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KUMASI, GHANA**

**Performance Evaluation of the Management and Performance of On-Street
Parking Within the Central Business District of Sunyani**

By

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DECLARATION

I hereby declare that this submission is my own work to the Masters of science in Road and Transport Engineering and that, to the best of my knowledge, it contains no previously published materials by other persons nor institutions material which has been accepted for the award of any other degree of the university, except where due acknowledgement has been made in text.

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ABSTRACT

Parking plays a significant role in any transportation system. Sunyani due to its rapid urbanization and increased vehicle usage has had its fair share of parking challenges. This study sought to evaluate the performance of on-street vehicle parking which is currently under franchise management by M/s. Day and Night Towing service. The study was conducted on on-street parking bays or stalls on selected roads, namely; Atoase Road

(Market Street), Twene Amanfour Street, SY Barnie Link, Blantyne Avenue and Starlet 91 Street within the Central Business District of the Sunyani Municipality. Field data were collected to determine parking accumulation, parking occupancy, parking volume and average parking duration. The study revealed that, almost all the parking facilities operated at less than full capacity. Land use was also identified as influencing parking duration. In terms of user perception, indicators such as proximity to destination, security for parked vehicles and pedestrians, congestion and rates charged were the main factors affecting parking. Respondents were satisfied with the services except with the state of congestion which was found not to have improved. Management challenges identified included lack of adequate enforcement, lack of scientific basis in the setting of revenue targets and the absence of appropriate technology to monitor daily collection and increase revenue. The Sunyani District Assembly, the owners of the scheme should be more proactive in ensuring that enforcement of parking regulation are strictly adhered to, use a more scientific approach to forecast revenue targets and employ technology-based methods for monitoring and evaluation of revenue generation.

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TABLE OF CONTENTS

DECLARATION	ii
ABSTRACT.....	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENTS	v
LISTS OF FIGURES	ix
LISTS OF TABLES	x
CHAPTER 1: INTRODUCTION	1
1.1 BACKGROUND STUDY	1
1.2 PROBLEM STATEMENT	1
1.3 JUSTIFICATION OF THE STUDY	2
1.4 OBJECTIVES	2
1.5 STRUCTURE OF REPORT.....	3
CHAPTER 2: LITERATURE REVIEW	4
2.1 PROVISION OF PARKING FACILITIES	4

2.1.1 On-Street Parking	4
2.1.2 Off-Street Parking	5
2.1.3 Factors That Influence the Provision of Parking Facilities	6
2.2 THE CHALLENGES OF PARKING IN CENTRAL BUSINESS DISTRICTS	8
2.2.1 Lack of adequate space for parking	8
2.2.2 Spillover from parking facilities	9
2.2.3 Congestion	9
2.2.4 Pedestrian Safety and Comfort	9
2.2.5 Rapid Urbanization	10
2.2.6 Lack of Proper Policy Direction	10
2.2.7 Increased vehicle population	10
2.2.8 Enforcement Issues	11
2.2.9 Institutional Challenges	11
2.3 PARKING MANAGEMENT	11
2.3.1 Parking Management Strategies	12
2.3.2 Types of Parking Management Strategies	12
2.4 ASSESSMENT OF PARKING SERVICE QUALITY	17
2.4.1 Availability of parking spaces	18
2.4.2 Convenience	18
2.4.3 Safety	18
2.4.4 Parking charge	19
2.4.5 Cruising time	19

2.5 PARKING SURVEYS	19
2.5.1 In-Out Survey	19
2.5.2. Fixed Period sampling	20
2.5.3. License Plate Method of Survey	20
2.6 PAID PARKING SCHEMES WORLDWIDE	20
2.7 SUMMARY OF LITERATURE REVIEW	21
CHAPTER 3: RESEARCH METHODOLOGY	22
3.1 INTRODUCTION	22
3.2 DESCRIPTION OF STUDY AREA	22
3.2.1 Description of the selected routes	25
3.3 FIELD DATA COLLECTION	25
3.4 PARKING STUDIES	25
3.4.1 Parking Inventory	26
3.4.2 Parking Accumulation	26
3.4.3 Parking Duration	26
3.4.4 Parking Volume	27
3.4.5 Parking Turnover	27
3.5 KEY INFORMANT INTERVIEWS	27
3.5.1 User Interviews	27
3.5.2 Facility Operators Interviews	27
3.5.3 Institutional Interviews	27
3.6 DATA ANALYSIS TOOL	28

CHAPTER 4: RESULTS AND DISCUSIONS	
29	
4.1 INTRODUCTION	
29	
4.1.1 Twene Amanfo Street	29
4.1.2 Starlet 91 Street	32
4.1.3 Blantyne Street	34
4.1.4 S Y Barnie link	36
4.1.5 Atoase Road	39
4.2 STAKEHOLDERS VIEWS	42
4.2.1 Users of facility	42
4.2.2 Operators of facility	44
4.2.3 Managers of Parking Facility.....	45
4.3 ASSESSING THE FINANCIAL PERFORMANCE OF THE PAID PARKING SCHEME	
46	
4.3.1 Comparison of Actual Revenue against Expected Revenue	48
4.4 COMPARISON OF SUNYANI ON-STREET PAID PARKING SCHEME WITH OTHER PARKING SCHEMES IN KUMASI AND ACCRA	48
CHAPTER 5: CONCLUSION AND RECOMMENDATIONS	
50	
5.1 CONCLUSION.....	50
5.2 RECOMMENDATIONS	51
REFERENCES	
52	

APPENDIX	
54	

LISTS OF FIGURES

Figure 3.1. Roads earmarked for On-street parking by Consultant (indicated in Pink). ..	24
Figure 4.1. On-street parking along Twene Amanfo Street.	30
Figure 4.2; Weekend and Weekday Hourly Accumulation on Twene Amanfo Street	31
Figure 4.3: Weekend and Weekday Parking Duration on Twene Amanfo Street	32
Figure 4.4: On-street parking along Starlet 91 Street.	32
Figure 4.5; Weekend and Weekday Hourly Accumulation on Starlet 91 Street	33
Figure 4.6: Weekday and Weekday Parking Duration Chart	34
Figure 4.7: On-street parking along Blantyne Street	35
Figure 4.8; Weekend and Weekday Hourly Accumulation on Blantyne Street	35
Figure 4.9; Weekday and Weekend Parking Duration Chart	36
Figure.4.10: On-street parking along S.Y. Barnie Link	37
Figure 4.11; Weekend and Weekday Hourly Accumulation on SY Barnie Link	38
Figure 4.12; Weekend and Weekday Parking Duration Chart	38
Figure 4.13: On-street parking along Atoase Street.	39
Figure 4.14; Weekend and Weekday Hourly Accumulation on Atoase Street	40
Figure 4.15; Weekday and Weekend Parking Duration Chart	40

LISTS OF TABLES

Table 4.1. Summary of Weekday Parking Studies	41
Table 4.2. Summary of Weekend Parking Studies	41
Table 4.3 Yearly Targets indicated against Actual Revenues Achievements	
44 Table 4.4. Assessment of the financial performance of the paid parking scheme	
.....	48

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND STUDY

Parking is an important aspect of any transportation system as a vehicle at the end of an auto-based travel requires a space to park. The two main forms of parking are on-street and off street parking. Parking also can be described as inter- immediate good as it forms part of the cycle of travel to satisfy a need or want. The facilities of on-street or off street parking when treated as a common good can be subjected to abuse. Additionally, parking if also underpriced comes with its own repercussions as a poorly managed facility can create intense traffic congestion and also compromise on motorist safety.

Central Business Districts (CBDs) of developing cities are areas of intense socio-economic and commercial activities. Sunyani, like any emerging developing city is confronted with huge demand for road transport infrastructure in its commercial enclave. Therefore providing adequate parking space to meet the demand for parking has become a huge challenge. Thus, a number of on-street facilities have been put under franchise management.

For the past three years, since the management of on-street parking facilities in the municipality were put under franchise, there has not been an assessment of the performances of the various management entities. This study therefore assesses the performance of the management of on-street parking facilities in the Central Business District (CBD) of the Sunyani Municipality.

1.2 PROBLEM STATEMENT

On street parking is normally provided in Central Business Districts so that people can have easy access to their businesses, generate revenue for the Local Authority as well as act as a restraint to control congestion. On street parking occupies roadway resources.

Sunyani, like Kumasi and Accra, due to its high economic activities has a number on street parking facilities under franchise management within its commercial enclave. However on-street parking facilities are confronted with the challenges of street hawking unauthorized parking by three wheelers at designated parking lots, inefficient use of parking space and pricing among others. It appears the Sunyani Municipal Assembly is comfortable with the present situation as no attempt has been made to assess performance and also on potential loss in revenue due to the current franchise management arrangement.

1.3 JUSTIFICATION OF THE STUDY

The study is being conducted to appraise the performance of the present franchise management arrangement and to advice on possible revenue generation through changes in faint setting approaches. This will stimulate improvement in the traffic management situation within the Central Business District of the municipality since traffic congestion will reduce and also encourage related environmental benefits. For the past three years, no assessment has been conducted on the existing arrangement and this service especially its findings will provide a basis of informing appropriate management for use in future engagements.

1.4 OBJECTIVES

The objectives of the research are presented as follows:-

1. To determine the usage characteristics of on-street parking facilities (parking duration, parking accumulation, parking turnover and volume) in the study area;
2. To investigate user perception on the quality of parking service delivery;
3. To examine the revenue prospects and the willingness to pay for time limited parking; and

4. To identify management challenges and to inform policy direction regarding the management of on-street parking facilities.

1.5 STRUCTURE OF REPORT

The report will mainly consist of five (5) chapters which are indicated below:

Chapter 1 –The contents of chapter 1 consists basically of the background study which gives information about the baseline conditions at the project site and what this research seeks to accomplish. It also outlines the present challenges with the system, the justification for the study and the objectives of the research. Chapter 2 –gives the Literature Review, this chapter consisted basically of the review of similar works or publications by other authors on the topic. The literatures that were reviewed consisted of book publications and relevant journals. The research methodology is presented in various methods used in the research and also included the collection of various data and conducting of inventory for analytical purposes. The Chapter 4 - Analysis and Interpretation of Results, the results obtained were also discussed and some conclusions arrived at. It uses charts and tables to present the results. Chapter 5 – summarizes the main Conclusions and Recommendations of the study. Here conclusions are drawn out of the results obtained which were then used to make appropriate recommendations.

CHAPTER 2: LITERATURE REVIEW

2.1 PROVISION OF PARKING FACILITIES

Parking facilities are generally provided to satisfy parking demand. It considerably influences travel behavior, and thus a major urban transport challenge confronts transportation planners. Parking areas are places of change of transport modality where user switch modes. A parking facility can be described as on-street or off-street based on its location.

