

**YANGON UNIVERSITY OF ECONOMICS
MASTER OF PUBLIC ADMINISTRATION PROGRAMME**

**A STUDY ON CAR PARKING PROBLEM
IN YANKIN TOWNSHIP**

**PHYU MON LINN
EMPA - 59 (17th BATCH)**

MARCH, 2022

YANGON UNIVERSITY OF ECONOMICS
MASTER OF PUBLIC ADMINISTRATION PROGRAMME

A STUDY ON CAR PARKING PROBLEM
IN YANKIN TOWNSHIP

A thesis submitted as partial fulfillment of the requirements for
the degree of Master of Public Administration

Supervised by

Daw Yin Lei Win Swe
Lecturer
Department of Applied Economics
Yangon University of Economics

Submitted by

Phyu Mon Linn
Roll No. 59
EMPA - 17th Batch
2018-2020

March, 2022

YANGON UNIVERSITY OF ECONOMICS
MASTER OF PUBLIC ADMINISTRATION PROGRAMME

This is to certify that this thesis titled “**A Study on Car Parking Problem in Yankin Township**” submitted in partial fulfillment towards the requirements for the degree of Master of Public Administration (MPA) has been accepted by the Board of Examiners.

BOARD OF EXAMINERS

Dr. Su Su Myat

(Chairman)

Professor/Head

Department of Applied Economics, YUE

Dr. Tin Tin Wai

(Member)

Pro Rector, YUE

Dr. Khin Thida Nyein

(External Examiner)

Pro-Rector, YUE

U Thein Naing

(Member)

Associate Professor

Department of Applied Economics

YUE

Daw Yin Lei Win Swe

(Member)

Lecturer

Department of Applied Economics

YUE

MARCH, 2022

ABSTRACT

Yangon city's living standard is rising as the economy grows, the owner of the car also speeding up and car parking became difficult situation to get one place in a central urban area and getting a burden on native people. This study aims to find out the ways to reduce the car parking problem and to identify the causes of the car parking problem in Yankin Township at Yangon. The method of study is based on the descriptive analysis and the structured questionnaire is used to collect information from 150 respondents especially those who stay on the Main Road Wards in Yankin Township. This study finds that the major source of the parking problem in Yankin Township is an imbalance between demand and supply of parking. There is no systematic parking place. There are shops stall on both roadsides on narrow roads that areas exhibit high parking situations. In the Market area does not have a specific car parking place, occurs illegal parking. This area is mixing with commercial and residential areas. These areas demand more parking spaces but increasing the number of parking space are restricted by the limitation of land use and traffic regulation. The solving ways as per demand choice are to be created off-street parking by charging system is implemented by a government (50% of respondents) than a private company (45% of respondents). Furthermore, policies are proposed to improve parking and to be effective management of reducing the parking problem in Yankin based on the city's current parking status (53% of respondents). Limitation of the car import policy will not be effective in reducing the parking problem (48% of respondents). A finding of this study gives information that management is a key tool in systematic urbanization development. Also, a plan is important. If there is not a systematic plan for parking management, it will have a problem.

ACKNOWLEDGEMENTS

First and foremost, I would like to express my deep gratitude to Professor Dr. Khin Thida Nyein (Prorector) and Professor Dr. Tin Tin Wai (Prorector) of Yangon University of Economics for their kind permission to undertake this thesis.

My sincere thanks go to my esteemed Prorector, MEUE Dr. Phyu Phyu Ei who is always patient and sweet to all students as a remarkable teacher. She always fully understands on nature of the executive class students. And Dr. Su Su Myat, Program Director of MPA. She guided me to pay attention to this thesis title. She also organized to be finalized my paper.

I would like to acknowledge my deepest gratitude to my thesis supervisor Lecturer Daw Yin Lei Win Swe, Department of Applied Economics, Yangon University of Economics, she guides me and she courage me to be able to finalize this thesis. And my former supervisor, Professor Dr. Pwint Phyu Aung, her practical advice and guidance to partly accomplish my thesis. During my thesis time she was moved to Meikhtila as promotion in early 2021.

I offer deep gratitude and gratefulness to all the persons who contributed in different ways to my paper. My thanks go to all respondent people from Yankin township who gave me response answers for this thesis. I am also thankful to everyone who has given me kind help throughout the compilation period of this thesis.

Last but not least, my deepest thanks with all my heart are saved for my sister-in-law who was always supporting me. Finally, I would like to thank my husband. He always supported me whenever I need, especially he made as a househusband I am ready to eat, everything was ready. He is perfect for me. Thank you to all who are from different dimensions support me, to be finished my thesis.

TABLE OF CONTENTS

	Page
ABSTRACT	i
ANKNOWLEDGEMENTS	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	v
LIST OF ABBREVIATIONS	vii
CHAPTER I INTRODUCTION	
1.1 Rationale of the Study	1
1.2 Objective of the Study	2
1.3 Method of Study	3
1.4 Scope and Limitations of the Study	3
1.5 Organization of the Study	3
CHAPTER II LITERATURE REVIEW	
2.1 Road Facility, Road Traffic, and Road Network in Urban Area	4
2.2 Importance of Parking System and Its Characteristics	5
2.3 Types of Parking	8
2.4 Causes of Parking Problem in Some Selected Asian Countries	10
2.5 Review on Previous Studies	18
CHAPTER III CAR PARKING SITUATION AND MANAGEMENT PLAN IN MYANMAR	
3.1 Background of Parking System and Road Traffic	21
3.2 Residential Parking System	24
3.3 Central Business Area Parking	26
3.4 Road Parking and Illegal Parking	29
3.5 Parking Facilities and Charging	31
3.6 Management Plan on Overview of Parking Problem to Eliminate of Traffic Woe	33

CHAPTER IV SURVEY ANALYSIS

4.1	Profile of Yankin Township	38
4.2	Survey Profile of Study Area	39
4.3	Survey Design	41
4.4	Characteristics of Respondents	41
4.5	Living Condition and Ownership of Respondent in Yankin Township	44
4.6	Causes of Car Parking Problem	45
4.7	Respondent's Opinion on Possible Ways to Reduce the Car Parking Problem	57
4.8	Respondents' Opinions on Possible Ways	65

CHAPTER V CONCLUSION

5.1	Findings	66
5.2	Recommendations	69

REFERENCES

APPENDICES

LIST OF TABLES

Table No.	Title	Page
2.1	Reason of Illegal Parking and Respondent Percentage	16
3.1	Detail Land Use Ration of 2012	27
3.2	Minimum Required Parking Area for High Raise Buildings	35
3.3	Vehicle Penetration Ration Up Coming Years	36
4.1	Demographic Characteristics of Yankin Township	39
4.2	Demographic Characteristics of Ward 1, Ward 3 and Ward 5	40
4.3	Characteristic of Respondents	42
4.4	Living Condition of Respondents	43
4.5	Vehicle Ownership by Respondents	43
4.6	Location of Apartment/ House Place and Parking	44
4.7	Difficult Time of Parking Place	44
4.8	Encounter Parking Problem	45
4.9	Encounter Common Problem and Police Case	46
4.10	Parking Restricted Area on Main and Downtown Streets in Yankin	47
4.11	Parking Time Per Week at Restricted Area and Reason	47
4.12	Assigning Traffic Police for Parking	49
4.13	Providing the Adequate Parking Space in School	50
4.14	Providing the Adequate Parking Space in the Market	50
4.15	Reason for Inadequate Parking Space at Market	51
4.16	Vehicle Parking at Market	51
4.17	Most Place Double Parking on Main Road	52
4.18	Most Time and Reason of Double Parking	52
4.19	Reason of Crowded Car Parking Surrounding Area of Myanmar Plaza	55 53
4.20	Free Park in Housing Compound Area	53
4.21	Parking Fee in Housing Compound Area	54
4.22	Car Parking Place for Visitor	54
4.23	Overall Mean Score for Possible Way-1 (On-street Parking)	58
4.24	Overall Mean Score for Possible Way-2 (Off-street Parking)	59

