the Causes of traffic congestion

Causes of traffic congestion		yes		No	
		Number of respondents'	%	Number of respondents'	%
1	The imbalance of road and number of cars	49	98.0	1	2.0
2	Similarity the arrival time of education and work	45	90.0	5	10.0
3	Ground construction of Addis Ababa railway	46	92.0	4	8.0
4	Frequently digging up of roads	45	90.0	5	10.0
5	Traffic accident	45	90.0	5	10.0
6	Parking cars on main streets	44	88.0	2	4.0
7	Lack of enough construction building to avoid waste material	46	92.0	4	8.0
8	Illegal trade on streets	45	90.0	5	10.0
9	Lack of enough pedestrian roads	46	92.0	4	8.0
10	Lack of parking area in buildings	47	94.0	3	6.0

Source: own survey, 2108.

Accordingly, as table 31 shows questions were forwarded about the causes of traffic congestion in Addis Ababa. As a result out of total 50 respondents 98%, 90%, 92% ,90% ,90%, ,88%, 92% ,90% ,92%, and 94% indicated The imbalance of road and number of cars, Similarity the arrival time of education and work, Frequently digging up of roads , Traffic accident, Parking cars on main streets, Lack of enough construction building to avoid waste material, Illegal trade on streets, Lack of enough pedestrian roads, and Lack of parking area in buildings respectively. In the other hand out of total 50 respondents 2%, 10%, 8%, 10%, 10%, 4%, 8%, 6%, 8%, and 10% do not favor the listed problem as a causes of traffic congestion in Addis Ababa. In general, the mentioned causes could hinder the role of road transport in our daily activities and the necessities of life would be difficult to achieve.

4.6 Effects of street parking lots on traffic congestion.

One of the main problems of today's road networks is parking. In most of the cities in developing countries the planning of road networks lacks the provision of the entire basic infrastructure to be provided for the safe and orderly movement of the vehicles.

In Addis Ababa, like elsewhere, where cars are one of the dominant modes of transportation, urban circulation is one of the most obvious problems and parking seems to be an overlooked element in transportation development.

4.6.1 Most of the time do you drive in roads where traffic congestion occurred?

Table 32. Most of the time do you drive in roads where traffic congestion occurred?

Driving on the way of traffic congestion occurred	**Number of respondents'**
yes	44
no	6
Total	50

Source: own survey, 2018.

As table 32 shows whether the respondents most of the time drive where traffic congestion occurred in this case 88% of the respondents drive in roads where congestion traffic mostly or frequently occurred while 12% of them do not drive rather sometimes.

4.6.2 Why they frequently drive where traffic congestion has occurred?

Table 33.Respondents' response of Why they frequently drive where traffic congestion has occurred?

Frequent drive on traffic congestion occurrence way	**Number of respondents'**
For work	44
For recreation	3
For education	1
For shopping	2
Total	50

Source: own survey, 2018.

As table 31, indicated that most of the respondents drive frequently where traffic congestion occurred following this table 33, shows the reason behind why so 88% of them respond location of work made them to drive along there, 6% of them respond for recreation, and 2% of them respond location of schools and 4% of shopping.

4.6.3. The solution of Addis Ababa traffic police for traffic congestion.

Table 34.Respondents response on solution of Addis Ababa traffic police for traffic congestion.

AATP give solution for traffic congestion	Number of respondents'
Yes they do	22
No they don't	28
Total	50

Source: own survey, 2018.

Its recognized that traffic police plays a significant role in day to day activity of flow of trucks in streets. So the respondents were asked whether traffic police of Addis Ababa addressed problems of traffic congestion. In this case for about 56% of them respond that traffic police of Addis Ababa don't arrived on time when traffic congestion has occurred while 44% of the respondent respond they arrive on time when such congestion problem occurred.