2.1.1 On-Street Parking

An on-street parking is a type of parking in which vehicles are allowed to park along the road or streets. Guo (2012) described on-street parking facilities as facilities which occupy road-way space and are found in both residential and business centers but more predominant in business centers because of the convenience it provides. Business owners and clients regard on-street parking as an essential service because it occupies less land space than off-street parking and provides convenient access to destinations.

On street parking if well managed can be used as a restraint. That is especially when variable pricing is applied, at certain times of the day, the facility can be priced so high to restrain some patrons of the facility and thereby reduce congestion at that location. Again when on street parking is well priced, it can generate a lot of revenue. On street parking can also be used to regenerate a business center once customers realize they can easily find convenient parking places which are close to their businesses. According to **Garrick et al (2009)**, on-street parking plays a crucial role in benefitting activity centers. Some of the derived benefits include higher efficiency; that is, it is highly patronized when compared to other parking types like off-street parking. The research further suggested that, on street parking also results in better land use as well as increase in safety when well managed.

Guo (2012) used the hazard-based duration model to establish that, on street parking is influenced by various factors, which also affects the distribution of travel time. He further concluded that, any change in the influential factors could affect travel time. It was further suggested through the influential factors relating to the characteristics of on-street parking should be given full consideration in the planning and designing of on-street parking facilities.

A poorly managed on-street parking facility results in the reduction in travel lane capacity and increase delay of through traffic due to vehicle maneuvering. It also contributes to congestion which arises out of longer cruising time that drivers spend by moving round in a bid to secure parking spots. Again, when vehicles spend longer cruising times, they also cause environmental pollution through emissions of gases such as carbon monoxide, hydrocarbons, oxides of nitrogen, lead and other particulate matter from the exhaust fumes of the vehicles. The search for a parking place is a task which can waste a lot of time and affect the efficiency of economic activities and social interactions. Safety of pedestrians also is of concern when on-street parking is not well managed.

2.1.2 Off-Street Parking

Off street as the name suggest are not provided on streets or roads. It can be located in both residential and business centers. Off street parking facilities normally have large land space compared to on-street. In terms of pricing off-street parking facilities are mostly low priced. It includes private lots, garages and driveways and the constructional cost of offstreet parking are quite high.

2.1.3 Factors That Influence the Provision of Parking Facilities

The type of parking facility that is whether on-street or off street and its location are influenced by a myriad of factors. Some of the influential factors are described in the following;

❖ Land Use Type

This helps to determine the type of activities that goes on within the location, determine the demand and the appropriate type of parking to provide. research work done by Osoba (2012) proved that, parking problems and traffic congestion are obvious in commercial

areas as a result of the land use pattern. He further established that, commercial land use has a high vehicular and pedestrian traffic generating capacity.

❖ **Vehicle Ownership and Vehicle Population**

Influences the type and the need for parking within a particular enclave. When vehicle population is high, there is a high probability of traffic congestion occurring and parking can be introduced at the appropriate locations to control the vehicle population. When such situation occurs, parking can be introduced at the periphery of the town to control the vehicle population. The vehicle population will help to determine the parking demand and also inform the appropriate type of parking to be introduced.

❖ **Average Household Income**

When income levels of people are generally high, there is a tendency for them to acquire more than one vehicle which in variably increases the vehicle population .Again when income levels are generally high, people naturally indulge in a lot of leisure trips like shopping and visiting recreational centers. The activity centers where these leisure trips are undertaken will also experience increases in vehicle population thereby necessitating the need for the provision of parking facilities.

❖ **Proposed Future Developments**

In making provision for demand for parking facilities, proposed future developments of the city should be considered because when they are implemented or completed they will also generate traffic which will utilize the parking facility.

❖ **Availability of land space**

Available land space also affects the provision of parking facility. For instance, if a road width is small, it will be impossible to make provision for on-street parking facility. Again if the available land is small and demand is high warranting the provision of a parking

facility, then the City Authority or the provider of the parking facility will have to make do with the inadequate available space.

❖ **Availability of funds**

Availability of funds plays a key role in the provision of parking facilities. Especially, construction of off street parking facility like multi-storey car park requires huge capital outlay. Though there might be the need to construct a multi-purpose car park to ease congestion and illegal parking, however, due to lack of funds, developers might opt for less capital intensive type of facility which may not address the problem of congestion and illegal parking within the Central Business District.

❖ **Average travel distance**

Average travel distance of each resident or shopper from the parking facility is a factor that influences the location of a parking facility at a particular location. When parking facilities are sited too far from especially business or recreational centers, pedestrians are inconvenienced since they have to undertake long walks to reach service locations. The inconvenience of walking might compel drivers to abandon the facility or look for closer ones or the other alternative will be to park illegally at unwarranted locations. It is therefore important to consider the location of a parking facility so as not to make it under-utilized or abandoned.

❖ **The target group**

Sometimes private business provides parking facilities as a means of attracting customers or clients to their businesses. Knowledge of target market or group will also influence the type of parking facility that one would choose as well as the management style that one would adopt.

2.2 THE CHALLENGES OF PARKING IN CENTRAL BUSINESS DISTRICTS

Aderamo and Salau (2013) conducted research on Ilorin city to examine the pattern and problems of on-street and off-street parking in Ilorin. They discovered that, the absence of designated parking lots led to congestion and delay problems. Through their research they were able to come up with parking demand models for estimating on-street and off-street parking of selected streets and parking facilities in Ilorin. They further recommended effective traffic management system that should be evolved to avoid the situation that pertains in larger urban centers.

The main challenges that affect the provision of parking facilities are discussed below:

2.2.1 Lack of adequate space for parking

Parking facilities are essentially provided in relation to satisfying vehicle population demand. Especially in Central Business Districts, a lot of activities occur, however, the available parking spaces are mostly not adequate to contain the volume of vehicles that travel to the city center on daily basis. The inadequate parking space could also be due to lack of proper assessment of the entire parking needs before its implementation.

2.2.2 Spillover from parking facilities

Spillover parking problems refers to the undesirable use of offsite parking facilities, such as when business customers and employees park on nearby residential streets or use another businesses' parking lot. Concerns about spillover impacts are used to justify excessive parking requirements and opposition to management solutions. Addressing spillover problems can increase parking management program acceptability and effectiveness.

2.3.3 Congestion

This happens when drivers compete for the few parking lots available. Since drivers spend longer periods cruising through town in a bid to find parking spots, they end up compounding the already existing traffic problems thereby leading to more congestion.

These congested roads with high vehicle population result in pollution of the Central Business District from the exhaust fumes of vehicle. A classical case is that of China where some of their city centers are so polluted that during certain times of the week people are warned not to drive cars to or advised to wear nose mask to avoid inhaling polluted air and contracting respiratory diseases.

2.2.4 Pedestrian Safety and Comfort

This is particularly prominent with on street parking where vehicles are consistently maneuvering and reversing into the main roadway thereby interfering with pedestrian traffic. Poor parking on the walkway constrain pedestrians into the roadway to compete with vehicular traffic and this exposes them to risks. Illegal street parking hinders the movements of vehicles and walkway which is important for pedestrian comfort and safety Ebihart & Corresponding (2013).

2.2.5 Rapid Urbanization

As the population of a city increases rapidly over the years, it put constraints on the existing parking facility. According to the 2010 Population and Housing Census, out of about 25 Million, more than half of Ghana's population live in urban areas. It is projected that by 2030, a total of 22.6 million Ghanaians representing about 65% of the national population would live in urban areas. Currently, major cities in the country are growing as fast as 4.5% per annum. This increase does not correspond to the capacity of the municipalities in 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 will continue to exert pressure on parking spaces.

2.2.6 Lack of Proper Policy Direction

Most cities or Local Authorities do not have proper policy to address present and future challenges that arises or would arise as far as parking is concerned. Lack of policy for parking leads to a myriad of issues ranging from institutional, organizational to enforcement issues. In Ghana, almost all the functioning parking facilities are under franchise management. **London's Department of Transport Traffic Management ACT 2004** recommends that each Local Authority should have a clear idea of what its parking policy is and what it intends to achieve by it. It further suggests that the policy direction should apply whether or not an Authority is responsible for enforcement.

2.2.7 Increased vehicle population

According to DVLA report for 2012, the number of vehicles registered was 174, 234, which was 23% more than that reported for the previous year. The DVLA inspected about 946,284 vehicles for road-worthiness last year, which brings the total vehicle population in the country to nearly a million, with concentration in the two biggest cities, Accra and Kumasi. This statistics clearly indicate the challenge that policy makers and operators of parking facilities faces with the astronomical increase in vehicle population vis-à-vis the limited parking space. The challenge encountered is trying to match up the increase in demand against the scarce available space.

2.2.8 Enforcement Issues

Enforcement of parking regulations is one of the major challenges of parking in Central Business Districts. Most times due to the high volumes of vehicle, drivers tend to park illegally, park for longer durations as well generally flaunt traffic rules. When parking rules

are not adhered to it can cause congestion which leads to chaotic traffic situation. Lack of political will to enforce fines and punishments associated with the violation of parking rules is also a major enforcement issue. This is prominent in Ghana where people flout parking rules with impunity and yet go unpunished because of their political affiliation or status in society.

2.2.9 Institutional Challenges

Several researches have proved that, the operation of public parking under franchise or private management has proved successful. When the City Authorities take control of the policy and strategy as well as operation of parking facilities, there are bound to be a number of challenges including operational over lapse,

2.3 PARKING MANAGEMENT

Parking management refers to policies and programs that result in more efficient use of parking resources Litman (2006). It involves how a parking facility is controlled through prices, time limits, and other regulations. Effective management of parking facilities can result in high turnover as well as generation of revenue which can be used to improve the system or to support other sectors of the economy. The main indicators for managing parking are time limits and price. Parking management can improve user quality of service, help create more accessible land uses, reduce congestion, accidents and pollution, create more attractive communities and improve mobility for non-drivers. For this reason, improved management is often the best solution to parking problems.

2.3.1 Parking Management Strategies

These are strategies required to efficiently and effectively manage parking problems. The strategies include enforcement, parking regulation, price based regulation and shared parking. The various strategies are effective when combined. The choice of a management

strategy is influenced by several factors including the type of parking problem, the funds available as well as the type of parking facility and the technical expertise to run such a system.

Litman (2015) recommended the use of management strategies to address parking challenges instead of relying entirely on planning policies. He found these strategies to be technically feasible, cost effective, and also capable of providing many benefits to users and communities.