4.25	Overall Mean Score for Possible Way-3 (Parking Lot Facilities)	60
4.26	Overall Mean Score for Possible Way-4 (Residential Parking)	62
4.27	Overall Mean Score for Possible Way-5 (CBA Parking Management)	63
4.28	Overall Mean Score for Possible Way-6 (Parking Regulation and Policy)	64
4.29	Overall Means Score for All Possible Ways	65

LIST OF ABBREVIATIONS

CBA	Central Business Area
CBD	Central Business District
CCTV	Closed Circuit Television
COVID 19	Coronavirus Disease 2019
DB	Design Build
DHSHD	Department of Human Settlement and Housing Development
HH	Household
ITS	Intelligent Transport System
JICA	Japan International Cooperation Agency
MOC	Ministry of Commerce
MOI	Ministry of Industry
TTC	Teacher Training College
UIO	Unit in Operation
YBS	Yangon Bus service
YCDC	Yangon City Development Committee
YRTA	Yangon Region Transport Authority
YRTP	Yangon Region Traffic Police Department

CHAPTER I

INTRODUCTION

1.1 Rationale of the Study

Car parking problem is the major problem in current urban planning. Urbanization refers to the increasing number of people that live in urban areas and it will become the most crowded population. Vehicles are very useful for people in daily life at the same time, the number of vehicles is also increasing. People who earn enough to buy a car but are not enough smart to find somewhere to park.

Developing the living standard in cities is rising as the economy grows, and the owners of cars also speeding up even in middle-income families. The purpose of using their cars such as going to schools, shopping, working and taking trips is to make their life easy. Some families have more than one vehicle. The lack of car parking places becomes a growing concern as the demands increase year after year. Reinforcement of supply-side to reduce parking problem is necessary for creating ways such as off-street parking, parking lot, and management side and it also needs to do systematic management and collect the parking fees. If parking demand rises without relevant improvement of parking management, on-street parking can become extreme.

In Yangon, there is no systematic on-street parking. Demands are highly imbalanced with the supply of parking, especially in central business area, residential area where the parking lot and off-street parking are not provided and thus, it can be worsen later. The central business area of downtown in Yangon is busy with trading, crowded with working persons who are coming in and out frequently the whole day. It is difficult to get one parking lot, it happens illegally parking. Even if “no parking” signboard is visible, the cars are parked as illegal parking shows the weakness of management.

Most residential areas of Yangon, roads are narrow and vehicle owners park their cars roadside. Some people who are staying on the ground floor make a block for their car can park anytime even the whole day. Another vehicle owner who stays in

above floor of the building, struggles to get one parking place on roadside, sometimes one or two driving around the road looking for one occupied not far from resident. It would happens loss of car parts by a thief. Furthermore, most vehicle owners who stay in downtown area fight each other because of parking place. This is one of the problems of townships of Yangon's residents who face every day.

The above problems can be defined in terms of lack of either parking supply or management in Yangon city. Parking management refers to policies and program that cause more efficient use of parking resources. Off-street parking can provide the large number of vacant for parking at crowded area of city. Off-street parking has a private sector and public sector it is high cost to be implemented and important of parking facilities as an efficient and cost effective. If parking charges are high, people cannot afford for parking fees. If there are no facilities, parking user will not satisfy even if parking fees are cheaper, it would be just a blank area. Therefore, cost and facility are very important of parking lot. In additional, it without effective parking management, user park in a convenient location and off-street parking will not be good working.

Yankin township is one of the crowded townships of Yangon city. There are entrances and exits of suburbs, there have many old apartments on narrow roads. As the residential vehicles are parking along the road, cases of thefts occur, and they fight each other for one safe parking place. In the peak daily hour, double parking frequently occurs there. There can find the vehicles park in restricted areas for almost a day. Also, the many taxis park a long time for waiting the passenger in there. For one parking place, the car owner looks for one place to park, driving around the road and it is very harmful for resident person in Yankin township.

Therefore, the purpose of this study is to find out the causes and better solution to parking problems in Yankin township. The people who live there and parking is very harmful for them and they are facing the difficulty of parking space every day.

1.2 Objective of the Study

The objectives of this study are

- (1) To identify the causes of car parking problem in Yankin Township.
- (2) To examine the ways to reduce the car parking problem in Yankin Township.

1.3 Method of Study

The method of the study is descriptive method based on both primary and secondary data. For primary data, structure questionnaire is used to conduct the public's answers on the causes of the car parking problem and better way to reduce these problems in their daily life in Yankin Township. Total of 150 households (car owners) who are 20 years old and above are randomly chosen by proportionately from three Wards in Yankin Township.

1.4 Scope and Limitations of the Study

The study focuses on the car parking problem in three sampling locations of Yankin Township. Therefore, Ward (1), Ward (3), and Ward (5) among 15 Wards in Yankin Township are selected for this research central area of Yankin Township. It is also market areas, business, and office-oriented areas, various shop stalls, and old apartments residential areas. The area of this study is limited to the respondents who are 20 years old and above and car owners from three wards of Yankin Township. The survey period is from November 2020 to January 2021.

1.5 Organization of the Study

This study is organized into five chapters. Chapter one is Introduction. Chapter two presents the Literature reviews. Chapter three explains the overview of car parking situation and management plan in Yangon. Chapter four is the survey analysis based on the information on the assessment survey. Chapter five is conclusion with the findings and the recommendation.

CHAPTER II

LITERATURE REVIEW

With the rapidly increase the economy, parking difficulty has become an unsolved problem in some large cities. Vehicle parking has an urgent problem in large urban cities.

2.1 Road Facility, Road Traffic, and Road Network in Urban Area

Road facility means Road facilities including garages and service stations, and also accommodation for rest and meals at suitable intervals on the road network and particularly in less developed areas, are essential to the comfort and safety of motorists (Union of International Association [UIA], 2019).

Some other facilities are facilities for pedestrians, bicycles, bus transit, rail transit etc. An example for a pedestrian facility is a provision of a subway exclusively for the use of pedestrians. In bus transit system, the buses have to stop at the bus bays, other vehicles are not allowed to stop bus bays area and also it has to share the road with the other vehicles. Bicycle's facility is provided a narrow line on space of main road. Throughout a road or related facility is referred to by the general term 'road'.

Road network (Rodrique and Notteboom, 2013) is a system of interconnected roads designed to get used to going vehicles and pedestrian traffic. The objective of a road network is to facilitate movement from one area to another. As such, it has an important role to play in the urban environment to facilitate mobility. If Investments in road networks, it reduces the travel time between two locations, increase the robustness of the transportation network and hence reduce the travel costs.

Road network capacity can be determined by its road's strength. The capacity of a road is the maximum number of vehicles that can pass a certain road section per hour. The capacity of a road is determined e.g., by its width, number of lanes and speed limit. If the traffic demand is larger than the road capacity, congestion will occur. When congestion is present, the road network cannot longer fulfill its task. Security issues influence on everywhere of the road network because an easy escape

adds to the attractiveness of targets is vehicle theft and other crime. Therefore, road network try to prevent or reduce congestion with traffic management measures.

Road traffic (Ruby et al., 2021) on roads is consists of road users, including pedestrians, ridden or herded animals, vehicles, streetcars parking, buses, and other conveyances, either singly or together, while using the public way for purposes of travel. Road traffic problem, experts seem to agree that a lack of local parking spaces can contribute to road traffic congestion.

Urbanization process presents an accelerated tendency and urban road traffic flow increases obviously. Road Traffic congestion has been the universal problem for most big cities. In recent years, with the rapid growth of privacy car, urban road transportation load enlarges suddenly, and many roads' sections approach to saturated limit in peak time interval. The causes of traffic congestion 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.