4.6.4. Kinds of solution provided by traffic police.

Table 35. Respondents' response about the Kinds of solution provided by traffic police

Solution by traffic police	Number of respondents'
Through traffic regulations	40
Through making the road free	12
Total	52

Source: own survey, 2018.

As table 35 indicates for about 76.9% of the respondents respond that traffic polices provide solution when congestion occurred through traffic regulation while 23.1% of them respond traffic police of Addis Ababa city provide solutions through making the road free.

4.6.6.Personal solution for when traffic congestion occurred.

Table 36.Respondents response on Personal solution when traffic congestion occurred.

Personal view about traffic congestion	Number of respondents
Using better shortcut	19
Using alternative roads	23
Nothing waiting till become free	8
Total	50

Source: own survey, 2018.

According to table 36shows that how respondents take personal solution when traffic congestion occurred. So 46% of the respondents took alternative roads to escape from traffic congestion, 38% of them uses better shortcuts, and 16% of the respondents took no action in order to escape from traffic congestion in Addis Ababa.

4.6.7. Results of traffic congestion in Addis Ababa

Table 37. Respondants response onResults of traffic congestion in Addis Ababa

	Results of traffic congestion	**Very high**		**Moderate**		**High**		**Somehow high**	
		Number of respondents	%	**Number of respondents**	%	**Number of respondents**	%	**Number of respondents**	%
1	Waste of working time	50	100	-	-	-	-	-	-
2	Air pollution	-	-	-	-	2	4.0	48	96.0
3	Sound pollution	40	80.0	2	4.0	8	16.0	-	-
4	Being late students on their way to school	49	98.0	-	-	1	2.0	-	-
5	Late delivery of ambulances	45	90.0	-	-	4	8.0	1	2.0
6	Lack of taxi service on time	43	86.0	-	-	3	6.0	4	8.0

Sources: own survey, 2018.

Accordingly, respondents were asked to what extent is reached the results of traffic congestion in Addis Ababa. As it's shown in table 37, all of the respondents or 100% of them respond that, waste of working time is very high or more visible in Addis Ababa as a result of traffic congestion. Following this the 96% respondents reported that air pollution in Addis Ababa is to somehow high, while 4% of them said high, in terms of sound pollution 80% of them respond its very high, 16% of them respond its high, and 4% of them respond its moderate. 98% of the respondents also it's very high that students will be late when they are on their way to school,

while 2%of them respond it's high. In the case of late delivery of ambulances in Addis Ababa as a result of traffic congestion 90% of them reported its very high or visible, 8% of them said its high and 2% of them agreed to somehow it's high. Finally in terms lack of taxi service on time 86% of the participants agreed it's very high in Addis Ababa such results 8% of them to somehow its high and 6% of the participants agreed that lack of taxi service on time is moderately visible in Addis Ababa as a result of traffic congestion.

4.6.8 Frequently experienced result of traffic congestion in Addis Ababa.

Table 38. Which result is frequently experienced in Addis Ababa?

Result of traffic congestion frequently occur	Number of respondents
All of them	20
Waste of work time	16
Lack of taxi service on time	15
Being late of students	3
Sound pollution	1
Total	55

Source: own survey, 2018.

As it's indicated in table 38, results of traffic congestion were described. So the above table indicated which one of those results is more experienced in Addis Ababa. Based on this for about 36.3% of the respondents respond almost all of the results are mostly experienced in Addis Ababa city. Following this 29.1% of the respondents respond wastage of work time is also dominant result next to 27.3% lack of taxi services on time, 5.5% being late of students, and 1.8% of them respond sound pollution is also frequently observed in the city.

4.6.9. Current traffic congestion situation in Addis Ababa.

Table 39. Current traffic congestion situation in Addis Ababa.

Current traffic congestion	Number of respondents
Extremely congested	17
Moderate congested	22
Highly congested	9
Somehow congested	2
Total	50

Source: own survey, 2018.

According to table 39, indicates that for about 44% of the respondents respond moderately congested, 34% of them respond extremely congested, 18% of them respond highly congested, and 4% of the respondents respond that the current situation of traffic congestion is somehow congested.