According to a research done on Riyadh city, it was found out that, the problem of on street parking is not related to inadequate parking space, but is generally related to poor management.

In Shenzhen in china, to reduce congestion, the city authorities increased parking fees on certain routes and this led to a 30% drop in congestion Rye (2010).

2.3.2 Types of Parking Management Strategies

❖ Enforcement strategy

Indiscriminate use of road facilities is very common among motorists and very often, the uncoordinated manner through which the road system is used creates further crisis. Thus, the need for an effective means of enforcement. To this end, Police and the traffic Management Authorities are the frontliners of traffic laws enforcement. They are mandated to enforce the rules and regulations binding vehicular traffic operations without fear or favour. In Ghana, where most of our parking facilities are managed under franchise management through public private partnership, the managers in charge of the parking facility can cooperate with the local task force of the metropolitan or Municipal Assemblies to ensure enforcement of parking rules and regulation.

The main constrain with the enforcement strategy is having enough enforcement officers to effectively monitor and control the parking facility. Normally, the enforcement officers monitor the parking spaces occupancy by walking around the parking lots to inspect the occupancy of individual spots as well as illegal parking. This is obviously time-consuming.

Enforcement is a necessary but not sufficient element of comprehensive parking management; other technology and regulatory strategies are necessary to improve parking conditions and support overall goals of an efficient transportation system. Osoba (2012) also advocates for the use of disciplined enforcement agencies to address the traffic regulations.

❖ **Technological Strategy**

The use of computers and other information technological tools like communication gadgets and radar for traffic monitoring are highly relevant for solving complex issues relating to parking problems and traffic management.

The use of more advanced technology in parking management is increasing and includes strategies as electronic and mobile device payment options, networked meters and occupancy sensors, and real-time information that can be disseminated via on-street signage and the internet.

Giuffrè *et al*, (2012) presented a novel smart parking system, called IPA, for the management of the off-street parking spots in consolidated cities. IPA puts the management of parking spots into a different perspective that goes beyond the simple engineering (or automation) of parking system through the use of advanced ICT solutions, such as wireless networks and sensor communication.

In general, smart parking technology allows people to dynamically reserve and pay for parking. Such technology may facilitate the introduction of parking pricing policies and significantly reduce auto travel and increase transit ridership. E-parking is an innovative business platform that uses advanced technologies to allow users to inquire about, reserve, and pay for parking, all without ever leaving their cars. Contactless smart cards can minimize transaction time by allowing a user to simply wave their card in front of a reader. Again just like enforcement, technology works better when combined with other parking strategies like conventional strategy and price based regulation.

The main challenges associated with technological management includes the huge capital investment required to purchase the technology as well as maintain the equipment. The technical expertise required to man such a system is also a challenge.

❖ Parking Regulation

Parking regulation controls who, when and how long vehicles may park at a particular location, in order to prioritize parking facility use. Parking and/or conventional regulatory strategy has long been the cornerstone of on-street parking policies and programs in San Francisco and include: traditional metering, time limits, residential permits, and colored curbs. Although some of these strategies utilize a fee, as in the case of meters, conventional regulation does not utilize variable or demand-based pricing as a central tool in meeting performance objectives for availability or utilization of on-street parking supply. Parking regulation necessitates an administrative process by which parking conditions are periodically observed and modifications to the “mix” of regulations are undertaken.

❖ Price-Based Parking

This means motorists are charged based on their usage of the parking facility. Pricing is also very important for the efficient management of parking facilities. For instance during peak

and off peak periods, a parking facility can be priced differently to either attract or discourage people from using the facility. When pricing is applied this way, it is called variable pricing. When variable pricing is applied, it can be used to generate revenue which can be used to maintain the facility as well as support other sectors of the economy if it is state managed. Variable pricing works well when backed by technology. Mackowski et al., (2015) concluded that, dynamic or variable pricing can be used to reduce cruising time, reduce congestion in the busy centers and also positively impact the local economy.

Pricing can also be used to encourage the use of off-street parking than on-street parking as a way of minimizing congestion and pollution in the Central Business District. This can be achieved by lowering the price of the off-street whilst the on-street is kept highly priced. This will force drivers to choose the off-street facility over the on-street facility.

Parking facilities when underpriced suffers from the tragedy of the commons where it is over utilized. Again when it is overpriced too the facility ends up abandoned thereby defeating the reasons for its construction. Therefore to effectively manage parking facilities, it is important that the right pricing approach is applied.

Inturri and Ignaccolo, (2011) recommended that effective parking management scheme requires variable on street pricing strategies that depend on the location of the parking facility, with higher fares in higher density, more attractive and congested urban areas. The variable pricing of on street parking facilities address the challenges of supply and demand which can create traffic congestion in Central Business Districts.

Adams *et al* (2014) recommended that, management of on-street parking can be greatly improved through intensive monitoring of the scheme, vigilance and close supervision. Their research further concluded that technology based parking charge collection and monitoring system will also help to keep parameters from declining. Other studies

advocate that, the pricing of on-street parking should be regulated using indices like the geographical location of the park, the time of the day and the demand that exist at a particular point in time.

Martens *et al*, (2010) established that using PARKAGENT model, parking facilities with low turnover have negligible cruising rate compared to facilities with high turnover. They also discovered that, for parking facilities where the arrival rate is essentially higher than the egress rate and does not depend on the level of parking turnover, in such circumstances, parking search may be described with a simple mathematical model. They then concluded that, PARKAGENT model can be used to support decision-makers to set policies that reduce cruising for parking as much as possible.

Chen (2015) conducted research on price elasticity by time of day for on-street parking demand on a block level in the United State. They demonstrated that even though price elasticities are inelastic, the parking rate adjustments made in Seattle affected the on-street parking occupancy. The study also used empirical evidence to buttress their point that, neighbourhood /environmental characteristics such as land use diversity and the availability of other travel mode alternatives affect parking demand responses to pricing. They finally concluded that, cities pursue dynamic occupancy and pricing monitoring system: the starting prices may be set more in line with the demand depending on time of day and the surrounding environment

Saltzman (2015) used an animated simulation model called FSTOP in the city central business district of San Francisco to gauge the effectiveness of several strategies to improve short term on-street parking conditions. When the model was used to quantify the impact of replacing current meters by either in-cars or resetting meters, the model output indicated an increase in the level of enforcement of the one hour time limit which also

meant there was an improvement in the turnover and thus the probability of finding a convenient on-street parking space.

Shoup (2013) concluded from his research that, if on-street parking was properly priced, the market could easily regulate the number of parking apices thereby eliminating minimum parking requirements that could reduce the cost of urban development, improve urban design, unburden enterprise, reduce automobile dependency and restrain urban sprawl.

2.4 ASSESSMENT OF PARKING SERVICE QUALITY

Several indicators can be used to assess the quality of service that a parking facility provides. The variables include; safety, availability of parking spaces, convenience, cost and cruising time.

He *et al*, (2015) developed a comprehensive parking facility service evaluation method called level of service that combined four parking service variables namely; peak-hour demand to capacity ratio, average parking space utilization rate, parking cost, and circulation time, into one single index. Based on the value of index, four levels of service were rated as excellent, good, fair and poor according to users' perception. They also established that, the developed level of service can also be used for planning and design.

2.4.1 Availability of parking spaces

Availability is the percentage of parking spaces in an area or facility that are not in use at a given time. Availability can also be described as occupancy or vacancy. The availability of parking space is a determining factor in whether people will travel to particular destinations during certain times of the day. Parking lots are places meant for vehicles to park but when a parking facility is managed such that people are not able to get places to park their cars, then such a facility is likely to be classified as providing poor level of

service. Good parking management strategy is appropriate to ensure that, parking spaces are available at all times. When people realize that it is difficult to get spaces to park in activity centres, they are likely to avoid such places and this will affect businesses around due to low patronage. Rye (2010) identified variable pricing and time limits as some of the parking management strategies that can be implemented to free up spaces at parking facilities.

2.4.2 Convenience

Convenience in this sense means proximity to destination. People normally prefer on-street parking to off-street parking because of the convenience of walking short distance to their destination. When the average travel distance from parking facilities to residential or commercial facilities is far, users of the parking facility are likely to abandon such facilities and look for closer facilities. Litman (2013) defined parking facility level of service by walking distance to destination as a criterion for parking facility's performance evaluation in terms of proximity.

2.4.3 Safety

People are more inclined to choose or patronize parking facilities where they feel their personal effects are better protected or well taken care of. According to survey that was conducted on a business suburb within San Francisco, safety received the highest rating out of other attributes such as availability, convenience and availability of different payment options.

2.4.4 Parking charge

When parking is highly priced, people are generally pushed to find alternative facilities whose charges are moderate or more affordable. Again when the facility is priced low, there is high demand on such a facility resulting in it being over used or high turnover.

Therefore it is important that the right pricing is charged at parking facilities.

2.4.5 Cruising time

Lack of available parking space at a parking facility will cause drivers to cruise around for longer periods in the hope of identifying a parking space. The longer periods spent cruising in order to find parking spots will increase the frustration of drivers. Longer cruising times also result in externalities like congestion, pollution and illegal parking. An on-street parking occupancy of 85 percent has been demonstrated by parking experts, most notably Donald Shoup of University of California, Los Angeles, as the benchmark for the practical capacity of on-street parking. At 85 percent occupancy, approximately one available space is expected per block, thus limiting the cruising phenomenon and generally assuring the availability of a space.

2.5 PARKING SURVEYS

Parking survey is the means or tool through which information is gathered for parking studies. The most common parking surveys usually conducted includes in-out survey, fixed period sampling and license plate method of survey.

2.5.1 In-Out Survey

In this survey, the occupancy count in the selected parking lot is taken at the beginning. Then the number of vehicles that enter the parking lot for a particular time interval is counted. The number of vehicles that leave the parking lot is also taken. The final occupancy in the parking lot is also taken. Here the labor required is very less. Only one person may be enough. In-out method does not give information regarding parking duration and parking turn over. These identified limitations makes it impossible to estimate the parking fare from this survey.

2.5.2. Fixed Period sampling

For quick survey purposes, a fixed period sampling can also be done. This is almost similar to in-out survey. All vehicles are counted at the beginning of the survey. Then after a fixed time interval that may vary between 15 minutes to one hour, the count is again taken. Here there are chances of missing the number of vehicles that were parked for a short duration.

2.5.3. License Plate Method of Survey

This results in the most accurate and realistic data. In this case of survey, every parking space 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 space. The License Plate method allows information such as parking duration and parking turnover to be determined. The determination of parking fare is easily derived through the parking duration. For shorter time interval, there are less chances of missing short-term parkers. But this method is very labor intensive.