Road traffic monitoring is an essential component of Intelligent Transport Systems (ITSs); indeed, ITSs need traffic data, said that Traffic congestion could produce negative externality, which made individual cars marginal cost of transportation journey (mainly including time cost, oil consumption, vehicles loses, service upkeep, parking fee).

2.2 Importance of Parking System and Its Characteristics

In many metropolises, parking systems are becoming increasingly important. Following the rapid incensement of traffic demand, the imbalance between parking supply and parking demand has been considered as the main reason for metropolis parking problems. Moreover, the parking system plays a key role in the metropolitan traffic system, and the parking problems show closed relation with traffic congestion, traffic accident, and environmental pollution. The parking problems urge that the traffic professionals should seek more efficient solutions as to how the parking system could be used more efficiently and how planning and management could be improved by using new technologies and new methodologies.

Parking a car is one of the most problematic things for every car owner. Every individual owning a car seems to concern the moment he/she has decided to buy the car because, on one hand, they have to find the right spot for parking the car while on another hand they have to wait for their turn in a parking lot.

However, sometimes it becomes more frustrating when there is no place or spot left in the parking lot. For this reason, people consider parking hassle more than convenience.

Other developed cities have allowed car owners to park their car properly without facing any trouble. But it is difficult to stand for a person in a crowded parking lot where people are looking for a safe place to park the car. It is not only a hassle for all the people but also the noise and smoke pollution present in the crowded parking lot. However, unlike conventional parking system, modern parking system saves us from the hassle of bearing noise pollution as don't have to wait and stand in line for hours to park car. Instead, it offers an organized system of parking that has enough capacity to adjust all the cars present at a short time. In addition, high authorities level need to fully aware regarding the benefit and advantage of good parking system and how much important.

Parking characteristics consist of parking accumulation, parking volume, parking turnover, parking index, parking duration, and parking capacity (Mathew, 2014; Chen, 2015). Parking durations and parking-related characteristics should be considered. According to Young et al. (1991), car parking is an issue of significance both at the local as well as at the strategic level of planning. In fact, it is one of the main concerns while planning and designing any infrastructure project. If ignored, it contributes towards traffic congestion and violations, accidents and injuries, wastage of time and money as well. One of the earlier research on parking shows that the parking problem arises mainly due to people want to park exactly in front of the door of their destination.

The common things that have been incorporated in most studies are the price of parking, distance to be traveled, and time of travel, but these factors do not only influence the behavior of parking for a variety of locality of various regions. Every person who owns a vehicle needs a space for parking. As the number of vehicles grows, need of space for parking increases. In general, lengthy parking occurs in a

commercial area, movie theaters. While areas near the markets show relatively shorter parking spans. This parking time difference somewhat depends on planned activities.

The people who watch movies, they should park their vehicles over the movie running time, about two hours, but they buy commodities, lengthy parking is not necessary. Areas near hotels were expected to present longer parking durations, but among parked vehicles in the areas, more than 60% spent less than an hour. This may be because that is, most would be taxis that pick up or drop off passengers or wait for customers. Indeed, hotel employees and visitors usually park their vehicles in a designated parking lot inside the hotel property.

At the 90% confidence level, parking volume, street length, and the presence of commercial land use is significantly related to the variation in the parking duration. The highest parking demand is present in areas where the dominant type of parked vehicles. The demand of most of these segments was more than twice of its capacity. Such a supply deficit has often led to parking rule violations for example sidewalk parking.

According to the Ministry of Road Transport and Highways of India, there is huge growth rate of motor vehicle population. Due to this high growth rate, parking has become integrated component of buildings as well as roadways. Hence, it creates a requirement while planning each infrastructure. Searching for empty parking space is also a reason for more traffic generation and congestion. Shoup (2006) stated that even a short time for searching a parking space would generate a considerable amount of traffic. In his study of cities, it has been shown that 30% of the traffic spend an average of 8.1 minute searching for parking spaces.

Arnott and Rowse (2009) have examined the integrated model of parking and congestion in medium-sized U.S. cities and found that cruising for parking contribute 14% of the cars on road which generate almost 50% increase in time loss due to congestion. The challenges for parking are exacerbated as parking supply in general is determined based on parking requirement without having view on how much it will cost directly and indirectly, now and in future as the parking spaces are built and converted on valuable lands to meet the requirements. In most of the big cities in the world, illegal parking is also a common problem.

Spiliopoulou and Antoniou (2012), they have found legal parking spaces were under-occupied but illegal spaces were fully saturated in many areas. The reason

behind it is, as stated earlier, the tendency of people to park as near as possible to destination regardless of legal or illegal parking spaces. Therefore, it is important to study each aspect related to parking, so that good management and design can give a solution and make an effective policy to become systematic parking.

2.3 Types of Parking

There are different types of parking. Parking is not just the driveway to home there are several different types of parking. Main focus street parking types are on-street parking and off-street parking (Gandhi, 2019).

2.3.1 On-Street Parking (Curb Parking) Weakness and Strengthen

When vehicles are parked on the street, along with the sidewalk or anywhere on the street is called On-street parking (Shoup, 2005). 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. It is also known as curb parking. Parking bays are provided alongside the curb on one or both sides of the street. These spaces are on the sides of the road identified for parking and you can clearly identify them because of yellow and white thick lines which show the parking boundaries. There have weakness and strengthen points.

On-street parking plays a crucial role in helping create places that are walkable, less require parking, and have more vitality (Barter, 2011). Its weak point and strength point are as below:

Weakness

- On Street parking is interrelate the traffic flow, if not properly managed, the street parking, road reduction and disruption of traffic performance.
- The crime as thieves and vandals have a chance so frequent happens stolen of car parts.
- There is very limited vacant need to find space and driving around it creates cruise of parking will happen traffic congestion. Cruising of parking also has an adverse impact on the Environment (Shoup, 2006).
- Fighting with house owner when parking in front of their house.
- In crowded area, frequent shifting vehicle in/out always hit or scratching on car.

- On-street/curb-side parking proves to be hazardous for through-traffic and also one of the most influencing factors for delay.

Strengthen

- Free or low cost so to save money.
- It does make a quick way to get into and off of the street.
- Close walking distance from the parking area and destination.
- Provide the storage of vehicle when not in use
- Reduce traffic speeds by narrowing the perceived travel way
- Provide a buffer zone between pedestrians and vehicles
- Improve access to nearby land uses

2.3.2 Off-Street Parking (Parking Lot)

Off-street parking means space for cars located on private property rather than on Public streets. It can be both indoors and outdoors. Off-street parking also includes private lots, garages, and driveways (parking network.com). Off-street parking users differ from short to long-term that monthly tenants and regular users. In many urban centers, some areas are exclusively allotted for parking which will be at some distance away from the mainstream of traffic such as parking lot that parking is referred to as off-street parking. Some for-parking lots are common use near shops, bars, restaurants and other facilities that requires parking open throughout the year but sometimes have improvise parking lot that are specially event. They may be operated by either public agencies or private firms.

On the other hand, off-street takes relatively long as it requires an arrangement for finance, and construction of facilities, as basics. The development cost of off-street parking and its facilities are relatively high. For instance, needs securing of land, paving, installation of a toll collection system, equipment, and construction of administrative buildings etc. Its facility can be operated solely by the private sector.

2.3.3 Parking in Residential Area

Residential parking areas are designated as areas where people live and are not meant to be used for commercial or industrial purposes. Local municipalities typically make their own parking rules that are intended to address potential safety concerns, including blocked sidewalks and restricted visibility.