4.7 Results of Interview with Government Officials

Interview questions were set and forwarded to government officials, namely, Addis Ababa Traffic management bureau, Addis Ababa City Administration office employees, and the Addis Ababa Road Transport Office. The main issues raised during the interview session were related to the research objectives of the study in relation to the following themes.

4.7.1 The conditions of parking related to the causes of traffic congestion

The officials were responded that the there is poor parking management system, no modern traffic management and continual improvement, less concern to establish new lots, usually focused on street parking and heavy duty trucks holds large space for loading and unloading. Besides, less supervision for underground parking which are used for gymnasium, supermarket, store, shops, bars, restaurants and other uses. The other problems facing the city is road side trade that affect the free movement of pedestrian, illegal parking like narrow carriageway, pedestrian walkway, roundabouts and junction points. The response of the officials about the opportunities was identifying the treat is one thing to solve the challenges. Then after, it solves the traffic congestion, it will reduce unemployment, it will be a place for shopping centre when parking established at different station or multi-storey buildings developed. When parking

stations developed, there will be a facility for toilet service and car owners may chose public transport like the expected city train to travel long distance. The performance of parking will be improved by take legal action those who Challenges and Opportunities of Car Parking in Addis Ababa 2014 43 used underground parking to other purpose. Narrow carriageway parking given to small enterprises should be eliminated, adequate parking signage should be provided, and it needs to give attention for the implementation of traffic management system.

4.7.2 Parking Industry and Strategy

As an industry is not developed in Ethiopia yet. But, the city administration will try to solve those challenges within the next five years plan and AddisAbaba City Transport Programs Management Office is working on modernization of city's transport infrastructure and bridging of the supply-demand gap, detected in the public transport service.

The office is putting effort to make parking problems easier by developing optimized parking systems in the city. In particular, constructing Smart and Ground Parking systems.

The creation of parking infrastructure at Megenagana (East Addis), WolloSefer (on the way to Bole International Airport) has been 85% complete. Parking infrastructure of numerous types is under construction in the city, which costs over 100 million Birr (more than 4 million US dollars),

The current car parking practice is not giving appropriate service to the community and need to be improved. There are no enough parking spaces in the city, because the existing places are not accommodating the increasing number of motorization rate and miss use of under building parking. Most of the roads are designed to vehicle passage but not considered parking bays like Torhyloch roundabout and Sarebet in front of Addis Ababa road Authority. Clear strategy and specific policy will be designed in the future, but it is consider under infrastructure works. The procedure, the principle and practice was developed for on-street parking but it will develop in detail with the development of master plan.

CHAPTER FIVE

5 CONCLUSIONS AND RECOMMENDATION

5.1 Conclusions

The study has dealt with the condition of parking lots and its effects on traffic congestion in Addis Ababa city. In order to achieve the objective of the study, data were gathered from community of Addis Ababa using questionnaires' and interview which were subjected to the analysis. Due to fact, the following conclusions could be drawn in relation to the objectives of the study.

As it's indicated on the above one objective of the study was to examine the condition of on street parking lots in Addis Ababa. Community members of Addis Ababa or drivers always used to park their car on streets for the purpose of private work, school location, shopping, and lack of enough parking areas. As result it's obvious that traffic congestion will be occurred. And as a solution for such problem Addis Ababa transport city administration came up with mechanism i.e. parking cars on boxes however, the mechanism is still not fruitful. Following this Merkato, Piassa, Megengana, and bole are some the places in Addis Ababa that parking problem is frequently found. To this end, the current parking condition of Addis Ababa is unsatisfactory.