2.6 PAID PARKING SCHEMES WORLDWIDE

All over the world, as part of traffic management strategies, a lot of cities have come with different parking schemes which includes on-street and off-street paid parking schemes. These paid parking schemes based on how they are managed have either improved or worsen the already existing traffic situation.

In Kampala city in Uganda for instance the introduction of paid on-street parking has been used to address congestion challenges. Parking on-street for more than three (3) hours attracts a fine. The collection of the fines is the responsibility of the franchised company. This according to city authorities has helped to reduce congestion drastically Rye (2010) .

In Serbia city of Nis, after the introduction of paid on-street parking, the city was able to generate revenue which was used to support other sectors of the economy. In Nis,

preference is given to residents for long term parkers while visitors are required to pay by the hour.

In Europe and America, paid on-street parking is more technology based. Real time information is made available to parkers to decide on their parking options.

2.7 SUMMARY OF LITERATURE REVIEW

Following findings from the review, these survey methods have been adopted and will be used;

- i. Parking inventory: collection of information on type and number parking spaces, times of operation, limit of parking duration, parking fees etc.
- ii. Parking turnover: determination of the rate of use of the parking facility.
- iii. Parking duration: determination of the length of time a vehicle is parked at a parking facility.
- iv. Parking volume: determination of the total number of vehicles that park in a study area during a specified time. Repetition is avoided that is; a vehicle is counted once.
- v. Parking accumulation: determination of the number of parked vehicles in a study area at any specified time.
- vi. Questionnaires will be administered and interviews conducted to solicit for the views of stakeholders on the operations of the franchise management.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

The intended data collection method included field surveys such as parking inventory, parking turnover, parking duration and parking accumulation. Questionnaires and key informant interviews were also administered to the relevant stakeholders to solicit for

views on the operation and management of the parking facility. Additionally, secondary data were extracted from documents relevant to the research work. Administrative and field data collected were analysed using Microsoft Excel.

3.2 DESCRIPTION OF STUDY AREA

Sunyani is the capital of Brong Ahafo region and lies on latitude (**719'59.988"N**) and longitude (**219'59.988"W**). Sunyani has a population of 248,496 (2012 Census). The economy of Sunyani is predominantly agrarian with approximately 48% of the population engaged in agricultural production. It is considered as one of the major food baskets of the country and supplies most of our forest products like timber for export.

Sunyani is currently experiencing rapid urbanization due to the changing dynamics of its land use. Within the past few years, there has been the establishment of two universities; that is the Catholic University College (CUC), Fiapre and the University of Energy and Natural Resources (UENR). These educational facilities coupled with the establishment of other businesses within the municipality have also contributed its own share of the negative externalities of traffic. The huge impact of traffic on mobility within the Central Business District led to the provision of a comprehensive traffic management scheme. On-street parking is one of the traffic management initiatives that was introduced and which is being operated under franchise management. The total road network within the Sunyani Municipality is 423.7km. The Figure 3.1 below indicates the road on which on-street parking facilities have been provided.

KNULICT



Figure 3.1. Roads earmarked for On-street parking by Consultant (indicated in Pink).

24
KNUST



3.2.1 Description of the selected routes

The Atoase Road (Market Street), Zongo One way, Twene Amanfour Street, SY Barnie Link, Nyamaa St, Akosua Dua street, Blantyne Avenue and Starlet 91 Street are the main routes on which on-street parking is undertaken. All routes selected for the on-street parking are local or access roads. The road width was also crucial in determining the parking geometry on each road. Parallel and 60° angle parking are the main parking geometries which were found on the on-street parking areas. All the on-street parking routes except Twene Amanfo have parallel parking geometry. The on-street parking facility was actually developed for short term parkers.

3.3 FIELD DATA COLLECTION

The field data collection was undertaken to primarily document existing parking conditions through parking inventory. Quantitative analysis which involves the recording of license number plate of vehicles entering and leaving study area was used to determine parking turnover, occupancy, volume and duration. Field survey was necessary to provide factual evidence of parking supply and demand. Questionnaires were administered to the relevant stakeholders to solicit for their views on the on-street parking.

3.4 PARKING STUDIES

Parking studies was conducted to collect the required information about the capacity and use of the existing parking facilities. The defined study area was the Central Business District within the Sunyani Municipality. The parking studies was undertaken on all onstreet parking facilities from 7:00 am to 4:00 pm on Thursday and Saturday, March 31 and April 16 of 2016. The license plate method was used for the survey. Even though this method is laborious, it has been found to provide more accurate and realistic data. For each on-street parking facility, two observers were placed to record the registration number of

vehicles continuously at intervals of 15 minutes. For the parking inventory, two enumerators inspected all the parking facilities and gathered the needed information.

Under parking studies, the following under listed data collection were undertaken.

3.4.1 Parking Inventory

Information was collected on areas where parking facilities are located, existing conditions of the facilities, number of parking spaces available, parking rates charged at these onstreet parking facilities and parking duration. Information was also gathered on whether the parking facility type is for short time parkers or long time parkers. The angle in which the parking spaces were designed in respect of the road alignment were also noted. That is whether vehicles park at angles of 30, 45, 60, 90°C or parallel. The operators of the various on-street parking facilities were also identified.

3.4.2 Parking Accumulation

Data on the number of vehicles parked in the study area during a specific period of time was collected. First, the number of vehicles already in that area were estimated. Then the number of vehicles entering and exiting during that specified period were noted, and added or subtracted from the accumulated number of vehicles. Accumulation data was normally summarized by time period for the entire study area. The license plate method was used in attaining the accumulation data.

3.4.3 Parking Duration

The ratio of total vehicle hours to the number of vehicles parked. It can also be described as the length of time a vehicle is parked at a parking facility. The parking duration data was also derived from the license plate method.

$$\text{parking duration} = \frac{\text{parking load}}{\text{parking volume}}$$

3.4.4 Parking Volume

The total number of vehicles that were parked at the facilities from 7:00 am to 4:00 pm was used to determine the overall parking volume.

3.4.5 Parking Turnover

It is the ratio of number of vehicles parked in a duration to the number of available parking spaces. This can be expressed as number of vehicles per available spaces per time duration. This was also obtained from the license plate method data that was collected.

3.5 KEY INFORMANT INTERVIEWS

3.5.1 User Interviews

Opinions of users of the facility were sought through the use of questionnaires and interviews. The sampling technique applied in the user survey was random. For the parking interviews, drivers are interviewed right in the parking lot. The interviews helped gather information on origin and destination, trip purpose, trip frequency, availability of parking space, safety of facility and convenience in terms of average walking distance to business centres. Again, the opinion of users were sought on the impact of the paid parking scheme on travel and businesses in the Central Business District. Operators of businesses around were also interviewed to determine the impact of the paid on-street parking on their businesses.

3.5.2 Facility Operators Interviews

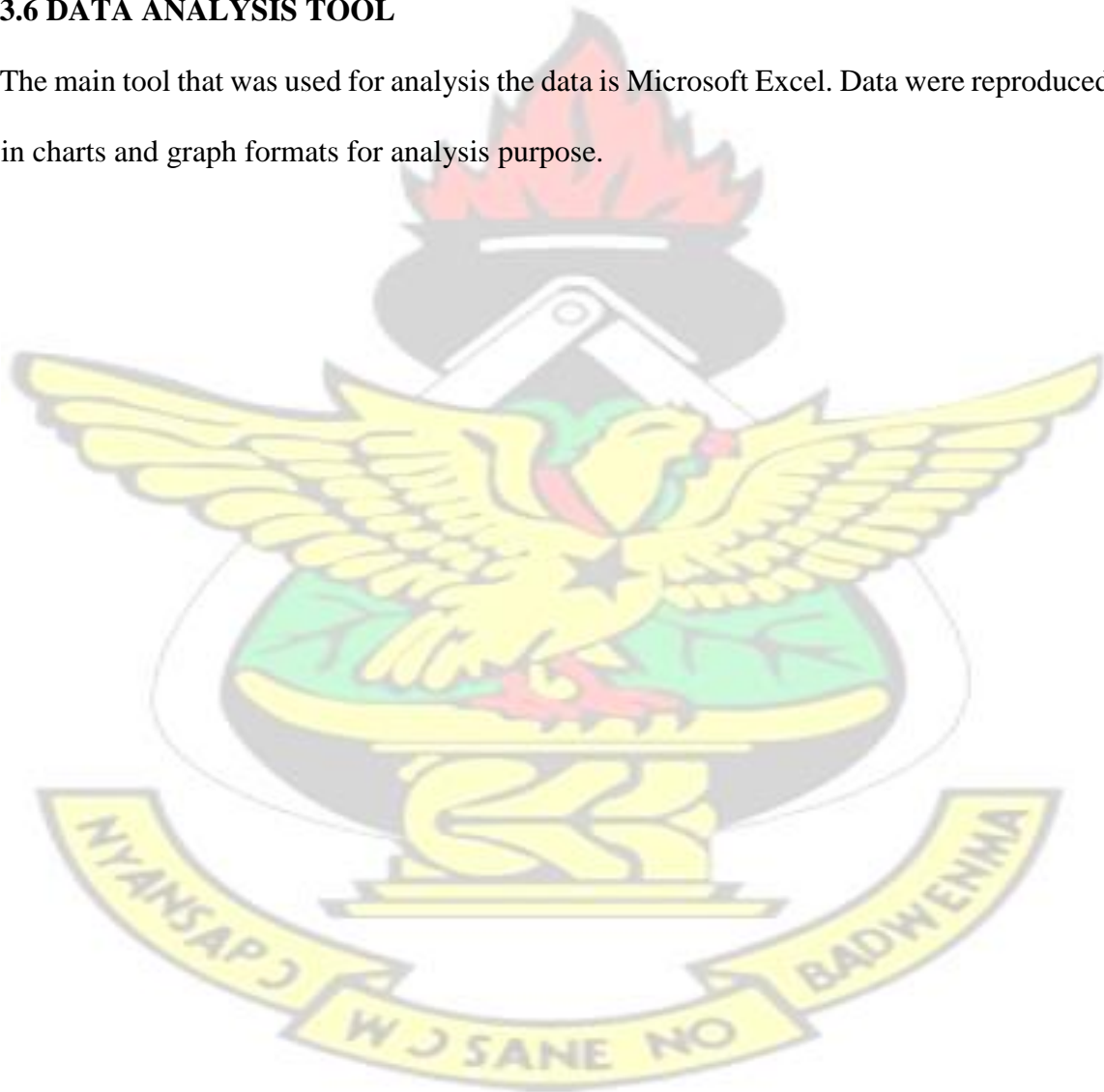
Questionnaires were administered to facility operators to determine the challenges they face managing and operating the parking facilities.