Parking in residential areas consists of more than merely providing an adequate number of parking spaces; it involves finding the proper place to park cars. Most of the newer residential areas are developed at a sufficiently low density to provide needed space along the street. The older residential areas, especially in the central city where the intensity of development is so high that curb space is clearly inadequate and off-street parking is a necessity. The new residential development also applies on off-street parking requirement as well. Because In residential area, the available of parking space is scarcity the number of automobiles per household is inversely with households per net acre and there have multi-unit automobiles.

Residential parking is aimed at satisfying the "long-term" parking demands of car owners, not the "short-term" demands of visitors and commercial vehicles. The demand in residential areas for overnight parking is indeed greater than in commercial or non-residential areas, with the peak demand occurring night. Often the short-term demand is completely ignored. The visitor and commercial vehicles will find space along the curb or will pay for space in a garage or parking lot. Where apartment buildings provide free off-street parking, the visiting driver is invariably greeted by a sign: For Residents Only. It is also assumed that commercial vehicles, which remain in one place for only a short period of time, will find space along the curb or, if necessary, will double-park.

Commercial vehicles are generally allowed to park in residential areas if the driver or any passengers are loading or unloading goods to a building, or if the vehicle is part of a call for service, including repair or remodeling.

The residential parking area should strengthen the plan and construction of parking lots in residential area and take full usage of the corner and idle land of residential area. Based on the green space, square and etc., the construction of underground parking should be encouraged suiting local conditions. Besides, government should improve the construction standards of residential parking facilities to prevent the gap of parking facilities from expanding. On the other hand, under the premise of not affecting the surrounding road traffic conditions, increasing the road utilization rate at night can increase parking supply to a certain extent.

2.4 Causes of Parking Problem in Some Selected Asian Countries

In developing countries, have a growing the car density at metropolis area and parking problem also become a big issue with various causes. Many of the parking woes in developed countries are also present in the developing world. Aside from the disparity between the number of vehicles and number of parking slots available, there are also the issues of parking locations, lack of parking signage, informal parking, and inefficient policies causing altercations and accidents related to parking. As expected, highly commercialized areas need more parking slots compared with less urbanized zones. But to exacerbate the problem, there's also a lack of garages in some urban residences.

2.4.1 Imbalance Demand and Supply

Every person who owns a vehicle needs a space for parking. As the number of vehicles grows, need of space for parking increases. Car parking is a major issue in urban areas. Mostly are facing issues related to the lack of parking places together with the increasing economic development and urbanization, vehicles are growing rapidly, which exacerbates the imbalance between parking supply and demand.

Parking demand refers to the amount of parking that would be used a particular time, place and price. It is a critical factor in evaluating parking problems and solutions.

Parking supply refers to availability of parking space. Availability of parking supply usually depends in large measure on intensity of development and cost of land.

In Indonesia, Tenants of middle-income apartments face difficulties in finding parking for their vehicles due to limited space. Regarding the street parking of Kalibata City Apartment, cars are parked in street as block, Kalibata City provide very limited parking space for their tenants. Next fact They could barely find space for car after office hours, especially past 8 p.m. they often had to drive around the apartment compound for an hour to find an empty parking space. Kalibata City apartments allowed in contract to bring the car and motorcycle. General manager of Kalibata city apartment he acknowledged the problem, explaining that the parking lots had a capacity of only 4,000 vehicles although there were now 9,000 apartment units. The management wanted to improve parking by building a high-rise parking ramp on its property, which is a designated green space. However, the city administration rejected the plan.

Another Green Pramuka City apartment in Central Jakarta as well, there are now 4,000 units to be built, but only 1,300 parking spaces provided for all unit owners. Current situation Green Pramuka City residents had not faced parking problems because the units had yet to be fully occupied and only around 400 cars used the parking lots. In future if the parking lots get crowded, that's a risk of living in an apartment that will have to face. In the future, the management was considering involving residents in solving parking problems. One idea is for residents to take turns using the parking lot.

The Indian government try to promote the car centric economy because of car industry can create a job. Nowadays India has over 100 million registered vehicles. In 2017 2.4 million vehicles were added to the Indian roads and auto companies estimate sales to increase to 6 million units a year by 2018. Delhi alone has 70 lakhs vehicles. The situation is such that approximate 40% of the roads in urban India are taken up for just parking the cars. The demand is lot more than the supply of parking spaces. The situation was exploded that families getting smaller and the total number of motor vehicles exceeding the total number of heads per family, further exacerbated by the fact that nowadays even people from low-income group are able to own cars. some residential and office complexes have car parks, the average middle-class citizen, who can today afford a car, has nowhere to park. For most, therefore, the solution is to park on the streets, sometimes double and triple parking. The number of families with cars has become much more than what the country is able to manage.

The increase in the number of vehicles on the road has not seen a proportional increase in the number of parking spaces. City development authorities seem to have forgotten the significance of efficient parking lots. They surely cannot and should not neglect the demand for parking spaces. The shortage of available parking space increases the instances of unorganized on-street parking which blocks the on-going traffic, thereby contributing to traffic congestion. Cities do not have the option to neglect the demand for parking space as it is escalating.

Since 2004, the number of private cars in Beijing grows 0.34 million annually (according to the Department of transport engineering Beijing). On the other hand, the supply of new parking facilities including curbside parking and off-road parking_ increases 0.10 million each year, let alone the lack of parking left over by history. In Beijing, the sharp gap between demand and supply of parking spaces is widening year by year. Therefore, the parking problems seem to be more and more serious.

Developing cities are characterized by rapid motorization, inadequate public transport service, extremely expensive land price in the city center, and severe resource constraints of local Government resulting in a huge gap between parking demand and supply (Lohani, 2005; Morichi, 2009; Morichi, 2005).

2.4.2 Central Business Area Parking

Central Business area is a commercial and business area of town. Parking spaces are in high demand, and the Central Business Area is full of many commercial and public places such as arcades, malls, multiplex systems, hospitals, offices and market areas that are located in CBA. It attracts people and vehicles from different parts of the city and its region for shopping and recreational facilities and accelerated mobility of vehicles in CBA. The greater mobility has created traffic congestion and parking problems (Amini et al, 2017).

In many cities drivers at busy times cannot find any place to park their cars in specific areas such as central business area and business centers, either in a parking lot or as a curb parking. In this case, frustrated drivers circle the nearby blocks searching for a place to park their cars. This phenomenon is called cruising. Cruising has an implicated impact on parking problems (Hossam, 2017).

The demand for parking in Indian central business area is seeing no signs of stopping. Because land resources are limited, it isn't possible to conveniently plan parking spaces according to demand. The core or older areas of the city, mainly central business district (CBD), fail to provide enough space for off-street parking, which tend to increase the amount of on-street parking demand in those areas. Cruising of parking takes place due to non-availability of enough parking space for parkers and high demand for on-street parking in such type of areas. The parking problem arises mainly due to people want to park exactly in front of the door of their destination. Moreover, the buildings are very closely next to each other and there is no basement for parking. Research indicates that the average volume of traffic-related to parking during peak time can reach 30%–50% of total traffic (Shoup, 2006). In the Central business area, there is no instead of increasing available parking spaces, an effective technology-based solution must be employed to optimize the use of available spaces.

Kota is an emerging city, third largest city of Rajasthan, India, there are lots of industries and commercial centers situated in the city that contributes to its economy. The rampart area of Kota which call Arya samaj road near Rampura: It is the core area since established in early days of Kota History. This is the most visited place for the visitors and consumers to shopping it known as the main market of the city. Therefore, still it suffers from the acute shortage of parking and there is no space of parking for shopkeepers as well as consumers due to which people park their vehicles in front of the destination area. Now, the amendments or implementations of creative or technical solutions of parking related problems like parking complexes, multi-level hydraulic parking system, metered parking, green parking etc. at the core places of the Kota are required.