The second objective of the study was to find out the cause of traffic congestion in Addis Ababa. In fact traffic congestion is more visible and becoming as hinder for day to day activity in main streets of Addis Ababa. The main causes of those problems are lack of alternative roads, increment of cars, and increment of pedestrian and improper railway construction. Traffic congestion in Addis Ababa tends to become high when students and workers are on their way to school and work place. As a result Merkato, Kera, and Meskel square are the places where traffic congestion always occurred as a main reason due to imbalance between amount of cars and roads.

Finally the third objective of the study was to identify the effect of street parking lots in traffic congestion. The drivers found in Addis Ababa, most of the time drives in roads where traffic congestion is more visible because of location of work place, location of schools, and location of commercial centres of the city. And when such problems occurred, to somehow traffic police of Addis Ababa city don't arrive at the time or addresses the problem but when they , they provide solutions through traffic regulations system. Considering the causes of traffic congestion in Addis Ababa this study reveals that waste of working time, late arrival of students on schools,

and lack of taxi service on time tends to be the major effects of traffic congestion in Addis Ababa.

5.2 Recommendations

On the basis of the findings of this research work, the following recommendations are suggested to reduce and possible reduce the challenges and traffic congestion confronting Addis Ababa due to car parking.

- ✓ Government should develop a mean through which some activities that propel on-street parking in Addis Ababa will be relocated to another area within the city.
- ✓ Government should embark on public awareness campaign and enlightenment programme as a basic mechanism for accomplishing effective traffic management control.
- ✓ Addis Ababa transport and traffic management bureau should adopt stiff penalty measures on on-street parking and traffic offenders, which will be communicated to the people.
- ✓ Off-street parking facilities/spaces should be provided at designated areas of the city.
- ✓ Police and the traffic Management Authorities are the frontlines in traffic laws. They should be mandated to enforce the rules and regulations binding the vehicular traffic operations without any fear or favour in order to mate out penalties and punishment to defaulters.
- ✓ However, if all the recommendation mentioned above are fully implemented, the problems of on- parking and traffic congestion in Addis Ababa can be minimize.

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APPENDIX
Addis Ababa University
College of social sciences
Department of Geography and Environmental Studies

Post graduate program in population and resource management questionnaire for to assess the condition of parking lots and its effects on traffic congestion in Addis Ababa city.

Dear Respondent,

Any information you provide for the purpose of this study will be treated confidentially and will not be attributed to any particular business or individual.

Thank you in advance!

1. **Identification of respondents.**
2. Sex 1. Male 2. Female.
3. Age of respondents _____
4. Marital status 1. Single 2. Married 3. Divorced 4. Widowed
5. Educational level 1. Elementary 2. High school 3. Preparatory 4. Diploma 5. Degree and above

2. The condition of street parking lots in Addis Ababa.

1. Do you always park on streets?
   a. Yes b. No
2. What are the reasons behind you park on streets?
   _____
3. How long you park on streets most of the time?
   a. 30min-45min b. 30min-1hr c. 1hr-2hr d. 2hr-4hr e. 4hr-6hr
4. Do you think there will be traffic congestion when you park your car on streets?
   a. Yes b. no
5. Do you think current condition of Addis Ababa parking is satisfactory?
   A, satisfactory b. unsatisfactory
6. If your answer for question number five is unsatisfactory what do you think will be the reason?
   _____-
7. When cars are parked along curved roads, is there will be problem when cars passing by?
   a. Yes b. No
8. What is the reason of parking cars in curved roads?
   _____-

9. Did the government new regulation of parking cars on box brought a solution?
   A. Yes b. no
10. If your answerfor number 9 is yes by what case will be minimized traffic congestion?

    _____
11. What do you think Most of the time peoples prefer to park their car on streets when there is service in building grounds?

    _____
12. Is there will be car accident when cars park on streets?
    a. Yes b. no
13. If your answer for number 12 is yes what is the reason?
    _____-
14. Do you get parking problem during existing parking condition?
    a. Yes b. no
15. Does parking create job opportunity?
    a. Yes b. no
16. Do modern parking systems will decrease accidents?
    a. Completely decrease
    b. Decrease
    c. Somehow decreases
    d. Absolutely not
17. In your view if it were would be the place of parking that decreases parking congestion?
    _____-
18. Where part of Addis Ababa is frequently found parking problem?