3.5.3 Institutional Interviews

Key officials of the Regional Coordinating Council, Sunyani Municipal Assembly, and the Department of Urban Roads were interviewed. Information was sought from management and operators through the use of questionnaires. Some of the questions asked included the challenges with meeting revenue target, user's willingness to pay for the use of the facility and also their general views on the scheme as well as means of improving the system.

3.6 DATA ANALYSIS TOOL

The main tool that was used for analysis the data is Microsoft Excel. Data were reproduced in charts and graph formats for analysis purpose.



CHAPTER 4: RESULTS AND DISCUSSIONS

4.1 INTRODUCTION

The on-street parking within the Central Business District of Sunyani is operated under franchise management by a private firm, Messrs. Day and Night Towing Services. The Sunyani Municipal Assembly awarded the contract to M/s Day and Night Towing Services in 2014. The Assembly is in charge of taking key management decisions such as policies, implementation and enforcement of these policies. M/s Day and Night Towing Services assists the Assembly with the enforcement of parking regulations by towing away cars that park at unauthorized locations. The core business of M/s Day and Night Towing Services is to also collect daily parking revenue. Per the contract, the Contractor receives 40% and the Assembly takes 60% of the annual revenue. The yearly revenue target is given by the Assembly and M/s Day and Night Towing Services pays its key staff monthly salaries but the revenue collectors are paid on commission basis.

Out of the twenty-one (21) roads that were earmarked for the on-street parking, only eight have so far been implemented. For purposes of this study, data was collected on five (5) routes namely; Twene Amanfo, Blantyne Avenue, Atoase road, Starlet 91 and SY Barnie Street.

4.1.1 Twene Amanfo Street

Twene Amanfo Street is in the Central Business district of Sunyani. It is located within a residential area but close to banks, offices and schools. A total of 90 spaces have been provided for parking. It features a one-way traffic system and the parking geometry is 60° inclined. The estimated parking volume was 132 vehicles on weekday and 106 vehicles on weekend. An average parking duration of 18 and 14 minutes representing week day and weekend respectively were noted Twene Amanfo Street had an average occupancy of 44%

on weekday and 27% on weekend. The occupancy values obtained means that, it is very easy to find a space to park since the facility does not operate at full capacity. Figure 4.1 below shows the parking geometry of the on-street parking along the Twene Amanfo Street.



Figure 4.1. On-street parking along Twene Amanfo Street.

The lower occupancy value obtained on weekend was due to the fact that banks, offices and schools that patronize this parking facility are absent on weekends. The figure 4.2 indicated below also gives information about the hourly accumulation variations on the Twene Amanfo Street.

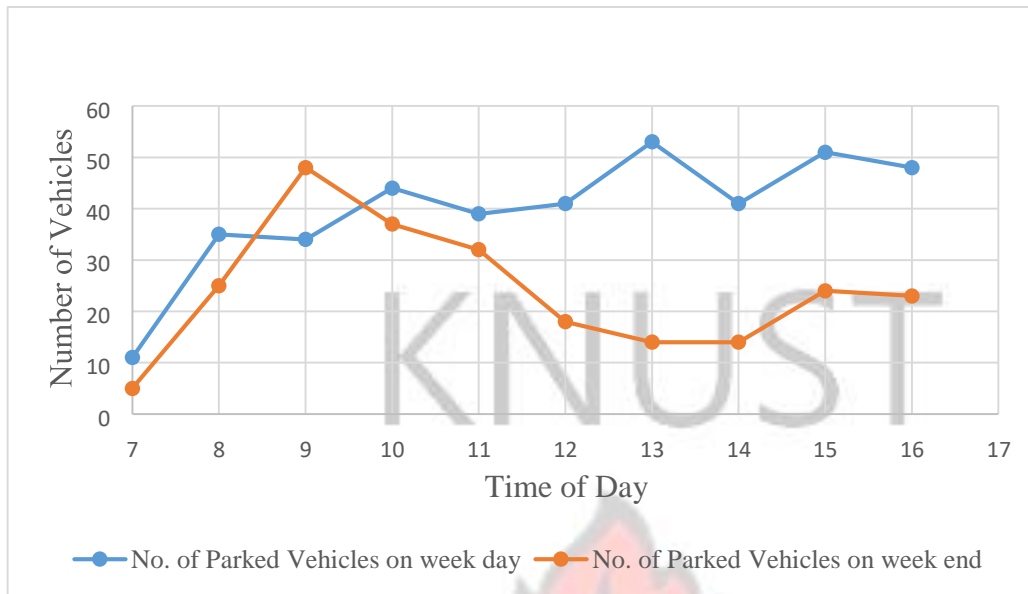


Figure 4.2; Weekend and Weekday Hourly Accumulation on Twene Amanfo Street

In terms of hourly accumulation, it can clearly be seen from the figure that, for the week day graph, the vehicle accumulation increased steadily from 7:00 am in the morning and peaked at 13:00 hours. The peak period could be attributed to the fact that the time is the break period /lunch time for most corporate institutions and as such people moved to the CBD either to shop or to have lunch. The weekend graph also recorded the highest accumulation value at 9:00 am.

From the Figure 4.3 below, it is evident that higher values were recorded for both short term and medium term parkers at the facility during the weekend than weekday. But when long term duration for weekday and weekends were compared, it was realized that weekday had a higher percentage in terms of long term parkers. The higher percentage of 26% on weekday against 3% on weekend of long term parkers could be attributed to usage of the facility by employees of corporate institutions on weekdays.



Figure 4.3: Weekend and Weekday Parking Duration on Twene Amanfo Street

4.1.2 Starlet 91 Street

The Starlet 91 Street is in the Central Business district and adjoins corporate institutions and offices. A total of fourteen (14) spaces have been provided for parking. The parking geometry is parallel. It has a parking volume of 90 vehicles on weekday and 42 vehicles on weekend. An average parking duration of 10 and 7minutes representing week day and weekend respectively were noted.



Figure 4.4: On-street parking along Starlet 91 Street.

The Starlet 91 Street had an average occupancy of 44% on weekday and 74% on weekend. Per the average occupancy values obtained, it can be concluded that, the facility operates at normal capacity and it is also easier to find a parking space on weekdays than on weekends.

Peak accumulation of 21 vehicles was recorded at 8:00 am on weekdays from the Figure 4.5 represented below. This means that at the peak time, it was highly difficult to find a parking space since more vehicles were using the facility.

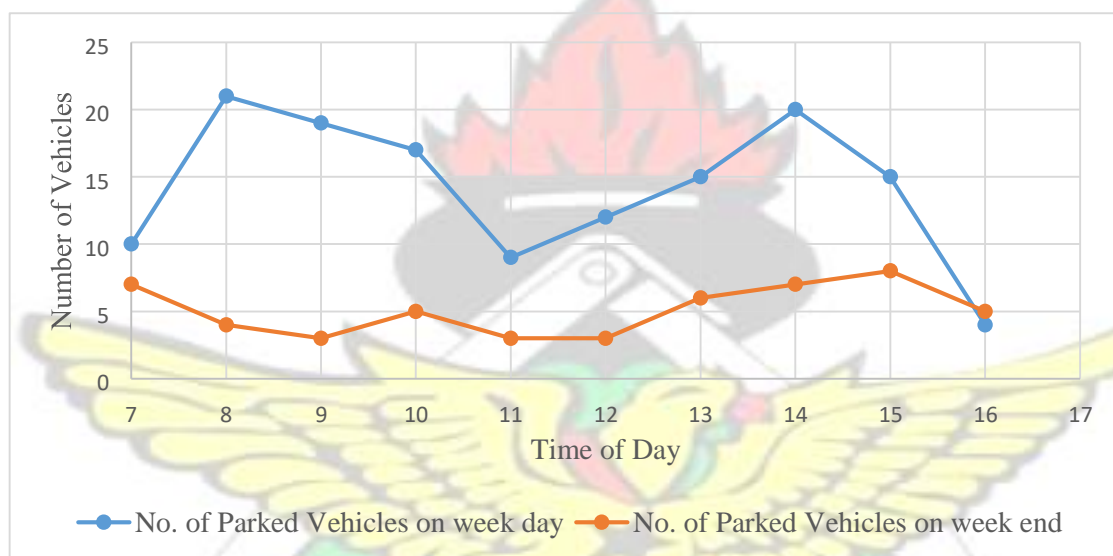


Figure 4.5; Weekend and Weekday Hourly Accumulation on Starlet 91 Street

For the weekend the peak accumulation of 8 vehicles was recorded at 3:00 pm. this means the parking facility is operating at normal capacity and as such there is high a probability of finding a parking space. Therefore cruising time was non-existent.

From the figure 4.6 below, a comparison between weekend and weekday parking duration for short term parkers realized almost the same values.

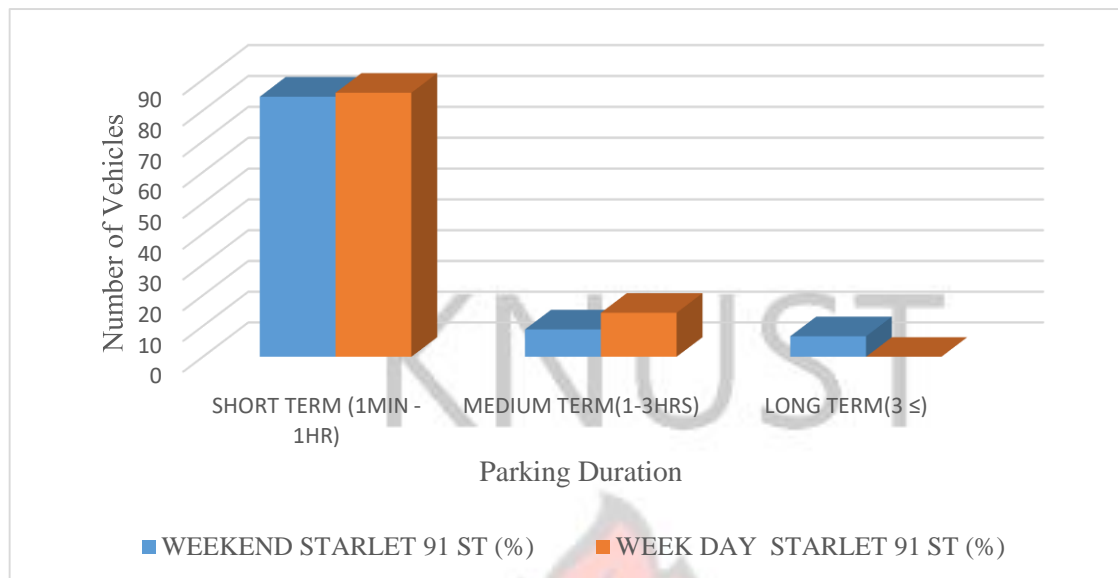


Figure 4.6: Weekday and Weekend Parking Duration Chart

This means that large percentage of the patrons utilizing this facility spend less than an hour because they engage in short term activities like brief shopping and business errands. For the medium term parkers on both weekday and weekend, lower values of 8.9% and 14.3% were recorded. No long term parkers was recorded on weekday compared to weekend which recorded 6.7%.