In Beijing, there are more than 5 million vehicles in Beijing with only 2 million parking lots. The cars without parking lots are parked on roads or in residential area, which makes the already vulnerable 'capillaries' of roads weaker, even makes fire control passageways blocked in some places. Fast-growing vehicles and limited parking lots formed a sharp contradiction and caused the phenomenon of "parking difficulty and parking disorderly". Especially in the Central business key areas of the city center, the phenomenon of parking disorderly is very serious and a large number of bicycles' paths, walking and living leisure space are used for motor vehicles parking.

In developing cities like Sabzevar in Iran, the car parking problems and congestion are serious problem, and it requires an urgent solution because of the rapid motorization. The traffic planners are facing problem in solving the parking problem especially in commercial areas. Finding vacant parking space in the Central Business Area (CBA) of the city center is a time-consuming process. The vehicles which are in search of a parking space rover their vehicles slow, thus congesting the traffic especially during peak hours. The location, design of a car parking can neither easy nor cause traffic congestion most especially within the CBA with a narrow or inadequate road infrastructure. Although on- street parking would be helpful to have easiest accessibility, would reduce the capacity of roads and in such circumstances, on-street parking provokes traffic congestion. Problems of congestions, delays and inadequacies in public transportation have forced people for opting of private vehicles. The private vehicle demands vehicle parking is an essential component of

the transportation system. This situation has increased the demand for parking and shortage the available for parking spaces in the Central Business area.

The major causes of parking problems in the CBA of Sabzevar city, Iran that are facing by the central area are as follow:

- a) Long duration parking which is generally done by shop owners and their employees
- b) Landowners have converted the parking spaces for other purposes, despite the building regulations which specify a minimum provision of parking area,
- c) During peak time, frequently shifting many transit vehicles and visitor vehicles

2.4.3 Illegal Parking Phenomenon and Parking User's Behavior

Illegal parking: there has not been a specific definition. The term can be understood simply that it is the act of drivers stopping and parking their vehicles in a place restricted by law regulations or in an unauthorized manner (Borough Council, 1992). It is against the law virtually. Illegal parking spaces, has negative impacts like unplanned land use but on the other hand, can fulfill the deficiency of parking supply. Especially in the core city center and the high-density resident area, illegal parking by some means can help to solve the problem of parking scarcity.

A research of Spiliopoulou & Antoniou (2012) revealed that illegal parking as one of the major parking problems in cities of Greece. Illegal parking occupied spaces of roads and caused imbalanced demand of garage parking and curbside parking. The prevalence of illegal parking was mainly due to a parking supply shortage and lacking parking information. Besides, the improper urban planning also contributed to this problem.

In Beijing, the government of Beijing has done a lot of research on the rate of parking fees, Both the rate of parking fees and parking fines are much lower. The construction of parking facilities needs to consume huge social costs. What's more, the cost paid for parking in the wrong place is low and there is not adequate punishment for illegal parking. A number of illegal cars pay almost nothing for parking in the wrong place. Inadequate punishment is one of the main reasons for illegal parking (Yan-ling, Xin and Ming-chun, 2016).

Most of the Asian countries, Motorcycle populations grew deteriorating the parking situation since the available space on the roads has remained unchanged. The

construction of public parking spaces has developed slowly and cannot keep up with the demand. Therefore, many illegal parking spaces (unregistered spaces used illegally by individuals who offer them to parking users and collecting illegal parking fees) have been created in those cities.

The illegal parking phenomenon and behavior of parking users in Hanoi. It is one of the developing cities. It is found that illegal parking occurs in 80% of 30 roads surveyed (World Bank, 2014). Illegal car parking occurs more frequently in New Development Area whereas illegal motorcycle parking happens more regularly in Old Quarter Area. A significant reason is that working people in this area (40% of total trip purpose) mostly are salesmen of shops alongside the streets. They often park their motorcycle in front of the shop during their working time. Another important reason is that people going for shopping (21% of total trip purpose) usually park their vehicles for a very short time (less than 15 minutes). Then they tend to park in front of the shop to buy things and immediately leave. In the New Development Area, since the sidewalks are wide enough and people can easily park their car, illegal car parking happens more frequently. Furthermore, it is observed that illegal parking occurs frequently due to the lack of police enforcement in every area in Hanoi. Many people travel to these areas for working purposes and frequently per week in these areas.

When illegal parking people are asked what the most important reasons are for selecting current parking location (reasons are pre-defined) the dominant answer was in Table 2.1. Therefore, there exists a potential that people who frequently go to a certain area are more likely to park illegally. Since people know the area very well, they easily find the parking location within short walking distance, no fee (even it is illegally parking), seldom having police patrol and enforcement, and no illegal parking fine.

Table (2.1) Reason of Illegal Parking and Respondent Percentage

Reason of illegal parking	%
Short walking distance	68%
No searching time	62%
No parking charges	61%
No police patrol (no fine)	59%

Source: Legalization the illegal parking solution of parking scarcity in developing countries

The other major factors which encourage illegal parking are inadequate capacity and enforcement level. Illegal parking seems to be one of the serious problems as the number of motor vehicles increases. Reduced traffic speed, reduced capacity, delays and congestion, change in modal choice, loss of revenue from legal parking lots, reduced level of respect to the law compliance, and accidents are some major effects of illegal parking (Cullinane and Polak, 1992).

2.4.4 Parking Facilities and Charging Standard

Most of the cars are parked most of the times and it can be reliably and cheaply stored when it is not being driven. Parking facility is key measurements of every parking system. The facilities of parking areas consist of; how much is it convenience and safety of walking from a parking space to destination, how much is it attractiveness and security of parking facilities. It also obvious to clearly mark parking so people can find it through good directional signage and/or way finding out system. Moreover, would be fulfilling the environmental requirements.

Parking facility managers and operators may foresee the parking system performance and carry out short and long-term preventive strategic decisions to avoid system breakdowns. On the other side, the parking occupancy can help reduce traffic congestion and energy consumption. Parking facility efficiency can be increased through good management which includes sharing, pricing, parking regulations, and improving enforcement.

The cost of parking is varying depending on the type and location of development and the type of its parking facilities. Parking value is determined based on location. A space that provides access to many people, job, and facility such as parking space in central city is more valuable than one provides access to fewer such as a street space in city. Parking was priced like most commodities; its price would vary by both time and location. It would cost more in big cities than small towns, more in business districts than neighborhoods, and more at midday than midnight. Parking fee is as a tool of limit the growing speed of vehicles and improving traffic order.

In Beijing traffic is too worse because of low parking cost is one of the more important reason. The rate of parking fee and parking fines are much lower. The construction of parking facilities needs to consume huge social costs and the average cost of each parking lot is so high. However, under the land supply system and pricing

system, users of parking facilities only pay one third of the cost in Beijing. The payment return back period is too long so there has little attraction to social investment. The majority of parking spaces are actually offered by property developers. Therefore, the willingness of developers to provide parking facilities can influence the actual parking provision. This willingness is mainly based on the trade-off between cost and benefit (Yan-ling et al, 2016).

In Indian metros, parking is either free or minimum priced, the fees being unregulated for many years now. For instance, Mumbai charges the same parking fee as it did 20 years ago and has one of the lowest tariffs in the world. Because parking price stays too long period, the longer one stays in a parking space, the less one has to pay. In Sarojini Nagar in Delhi, parking price is a meager Rs. 20 per hour with a standard fee of Rs. 100 for 24 hours, making parking even cheaper. Parking space is a scarce commodity today and the price should come with together raise. The best way to manage the parking is by charging the right price for it. This can be done by using demand to price parking and optimize occupancy. If the price is too high and spaces remain vacant, operators lose revenue, nearby shops lose customers, employees lose jobs, and governments lose tax revenue. If the price is too low and no spaces are available, it leads to traffic congestion and chaos. Pricing can be a very effective tool for the management of travel demand as whole. Issue with parking in India metropolises (Gautam, 2019).