    _____
19. Why is on this place parking frequently found?

    _____

3. Cause of traffic congestion in Addis Ababa.

1. Either any traffic congestion in Addis Ababa?
   a. Yes b. no
2. If your answer for number 1 is yes what is the reason?

   _____
3. In Addis Ababa there is traffic congestion when students and workers in and out, so what do you think is the reason?

   _____-

4. Where part of Addis Ababa experienced most the time traffic congestion?

_____

5. Why is traffic congestion existed on those places?

_____

6. What is the reason for increasing traffic congestion from time to time?

_____

7. Do you think parking cars on streets causes traffic congestion?
   a. Yes b. no
8. If your answer for number 7 is yes what is the reason?

_____

9. Do you think there is accident when city bus and taxi dropping and lifting pedestrians on streets?
   1. Yes b. no
10. Causes of traffic congestion

Causes of traffic congestion		yes	no
1	The imbalance of road and number of cars		
2	Sameness the arrival time of education and work		
3	Ground construction of addisababa railway		
4	Frequently digging up of roads		
5	Traffic accident		
6	Parking cars on main streets		
7	Lack of enough construction building to avoid waste material		
8	Illegal trade on streets		
9	Lack of enough pedestrian roads		
10	Lack of parking area in buildings		

11. Which one of the above list is frequently experienced in Addis Ababa?

_____

4. Effect of street parking on traffic congestion.

1. Most of the time do you drive in roads where traffic congestion occurred?
   a. Yes b. no
2. If your answer is yes why you frequently drive where traffic congestion has occurred?
   a. For work b. for recreation c. for education. for shopping

3. Did Addis Ababa traffic police arrive for solution when such traffic congestion occurred?
   a. Yes they do b. no they don't

4. If they do what kind of solution they provide?

   _____

5. What kind of solution you take personally when traffic congestion occurred?

   _____

6. Most of the time do you drive in roads where traffic congestion occurred?
   a. Yes b. no
7. If your answer for number 6 is yes why you frequently drive where traffic congestion has occurred?

   _____

8. The following are results of traffic congestion. So tick on what you favour.

Results of traffic congestion	Somehow high	Moderate	High	Very high
Waste of working time				
Air pollution				
Sound pollution				
Student being late				
Late delivery of patients through ambulances				
Lack of taxi service on time				

9. Which one of the above list is frequently experienced in Addis Ababa?

   _____

10. How do you see the current traffic congestion situation?
    a. Extremely congested c. highly congested
    b. Moderate congested d. somehow congested

ቃለ መጠይቅ

1. አዲስ አበባ ዉስጥ ያለዉ የፓርኪንግ ስርአት ምን ይመስላል
2. የፓርኪንግ አገልግሎት ምን ያህል ተደራሽ ነዉ?
3. በመንግስት ደረጃ የተዘረጋ በተለይም በአዲስ አበባ ዉስጥ ስለፓርኪንግ የወጣ ህግ እና ደንብ አለወ ይካለ ዋና ዋናዎቹን ይዘርዝሩልን?
4. አዲስ አበባ ዉስጥ የትራፊክ መጨናነቅ መንስኤ ተብለዉ የሚጠቀሱት እነ ማን ናቸዉ?
5. የፓርኪንግ አገልግሎት በምን መልኩ ነዉ ለትራፊክ መጨናነቅ የሚያጋልጠዉ?
6. በፓርኪንግ ምክንያት የትራፊክ መጨናነቅ የሚያመጣዉን ችግር ለመቀነስ ምን ምን ስራዎች እየተሰሩ ነዉ?
7. አዲስ አበባ ዉስጥ በቂ የመኪና ማቆሚያ ቦታ አለ ወይንስ የለም? ከሌለለምን?