4.1.3 Blantyne Street

Blantyne Street is also located in the Central Business District. There are residential and commercial facilities like banks and offices located along the route. A total of 27 spaces have been provided for parking and the geometry is parallel. A parking volume of 102 vehicles on weekday and 38 vehicles on weekend were recorded. An average parking duration of 10 and 9 minutes representing week day and weekend respectively were noted. Picture showing on-street parking on Blantyne Street is in figure 4.7. below.



Figure 4.7: On-street parking along Blantyne Street

Blantyne Street had an average occupancy of 59% on weekday and 20% on weekend. The occupancy values obtained means that, it is very easy to find a space to park since the facility does not operate at full capacity for both weekday and weekend.

From the hourly accumulation graph figure 4.8 below, it can be seen that the weekday graph increased steadily till 11:00am when peak accumulation of 28 vehicles was recorded.

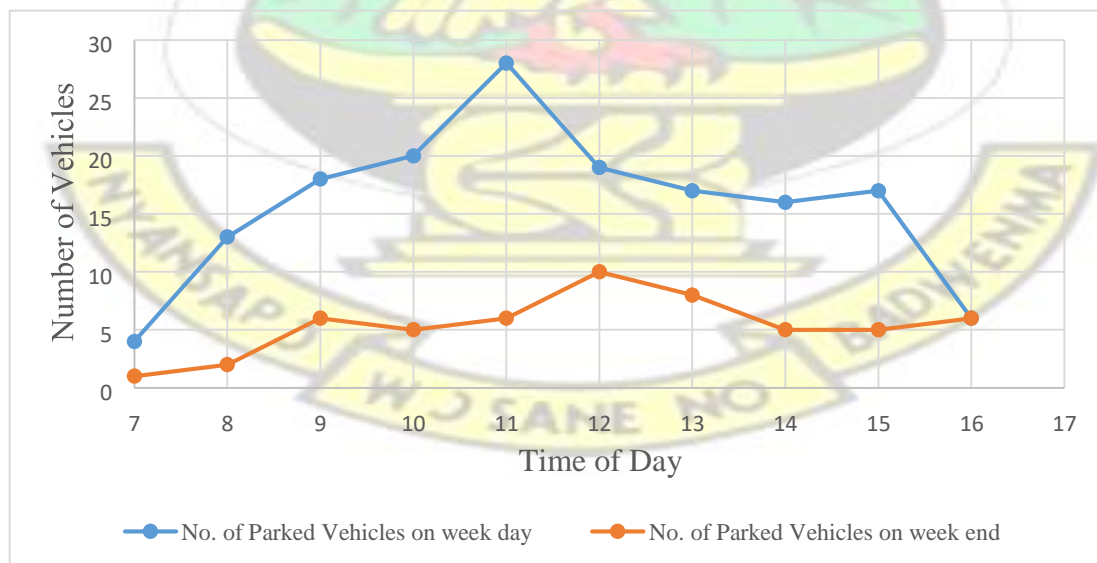


Figure 4.8; Weekend and Weekday Hourly Accumulation on Blantyne Street

For weekends, peak accumulation of 10 vehicles was recorded at 12:00 pm. this means the parking facility is operating under capacity and as such it is easy to find a parking space at any time during the day. The figure 4.9 below, indicates that most of the users of this parking facility on both weekend and weekday park less than an hour. This means that on Blantyne Street, short term parkers represent the majority

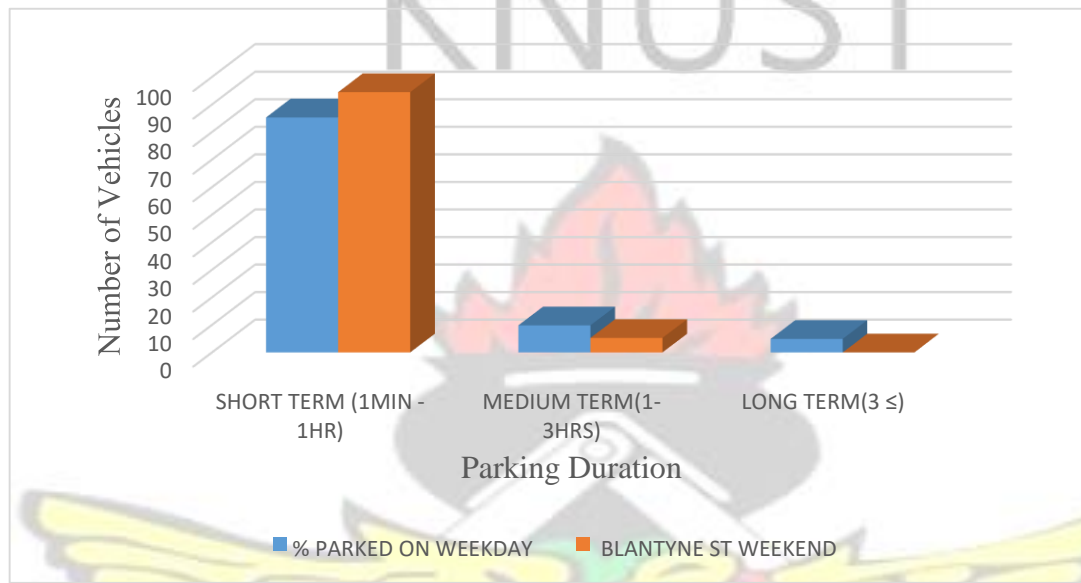


Figure 4.9; Weekday and Weekend Parking Duration Chart

Medium term parkers constituted 9.8% and 5.3% on weekend and weekday respectively. The chart indicates that during the data collection, which lasted for ten (10) hours, no car parked for more than three hours on the weekend but the weekday recorded 4.9% of long term parkers.

4.1.4 S Y Barnie link

The SY Barnie link is also called Semanhyia Street. It is positioned within an enclave of corporate institutions, shops and offices. A total of 17 spaces have been provided for parking with parallel parking geometry. A parking volume of 158 vehicles on weekday and 46 vehicles on weekend were recorded. An average parking duration of 8 and 9 minutes representing week day and weekend respectively were noted. Figure 4.10. below shows on-street parking along S.Y. Barnie Link.



Figure.4.10: On-street parking along S.Y. Barnie Link

An average occupancy of 94% on weekday and 46% on weekend were also recorded. The average occupancy values obtained means that, for weekdays, the facility operates at almost full capacity. That means it is extremely difficult to find a parking space on weekdays and as such has a high cruising time. The average occupancy of 46% value recorded for weekend indicates that the facility does not operate at full capacity and it is easier to find a parking spot. The weekday hourly accumulation graph figure 4.11 recorded peaked at 8:00 am. There was a sharp increase in vehicle population between 7:00 am and 8:00am from 12 vehicles to 36 vehicles.

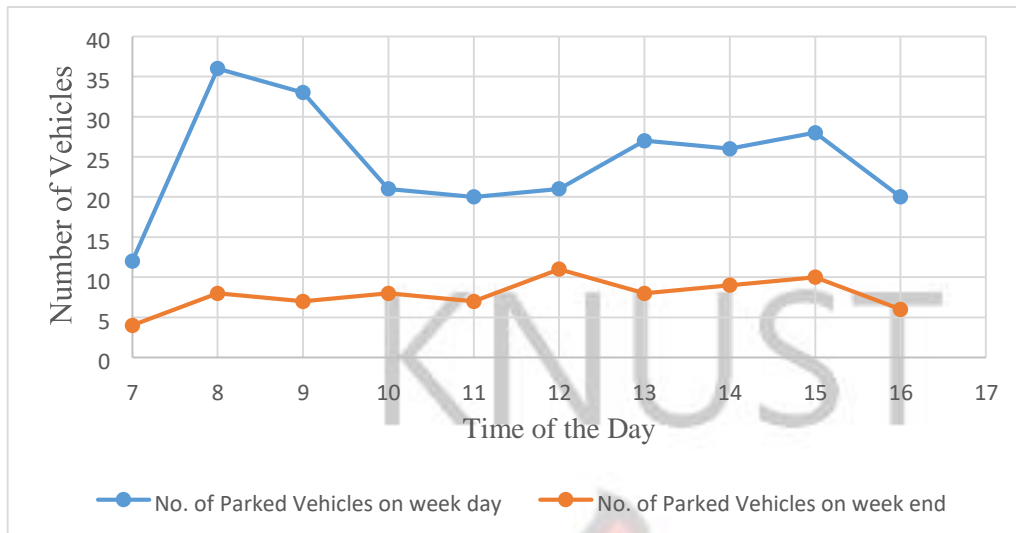


Figure 4.11; Weekend and Weekday Hourly Accumulation on SY Barnie Link

After 8:00 am there was a steady decline in the vehicle population till after 12:00 pm when the number of vehicle population increased again. The number of vehicles recorded on weekend experienced fluctuated growth throughout the 10 hour duration when the recording was done.

Comparing the weekend and weekday charts from figure 4.12, it is clear that short term parkers are over-represented on a weekday than on a weekend. The weekdays also experienced more long term parkers than medium term parkers.