2.5 Review of Previous Studies

Amini & Shanker (2017) focuses on the central business area parking problem in Sabzevar City, Iran. This study is a descriptive method based on primary and secondary data and qualitative assessment based on the speedy and density of traffic. The variable are vehicle population, Land use pattern, and traffic volume. The major finding of this study was CBD area is increasing vehicles ownership of parking demand and also high land value so as per various kinds of parking demand, the ways to be reduced the problem that promote public transport, charging parking fee, transportation policy development and finally to build automated multi-level car parking system. traditional parking system is typically unsafe and inefficient. Automated multi-level car parking system is more economical, space efficient, safe, and secure than traditional. It has important role of reducing the traffic congestion and solving the parking problem.

Parmar, Das and Sanjaykumar (2019) focus on the demand characteristic of parking system in urban area. This paper reviews the past studies emphasized on the parking characteristics and developments in models for parking choice behavior, both at aggregate and disaggregate level. This also discuss the different methods and variety of approaches like linear regression, least square regression, unitgraph technique, logistic models, principal component analysis, random utility and game theories, gaussian mixture model, and gray correlation analysis have been used for developing parking demand forecasting models. This study focuses to reveal between the parking policy and traffic management that how parking will be becoming barriers of traffic operation. This result found that supporting parking policy is important it also part of the transport planning and management. The increasing of parking supply is not a solution of parking problems. Therefore, private vehicle traffic restriction can be achieved through parking restriction. Improvement in the parking performance and attention to sustainability will help transport planner to develop sustainable parking eco-system.

Cho, Oh and Park (2001) focus on the developing countries parking policy and its effects on traffic flow in CBD areas. This study is focused on parking behavior one of the major streets of CBD area in Yangon and reviewed of the existing parking policy to know suitable parking management measure for existing parking problem. This study found that the influence of on-street parking affecting the traffic flow, demand and supply are not balancing condition. Transport policy should be appropriate their city nature. Parking policy is one of the most important tools for parking and traffic. Demand management by making parking policy is better way than doing nothing.

Litman (2006) focus on the best practices of parking management. The study method is descriptive and survey on parking management strategies. This study is focused systematic parking management will reduce the demand problem. This stated that parking management need to focus as equally on quality such as the ease of obtaining parking information, the convenience, safety of walking from a parking space to destinations and the attractiveness and security of parking facilities. Parking regulation should be more accurate and flexible what as reflecting geographic and demographic factors and various suitable management strategies that encourage more efficient use of supply. This can be matching with demand satisfy point and reduce the number of parking spaces.

Yan-ling, Xin, and Ming-Chun, (2016) focus on current situation of parking problem in Beijing. The study method is descriptive based on secondary data and primary data. The variables are parking supply in residential area, charging congestion fee, public transportation development, and purchase restriction policy. This study is analyzed systematically and thoroughly what is the problem of Beijing on current situation and the reason of this problem. This result found out that there have two kind of measure to solve the problem that increase the supply of transportation facilities such as increasing the parking space appropriately and strength the demand management to guide the properly and control the transportation demand as vehicle-purchasing restriction policy.

CHAPTER III

CAR PARKING SITUATION AND MANAGEMENT PLAN IN YANGON

With the rapidly growing Yangon economy, Parking difficulty has become an unsolved problem in many urban areas of Yangon city, it is the urgent problem for metropolis city.

3.1 Background of Parking System and Road Traffic

Before government liberalization of car import policy, Yangon has no traffic, slowing down the speed of motorization and a few people own private vehicles. Vehicle import is restricted to individual and companies by the previous government. This situation, commuter encourages to use the public transportation. Related key vehicle parking was not burden for owner, planner and management of transportation. At that time, it is easy to park in any designated areas. In Residential area, only a small number of households owned vehicle, its parking vacancy especially in front of their apartment or house and some township has over sufficient land area and the vehicle owner makes a small garage to keep their vehicle even though it is public land. Although commercial areas have a parking problem since it was 10 year ago especially at a peak time where the place of main trading and distribution of commodity and the government offices, were crowded with traders, customers, workers and civil servants. The cars that come there are mostly shopping cars which parked on roadside area, and so there was no specific parking place. Each vehicle was charged Ks 200 with no limit time of parking on roadside. Some schools exit on main road, traffic congestion occurs at school time because of drop-off and picked up cars were parking on main road and they were mostly the private car and had a small number of school bus. All cars parked on main roads, so traffic congestion was taken a time at this place despite one or two police who are to clear the road traffic. Government did not car any concern for vehicle parking place and its related policy

expect near traffic light area restrict the parking where payment was highlighted with red and white line.

Government made the lessen car import regulation in 2010 in order to promote the urban transport that allowed importing the used vehicle from other countries and individual who opens a bank account with foreign currency has been given an import permission for one car since 2012. Consequently, the deregulation of importing motorized vehicles has recently increased the number of registered passenger cars and private care in the Yangon Region significantly raised. Before 2010, Yangon had 160,000 cars after the policy changes the number of passenger and private vehicle rapidly increased to more than a million and registered in Yangon were about 900,000 out of 7 million vehicles registered nationwide according to data from the Department of Road and Transport 2019 result. By looking at the accelerating rate of car ownership increase by 5 times after the 10 years, consequently parking demands a significantly raised. Due to this, parking space was becoming fewer and fewer not only in downtown Yangon but also in almost all the other townships of Yangon too. Medium income families becoming car owners, some are more than one vehicle in within the family. Previously there was no consider placing of car parking in a construct of the resident building after changing of car permit policy it was being a big problem. Vehicle's owners are parking on the roadside, public areas e.g. Park and on the pavement even illegal area. It can be cured with parking lot or off-street parking but unfortunately it is losing under the high land value especially in downtown area the land is very scare. Frustration at slow progress of regional government effort to build off-street parking facilities. Parking lot can be seen in private shopping mall which intend to collect fees and some of their parking lots are open to the public by pricing it. Due to these situations, all private vehicles are enforced to park on roadside as a public good. It happens worsen for many other mobilities and traffic problem, economy, and environment. Now Yangon city Development Committee is under the control of Yangon regional government informed to build the smart car parking system in six townships at downtown area to reduce the traffic congestion. They cooperate with private companies to implement the plan of smart parking building and it would be charged various fees depending on parking time and condition. But the government delay in making specific parking policies. The Parking policy is the main tool of parking management. Whatever they do as smart parking without any parking policy, effective sanction would not work for

parking problem and burden on the public of city. YCDC try to extend the road for the purpose of getting road parking space and good traffic flow even though these extend space is full of on-street shopkeeper instead of car parking in narrow the pedestrian area. The main reason for road congestion in Yangon was due to haphazardly and unsystematically parked cars according by JICA research.

Road traffic: Yangon has more than 7 million people, with high population density and daily running with many commuters. They come to downtown of Yangon for daily work and have to spend hours on the roads to get to work. According to the Myanmar time data, seven million of Yangon population exhausted with road traffic where during the rush hours, commuters spend at least three hours per day on the road. It is waste of time and time makes money, therefore multiply with many commuters. According to the YCDC data, in 2007 vehicle speed reached 30 kilometers per hour (km/h), which is the free flow speed even at peak hour and by 2015, it has dropped 10/15 kilometer per hour (km/h).