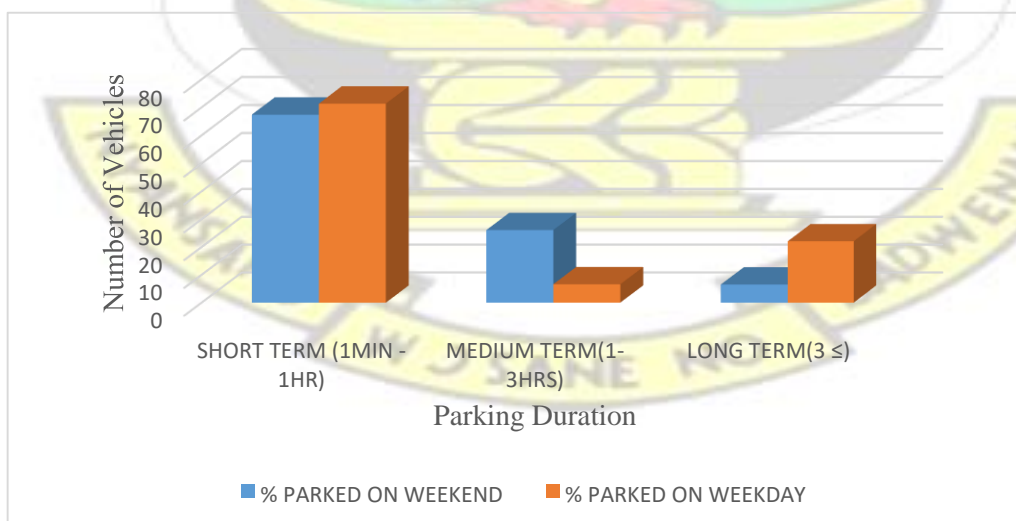


Figure 4.12; Weekend and Weekday Parking Duration Chart

The weekend chart show a significant proportion of medium term parkers as the weekday recorded 7% while weekend recorded 26%. Again, it was evident that weekday chart recorded 22% for long term parkers against 7% for weekend. The high percentage of long term parkers on weekday could be attributed to the usage of the facility by employees of the banks and other offices.

4.1.5 Atoase Road

This road is also called the market road. The main Sunyani market is located on this route. 67 parking spaces have been provided for parking. The parking geometry is parallel, even though 60° parking is what is practiced. Parking volumes of 222 vehicles on weekday and 339 on weekend were recorded. An average parking duration of 8 and 9 minutes represented week day and weekend respectively were noted. An average occupancy of 44% on weekday and 74% on weekend. The average occupancy values obtained means that, it is much easier to find a parking space on weekdays than on weekends. A picture of on-street parking along Atoase road is shown in Figure 4.13 below.



Figure 4.13: On-street parking along Atoase Street.

From the weekend graph figure 4.14, the number of vehicles increased steadily from 7:00am to 10:00 am when peak accumulation was recorded. The slope declined till between the hours of 12:00pm to 1:00pm when it became constant.

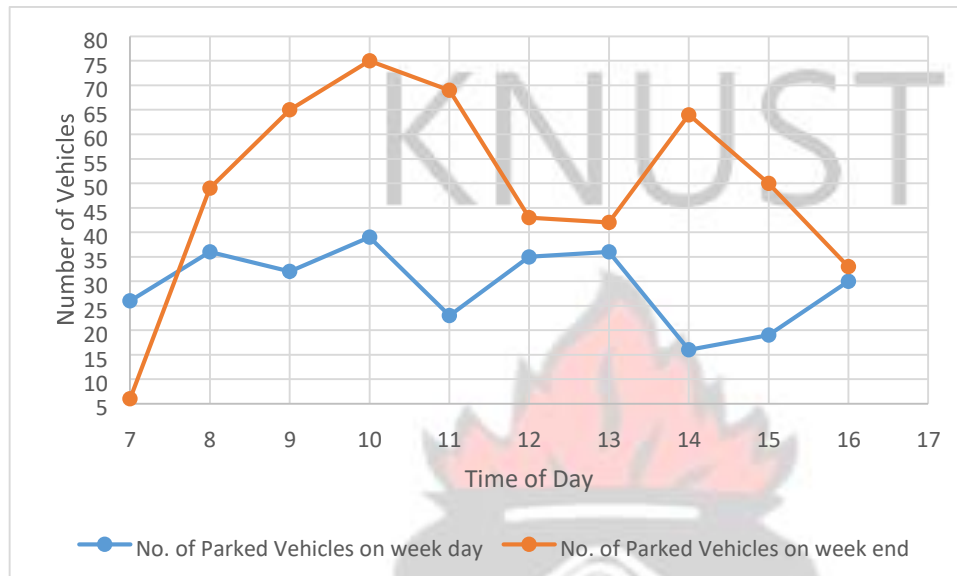


Figure 4.14; Weekend and Weekday Hourly Accumulation on Atoase Street

At peak accumulation, a total of 75 number vehicles parked at the facility. Peak accumulation was obtained for weekday at 10:00am.

The figure 4.15 below, represents the parking duration on Atoase road for a typical weekend and weekday.

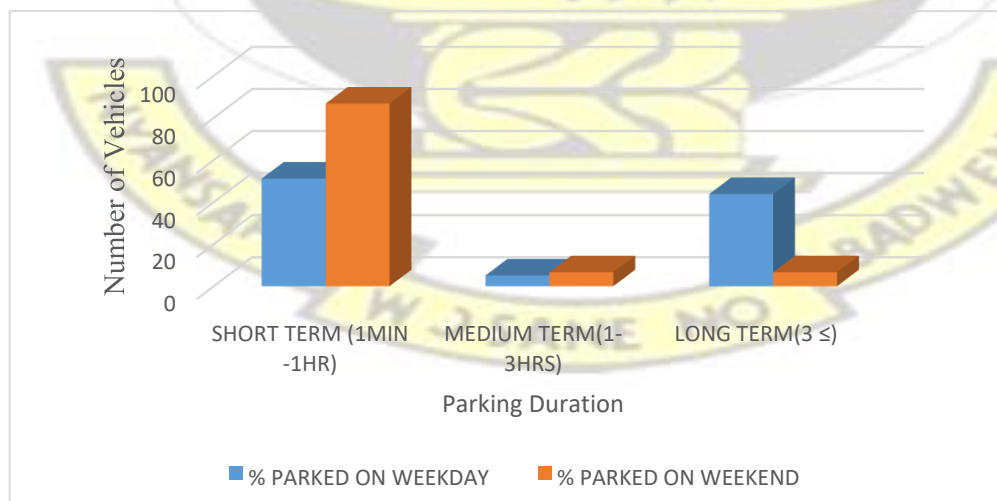


Figure 4.15; Weekday and Weekend Parking Duration Chart

The weekend chart had a higher representation of short term parkers (87%) against the weekday (51%). The higher percentage recorded for weekend is due to the fact that most people do their groceries on weekend because they do not go to work. Long term parking on weekend was 44% against weekday value of 7%. For medium term parkers, weekend recorded 6% and 5% on weekday.

Tables 4.1 and 4.2 below gives summary of the weekday and weekend parking studies which was conducted

Table. 4.1. Summary of Weekday Parking Studies

Road Name	No. of Spaces	Parking Orientation	Parking Volume	Average Parking Duration (minutes)	Average Occupancy (%)	Maximum Accumulation (No.)
Twene Amanfo	90	60° inclined	132	18	44	53
Starlet 91	14	Parallel	90	10	44	21
Blantyne Rd	27	Parallel	102	10	59	28
S.Y. Barnie Lk	17	Parallel	158	8	94	36
Atoase Rd	67	Parallel	222	8	44	39

Table .4.2. Summary of Weekend Parking Studies

Road Name	No. of Spaces	Parking Orientation	Parking Volume	Average Parking Duration (minutes)	Average Occupancy (%)	Maximum Accumulation
Twene Amanfo	90	60° inclined	106	14	27	48
Starlet 91	14	Parallel	42	7	74	8
Blantyne Rd	27	Parallel	38	9	20	10
S.Y. Barnie Lk	17	Parallel	46	9	46	11
Atoase Rd	67	Parallel	339	9	74	75

4.2 STAKEHOLDERS VIEWS

Questionnaires were administered to the following categories of people;

- ❖ People who patronize the on-street parking facility (users of facility)
- ❖ Operators of the parking facilities ; and
- ❖ Managers of the parking facility

4.2.1 Users of facility

Opinions of users of the various on-street parking facilities on how they rated the efficiency of the parking scheme were sought using key indices such as availability of space, proximity to destination, security for users, improvement and efficiency of parking facility, average duration of parking and users perception about the hourly rate charged.

❖ *Availability of parking space*

Users were asked on the likelihood of easily finding a spot to park either on weekday or weekend. Out of the fifty-nine (59) people who were randomly interviewed, ten (10) respondents representing 17% indicated that it was extremely difficult to find a parking spot. Thirty-four (34) respondents representing 58% said it was easier to sometimes find a parking spot. Fifteen (15) respondents representing 25% were of the opinion that they easily found a parking spot anytime they visited the parking spot.

❖ *Proximity of parking facility to destination*

Of the fifty-nine (59) respondents, twenty-four percent (24%) rated the various on-street parking facilities as being far from their destination, forty-two percent (42 %) rated the various on-street facilities as being close to their destinations. Thirty-four percent (34%) also rated the facilities as being very close to their destinations.

❖ *Security for parked vehicle*

Twenty-two respondents representing thirty-seven percent (37%) were of the view that security for parked vehicles has not improved since the implementation of the parking scheme and thus rated security as being poor. Thirteen (13) respondents representing twenty-two percent (22%) rated the facility in terms of security as fair as there has been some improvement since the implementation. Forty-one percent (41%) of respondents rated security for parked vehicles as being good at the various on-street parking facilities.

❖ *Improvements*

In analyzing the improvement of the parking facility, traffic congestion was used as the proxy for the assessment. Forty-nine percent (49%) said traffic congestion was poor, thirty-nine percent (39%) were of the opinion that traffic congestion had improved and twelve percent (12%) said the traffic situation had improved tremendously since the inception of the on-street parking management scheme.

❖ *Hourly charges*

Forty-seven (47) respondents representing eighty percent (80%) which is also majority said they were satisfied with the hourly rates charged. Nine percent (9%) of the respondents interviewed said the hourly rates charged were low while twelve percent (12%) said that the hourly rates charged were expensive.

❖ *Parking Duration*

Out of the fifty-nine (59) respondents, thirty-six (36) representing sixty-one percent (61%) indicated that they park for less than one hour. Seven percent (7%) said they park for more than one hour but less than three hours. Twenty-seven percent (27%) said they park for more than three hours.

4.2.2 Operators of facility

The operators M/S Day and Night Towing Services were of the view that the various onstreet parking facilities were able to meet the expected demand. Four hundred and fifty (450) parkers patronize their services on a daily basis. Most users of the facility park their vehicles for an hour or less and the hourly rates charged were considered to be realistic. They found the attitude of parkers towards the rates charged as satisfactory. The operators also pointed out that they are given yearly targets to achieve. Data available suggests that, since the inception of the paid parking scheme in 2014, M/s Day and Night Towing Services always exceeded their targets. Below is a table showing the yearly target and the actual revenues achievements.