According to the data from Yangon's Road transportation department in Yangon region, for car registration there were around 210,000 vehicles in August 2011, but it increased to 520,000 vehicles in July 2017 in double. According to this data, vehicles increase by 50,000 per year. If the current population and vehicle ownership trends continue over the next 5–10 years and bus services are in low quality and not responsive to demand. An increasing population is likely to reject low-quality transport modes and 4000 buses of 7 million population (data from YRTA) in favor of private transport. About 900,000 out of 7 million vehicles registered in Yangon where there are insufficient road, lack of parking supply and management too. A few law-enforcement officers and inadequate public transport system are causes of road traffic and parking problem. Traffic police department running with about 1000 traffic polices in Yangon which is inadequate to smooth traffic flowing and working with assigned each traffic polices team look after the school area and congestion control and sometimes mobile polices team watch and check vehicle beyond the traffic rule. Regarding this situation, traffic police are not controlling entire day at one place.

Buses also cause traffic congestion and buses need to stop enter the bus bay which are highlighted with yellow. Although most are stop out of the bay when many buses arriving at the same time at bus stand. Because no bus to keep orderly the situation in the bus bay, it occurs chaotic. Another problem of bus bay is parking of

the resident vehicles, taxi and shopping cars in illegal parking area, which can cause buses to stop inner bay line and stop at traffic road, and thus make traffic congestion.

Yangon has many on street vendors everywhere and they are selling the whole day. Regional government has provided specific place for those street vendors particularly in along strand road. According to the YCDC law, it is not allowed to sell on public streets, but law enforcement is weak as street vendors disappear when the time YCDC staff check and look around and when staff go back, they re-stall their shops. Sometimes, it the bribery occurs. They take place where parking area and pedestrian area, its affect the vehicle parking. Resulting that the road is made narrow flowing line and current traffic circuit slows with jam. Reference from *The Project for the Strategic Urban Development Plan of the Greater Yangon Final Report*; In general, the purposes of traffic control in Yangon are:

- i) To ensure road traffic safety;
- ii) To maintain smooth traffic flow; and
- iii) To prevent negative impacts caused by road traffic

On-road parking restriction/prohibition is one of the procedures to fill the above purpose for traffic control adopted. It is currently applied in the designated road section. A situations mentioned above are occurring the road traffic slowing and congestion.

3.2 Residential Parking System

According to the Yangon City Development Committee (YCDC) rule, it has at least 4 layers and above parking space must include apartment and most mini condo free from parking rule. Government updating the condominium rule and regulation, all condos must be allocated 1.2 parking spaces per unit(room) under current regulation, but nothing changes existing car parking regulation and can see some townships where there are condo that do not follow the rules. Relevant departments cannot take effective action on beyond regulation. It occurs imbalance between vehicle owner and parking space at second road on side parking.

Public car parking lot was not included when market, apartment and department buildings were built under the previous governments. Furthermore, the past construction permits were allowed easily, without considering urban development as vehicle parking space, making a worse that buildings are constructed

next to the main road. The constructions are still permitted in Yangon without concerning the parking space for residents.

The vehicle owners who are staying at old apartment have a trouble to park a car and always park roadside even in pedestrian area causing not only traffic congestion but also public safety. Most people wanted to park near their destination point, and some shop and apartment owners are making block empty area for their customers and vehicles, sometimes making a block with plastic chair and smalls plant port for block space for all day even coming back in the evening ready to park after a long day from work that means the space is just useless during the day there is no one park. So, a car owner who looks for a vacant space turns again and again to get parking by using valuable time, fuel even residential car. YCDC try to reduce the car scarcity of car parking space that they seized its block item for parking space but nothing penalties fee charging on residents. Therefore YCDC seized something today, but residents put it back the next day. In addition, some residents who stay at ground floor by expanding their territory take the public land especially parking space in that area.

In line with urban development, the government has granted quality housing by private company, it looks like that for public private partnership that the government provides land for housing in Yangon region, and these housing complex includes car parking for households. It may even be possible for nonresidents to lease a parking space within the complex. Most residential complexes are managed by residential housing committee and they managed the parking space to lease the external vehicle owners within complex and this revenue is income of their housing welfare. External vehicle owners used private space with rental payment and change the safety of their car by thief and damages.

Yangon regional government should consider long-term sustainability of housing development. Nowadays the Ministry of construction is implementing the new low-cost housing in suburbs areas, without considering the car parking place. As a result, the lane is very narrow and there are electric poles in the middle of lanes. In addition, the main entrance road is inadequate for parking even when one car is parking, the other car cannot drive on to it.

If there is no plan to create the parking lot or smart parking area it can lead to fight over parking space. Violent quarrels and even murder cases from fighting over parking space can occurs. In some places, arguments caused by car parking problems

account for 68 percent, according to 2018 parliament data. It is crucial for the government to construct parking lots in the public areas and high-rise buildings. The townships which are beyond Downtown Township have a still vacant land that just needs government arrangement to build or create parking area.

According to a new building construction policy, a building must have adequate parking space for it. The individual person needs to show that they have parking space for their new vehicle since 2015 January. Although the policy is released later how to solve current situation should be considered at the management level.

3.3 Central Business Area Parking

Yangon is a commercial city of developing country Myanmar. The rapid increase of vehicles is following economic growth in its consequence from traffic congestion and parking problem to seek the serious and requires urgent solution in central business area of city. Currently, urban central functions including administration, banking, business and commerce are located in the CBD with high density of houses and shops. Yangon has six downtown areas as per YCDC data. All important public buildings, commercial and trade centers, municipal markets and shopping centers and even warehouses remain in the CBA so that most of the traffic flows are heading to CBD. The cars are parked on along main roads and inner roads. Moreover, off-street or parking lot are very scarce because of difficulty of Land use. The Local people have been facing the serious traffic congestion, air pollution, and poor safety in the central of Yangon City.

Parking demands rapid increase when car import policy changes. Most building of downtown CBA buildings are built for mix-use of commercial and residents, they did not make a plan for parking place and old apartments without parking space. In addition, they cannot geographically, expand southwards and westwards because being limited with rivers, vacant land is very scarce. Central business area's roads are not wide, and the second lane are very narrow with dense population. In most central area parking is permitted and people can only park on road because of narrow space. Land is almost full of residents and business buildings that have been shown in **Table 3.1** by YCDC data and thus the table show, In CBA not possibly to implement the parking lot or off-street parking. Parking on major streets causes traffic congestion due to more time consuming rather than actually required.

Table (3.1) Detail Land Use

No	Township	Area (Sqkm)	Built-up Area					
			Residential Area	Business Area	Commercial Area	Industrial Area	Public facilities Area	Build up Area Total
1	Latha	0.60	55%	0%	0%	0%	45%	100%
2	Lanmadaw	1.31	65%	10%	0%	0%	25%	100%
3	Pabedan	0.62	76%	4%	19%	0%	1%	100%
4	Kyauktada	0.70	88%	11%	0%	0%	0%	100%
5	Botahatung	2.60	64%	15%	0%	8%	2%	88%
6	Pazundaung	1.07	78%	3%	0%	8%	0%	89%
7	Ahlonge	3.38	62%	5%	0%	20%	3%	90%
8	Sanchaung	2.40	92%	0%	0%	0%	7%	99%

Source: Urban Planning Department, Yangon City Development Committee (2022)

At the central business area, there are running five main roads that run along east to west direction. Among them, four roads were catering to the one-way traffic system and only Kanna road allows two-way traffic system to reduce vehicles traffic congestion. Now they increase the restricted parking area because of traffic carriage to be smooth. In the central area of Yangon city, the on-street parking is very predominant. Vehicles are allowed to park in state of perpendicular or parallel relating to a low width of carriage way and limited space especially in CBA. All vehicle park on both side of road and taxi stops for picking-up and dropping-off so the actual carriageway is narrow. Vehicles registered in Yangon region reached to about 900,000 out of 7 million nationwide by 2019 according to data from the Department of Road and Transport and thus result the CBA attraction of huge volume of vehicles so it would be more difficult to park especially during peak hours.