Table 4.3: Yearly Targets indicated against Actual Revenues Achievements

Year	Target for Year	Revenue Generated
2014	96,000.00	196,799.30
2015	85,800.00	87,295.50

The 2014 target was exceeded by more than hundred percent. The operators explained that 2014 was when the parking scheme was introduced and that they were able to generate a lot of revenue from towing of vehicles which parked illegally. This was due to the fact that people were still coming to terms with the new development. In 2015 however, the operators exceeded their revenue target marginally because by that time people had become conscious and as such were not parking illegally. The operators said they were yet to receive their expected target for 2016. In terms of enforcement of parking regulations they outlined the following challenges;

- ❖ Encroachment of parking lots by hawkers, three wheelers and motor bikes.
- ❖ Inadequate road signage
- ❖ Big trucks loading and off-loading during unapproved periods.

They further complained that, the Assembly was required to take up issues of enforcement but have not been proactive. The operators view enforcement as their biggest hindrance to achieving their yearly targets.

4.2.3 Managers of Parking Facility

Managers in this vein included the Regional Coordinating Council (RCC), Sunyani Municipal Assembly, Department of Urban Roads and other stakeholders like the Police Service and the National Road Safety Commission.

❖ Regional Coordinating Council (RCC)

The Regional Coordinating Council submitted that the implementation of the parking scheme has had a positive impact on the Central Business District. On the issue of traffic congestion, the introduction of the parking scheme has helped to decongest the city since people no longer park at illegal locations.

❖ Sunyani Municipal Assembly (SMA)

The introduction of the parking scheme has helped to minimize illegal parking on especially major arterials within the Central Business District. It was indicated that not only has the introduction of the scheme helped decongest the city of illegal parking but also generated revenue for the Assembly to support its other projects. Though the introduction of the parking scheme has been beneficial not enough has been done on the issue of enforcement of parking rules.

❖ Department of Urban Roads (DUR)

The Department admitted that the introduction of the parking scheme within the Central Business District has made some positive impacts, it was suggested that a lot could be done to improve the system. Some of the key issues raised included enforcement of parking regulations and provision of signage at the various parking facilities. On the issue of

enforcement, the situation of the Atoase road where markings depict parallel parking yet drivers' park inclined was cited. This anomaly has not been addressed on countless occasions of complaining by operators. The hourly rate charges were not effective as patrons irrespective of the duration still pay for an hour. Again, concerns were raised to the Assembly of not expanding the coverage to include more streets for the on-street parking.

❖ *Police Service (MTTU)*

Information gathered from the Sunyani Police Service indicated that only one pedestrian accident has been recorded. On the issue of vehicular safety, no complaint had been made on vehicular accidents. The parking scheme has helped curb the city of illegal parking thereby reducing congestion.

❖ *National Road Safety Commission (NRSC)*

The National Road Safety Commission praised the parking scheme as being pedestrian friendly. There has been only one incident of pedestrian accident that was recorded on the Zongo Road since the introduction of the scheme. It was cited that enforcement of parking regulations is the main low point of the parking scheme.

4.3 ASSESSING THE FINANCIAL PERFORMANCE OF THE PAID PARKING SCHEME

According to table 4.4, the consultant upon careful study of the Central Business district recommended the paid parking scheme to be implemented on twenty-two (22) streets. This would have accrued a weekly revenue of Twenty-five thousand, four hundred and sixtyfour cedis (¢25,464.00). This weekly charge does not include towing service charges. Currently, the on-street paid parking scheme is available on eight (8) streets. According to

M/S Day and Night Towing Services who are the operators of the facility, on the eight (8) streets, they make an average of five thousand Ghana cedis (¢5,000.00) weekly. This weekly revenue is inclusive of towing services. The weekly revenue generated included charges for towing services. The operators of the facility attributed the low revenue the parking scheme is generating to the following reasons;

- ❖ Low coverage area; currently out of the twenty two streets that were earmarked for the on-street parking, only eight are in operation.
- ❖ Lack of enforcement on the part of the Assembly.
- ❖ Revenue collectors' failure to monitor vehicles and collect the approved rates.

When the expected revenue for the five (5) streets on which the parking studies was conducted was calculated, a weekly revenue of three thousand, six hundred and ninetytwo (¢3,692.00) was realised. Based on the parking studies, enough information was gathered to calculate how much the paid parking scheme should generate for the eight streets. An amount of six thousand, three hundred and fifty-two cedis was realised (6,352.00). This amount does not include towing service charges.

Table. 4.4. Assessment of the financial performance of the paid parking scheme

No. of Roads	Duration for Charging (Hours)	Parking Rates (GH ¢)	Annual Revenue(GH ¢)	Weekly Charges(GH ¢)	Remarks
22 Roads earmarked for initial Implementation	8	0.3	1,222,272.00	25,464.00	Towing services not included
Actual revenue on 8 Roads on which on-street parking is currently ongoing	8	0.5	260,715.00	5,000.00	Towing services included

Five (5) Roads on which data was collected	8	0.5	192,000.00	3,692.00	Towing services not included
Expected revenue from the 8 Streets	8	0.5	304,896.00	6,352.00	Towing services not included

4.3.1 Comparison of Actual Revenue against Expected Revenue

According to the operators, they make an average of ₵5,000.00 per week but when this is compared with the expected revenue on the eight streets on which the on street parking is operational, it is seen from Table 4.4. above that, a weekly revenue of ₵6,352.00 should be accrued. The weekly revenue of ₵6,352.00 excludes towing services. It is clearly evident that M/s Day and Night Towing Services whose core duty is to collect revenue is under performing.

4.4 COMPARISON OF SUNYANI ON-STREET PAID PARKING SCHEME WITH OTHER PARKING SCHEMES IN KUMASI AND ACCRA

When the Sunyani paid parking scheme was compared to that of Kumasi and Accra, it was observed that due to the lack of a technological based approach to monitor duration of parked vehicles and collect the revenue required, the various parking facilities which are all under franchise management are not able to generate the required revenue. Enforcement of parking regulations was identified as one of the main setbacks of the paid parking schemes. Research work done by (Adams et al. 2014) on Kumasi paid parking recommended the above solutions including an independent periodic evaluation and monitoring management.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

From study findings, the following conclusions were drawn:

- ❖ In terms of occupancy, almost all the parking facility operates at less than full capacity; it was therefore easier to find a parking spot. Land use was also seen as playing an important role in vehicle accumulation, occupancy and duration. Parking facilities located along offices and banks had higher percentage of long term parkers on weekdays than on weekends. The on-street parking facilities accommodated more short term parkers thereby accomplishing the purpose for which it was set up.
- ❖ On users' perception of service quality, forty-two percent (42%) of respondents rated the parking facilities as being close to their destinations. A similar representation (42%) indicated that security of parking facilities have improved. It was evident that congestion in the Central Business District had improved even though some level of congestion still persisted. About 80% of respondents were satisfied with the mode of charges.
- ❖ Managers and operators of the parking facilities revealed that their focus was more on revenue generation than on other issues that would improve efficiency and service quality.
- ❖ The main management challenges included lack of enforcement of parking regulations, failure to extend the scheme onto other streets and inefficiencies in revenue generation. Lack of a more sophisticated approach like using the electronic medium to monitor the hourly charges also hinder the realization of revenue targets.

5.2 RECOMMENDATIONS

These recommendations are worth considering:

- ❖ Assembly should partner with a private contractor to make sure enforcement of parking regulations is effective.
- ❖ A more scientific approach should be adopted in the setting up of revenue targets in order to ensure there is value for money. Setting of monthly targets rather than yearly targets will also help to identify any shortfalls earlier so that the right mitigating measures are applied.
- ❖ Variable pricing should also be considered during certain times of the day in order to discourage long term parkers and to also minimize congestion.
- ❖ Revenue collectors find it extremely difficult to monitor the duration of the vehicles in order to charge appropriately. Thus, a technological-based approach like e-parking, metering and smart parking approach should be adopted.
- ❖ In order to reduce congestion and increase revenue mobilization, the on-street parking scheme should be expanded to cover all the roads initially earmarked for implementation.
- ❖ Sunyani is currently experiencing rapid population and vehicular growth thus consideration should be given to the construction of multi-storey car parks in the near future to reduce congestion.
- ❖ Periodic performance evaluation of the parking scheme is also recommended.

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APPENDIX

QUESTIONNAIRES FOR USERS OF ON-STREET PARKING FACILITY IN THE CENTRAL BUSINESS DISTRICT OF SUNYANI

Write the answer next to the question or tick the correct answer if a choice is given.

1. Sex Female Male
2. Trip origin Trip destination
3. Car ownership Personal Official Others
4. Reasons for coming to the CBD. Shopping Official
others
5. Where did you first hear about the paid parking scheme?

Media Bill Boards Foral Other

6. How often do you patronize the parking scheme

1-3 times a week 3-5 times a week More than 5 times

7. What has been the impact of the paid parking scheme on your frequency of travel to the CBD?

Increased Decreased No change

8. How long do you park averagely? 1hr 2-3hrs -5hrs
above 5hrs

9. How often do you find a parking slot within the CBD?

Always Sometimes Rarely

10. How far is your intended destination within the CBD from the parking lot

Close Far

11. What do you do when you cannot find a parking space near your destination?

Keep Searching Visit Next Street Park illegally

12. What is your perception about the hourly parking rate charged

Satisfied expensive low

13. How do you rate the efficiency of the parking scheme so far?

Traffic congestion- Poor Fair Good

Availability of parking space -Poor Fair Good

Proximity to Destination Poor Fair Good

Security for parked vehicles-Poor Fair Good

Improvement in customer park- Poor Fair Good

14. Any reservations about the on-street parking - Yes No

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QUESTIONNAIRES FOR OPERATORS AND MANAGEMENT OF THE ON-STREET
PARKING FACILITY IN THE CENTRAL BUSINESS DISTRICT OF SUNYANI

Write the answer next to the question or tick the correct answer if a choice is given

1. Sex Male ☐ Female ☐
2. What is the capacity of the on-street parking facility.....
3. Is the parking facility able to meet demand.....
4. What is the average number of parkers in a day.....
5. What is the average duration that users park?
6. Are realistic prices being charged? Yes ☐ No ☐
7. What is the average monthly income?.....
8. Are the operators able to meet monthly revenue targets?.....
9. In terms of enforcement of parking regulation what are the challenges encountered?
 - I.
 - II.
 - III.
10. What is the general attitude of parkers towards the hourly rates charged for the onstreet parking?
Satisfactory ☐ Not Satisfactory ☐

ON-STREET PARKING UTILIZATION SURVEY FORM

ON-STREET PARKING UTILISATION

SURVEY FORM

Date

Location

Weather

Day

Number of vehicles at beginning of survey

Number of vehicles at end of survey

Total number of parking spaces

Parking geometry

Time(parking)	Registration Number	Time (exit)	Registration Number