For developing, the government has extended new urban area due to the increasing population and other townships become the commercial areas as a CBA in a recent year at Yangon region and under this circumstances of increased local population, retail shops, commercial areas and big shopping centers and local plazas which have placed lager demands on existing parking facilities there such as San

Chaung township, and existing car parking spaces are inadequate. The parking problems emerge conflict between demand and supply.

Typically, drivers have the ability to park motorist very closely to their destination in many parts of area although in the central situations have changed for example motorists cannot park directly outside their destination and, so they have to look for parking space and they have a problem for their car space. This has led to a perception for some motorists that there is an undersupply of parking within CBA, particularly there are the central retail shopping areas and streets surrounded by the big shopping plaza. Some reason has a typically demanded choice as easy parking on roadside even it has smart parking in big malls which may be cost rather than convenience. Another issue is rental vehicles(taxi) that have double parking even in restrict road areas to pick-up and drop-off passenger its enforcement of traffic congestion and they do not follow the current rule without any penalties. The weakness is that traffic police cannot oversee full, or part time worker and they take action.

According the YCDC data, more than 4 million of people from suburb of Yangon city commute to central downtown business area. The traffic congestion causes bus passenger to take long time for going into and out of Central business district area. Therefore, Public transport improvement is essential instead of using the private cars and taxis. With the increasing use of cars and taxis, traffic speeds cannot be expected to continue to decline unless measures are taken to change the situation. Current bus speeds are peak in the morning inbound and evening outbound direction at CBA.

In a big municipal market, peak time is from morning until midday, and some are running the whole day but there is no parking reserve since building plan. All vehicles park on roadside as curb parking, double parking has caused chaos on the roads, for instance Nyung Pin Lay market and Mingalar market. In central Business area, land value is high, and the developer prefer to take benefits, shopping areas are implemented rather than a parking place in the ground floor. Further issue makes more worsen of the cause of parking problem that empty cars, container took the place reserved for shop owners and their customers.

3.4 Road Parking and Illegal Parking

The government expanded non-parking area in an effort to reduce traffic congestion. According to the motor vehicle act 1964, the car that park at the restricted area will be changed. Six more roads have been restricted as non-parking areas. Non parking road system was introduced in the early 2013 at 20 main roads section. Generally, there are 6 roads in Yangon city such as Pyay Road, Kabar Aye Pagoda Road, Bayin Naung Road, Strand Road, Baho Road, and Insein Road, 200 feet within traffic light area and buses stand area that is often observed such as occupation of one lane, double parking by multiple parked cars, and on-street parking adjacent to intersections. These types of on-street parking could cause serious traffic congestion and traffic accidents. Seconded roads are still allowed to park on roadside. Even the lack of on-street parking pricing and management causes illegal parking on road.

On-street parking can be observed typically, and the results are

- a) schools where private cars and school buses stop near the school gate for dropping-off and picking up the school children. There are two peak hours of on-street parking at schools: in the morning and at noon, because most schools in Myanmar adopt a half-day school schedule in which two shifts are practiced at the same school during the day.
- b) major hospitals where the capacity of off-street parking spaces is insufficient. High-income car users typically access these major hospitals.
- c) shopping centers and retailer shops where many taxis and pick-up cars compete for parking spaces near the entrances that tend to offer less parking than required
- d) auto dealers where many cars are displayed on the roadside even on pedestrian area
- e) Municipal market which are crowded during market time with floating street shops and shopping vehicles. As there is no designated parking space, car parked on roadside, double parking on street occurs.
- f) lack of public parking lots and weaknesses of parking policy

The terms of illegal parking that the act of drivers stopping and parking their vehicles in a place restricted by law regulation actually is against the law. Increasing car ownership has led many problems is including car parking around Yangon. No management On-street parking leads to illegal parking ahead and it also causes traffic congestion. In Yangon heavy traffic is one of the reasons in illegal parking of cars on

the street and thus illegal parking is always one of the causes of serious traffic congestion.

Illegal parking is observed and why it happens typically are:

- a) imbalanced demand of garage parking lots and curbside parking. It occurs mainly due to parking supply shortage
- b) Those street stakeholders who occupied space on the road
- c) Behaviors of parking user who can immediately stop to occupy when polices are not there even if there is no parking sign standing.
- d) Double parking in development area where mostly shops are alongside on the street
- e) People who are shopping usually park their vehicles for very short time and intend to park in front of shops to buy something and immediately leave.
- f) Police cannot have full time watch and there is no CCTV for watching illegal parking in restricted area.

This area will be severely affected when a disaster occurs such as accident, and hence it is essential to clarify the effect of such undesirable parking behavior on the reduction in capacity of the Yangon road network.

For off-street parking to be revealed that no one takes interest, and people do not use paid parking lot why the cause is government allows parking along on roadside, there is no parking fee charged and nobody will build parking lot/ off-street parking.

Parking is a major urban land use. Since Yangon Land is standing with high value, the developer cannot take a challenge to build parking lot. Availability of parking (parking supply) usually depends on intensity of development and cost of land. So, they are eager to use what to get commercial benefit. The Yangon government lacks a clear policy for parking, making it difficult for developers to build parking lots. In some Townships, parking lots have been built by YCDC, but it is not successfully laid down due to the free cost of on-street parking. The region has still public land areas that needs to have effective management of urban development through integrated coordination with private company such as parking facilities, reliable parking fee.

The regional government has been trying to reduce car parking problems but there is no workable solution. The government planned to carry out car parking project on a plot of land owned by Myanmar Railways in 2013, but due to the lack of

cooperation between the governments' departments, the project fail. Yangon region has still available plot of land owned by various departments such as the Housing department under the ministry of construction and thus the enforced cooperation is given within the government to reveal the parking lot in the vacant plot area. The government cannot provide them, and the people have to solve the parking problem in their own ways, for example some try to find the parking lots inside the monasteries complex, stand on a public platform.

In downtown area, due to the lack of valuable of land, and accumulated occupancy, it is not possible to make parking lot. Therefore, Yangon mayor has a plan to make a more modern and systematic smart-parking and multi-story building to be implemented in downtown area (Yangon time). Even though the plan was suggested over a year ago, nothing had been implemented. Yangon city dwellers are enthusiastically hoping for the Region government and YCDC to address the problem.

3.5 Parking Facilities and Charging

Parking facilities are mainly important and one of the measurements of parking quality and safety. This consists of how many conveniences for the users and how long from target distancing and need to fix the CCTV for safety and one important thing should be considered that convenience price for demands. The accessibility, ease of entering, circulating, and parking are an important factor of facilities. Good dimension and circulation are more important than a few additional spaces and better sight distance, parking ease, and traffic flow are the results of a well-organized adequate design of the parking lot.

In Yangon region, we can see the difficulty for a parking lot with good facilities except the shopping center and mall. Yangon government allowed the system of a parking lot in some townships to be implemented by a private company even though it was not well implemented because of lack of facilities and integration between with private and government. For example, off-street parking was provided in SanChang township, according to the demand. It is working well with high parking fee even though it is not highly comfortable and secure. Finally, it failed, and the government revoked permission this place for other purposes.

In South Okala Pa Township, four-story parking building was implemented by YCDC. It is still working with a vehicle of car brokers whereas there is storage for selling vehicles and the parking fee is cheaper. The facilities are not provided with a

full package, and it has just a security guard, but there is no CCTV and ease parking system. Furthermore, the demand side is not too high and there is a separate building with a space to park their car and it can affect the charges of on-street parking as well.

The full facilities parking can be implemented by the big shopping centers and private building companies with high parking fees such as 500 Ks per hour. Now Yangon Region government and Yangon City Development Committee are joining hands in implementing the smart car parking system in six townships of the downtown city.

YCDC invited technological companies to join the tender competition for the smart car parking system. Extended implementation system is to charge fees from cars for car parking based on technology. If the system is successful, it will be extended to more townships. For the time being, the project is suspended due to outbreak of Covid-19. They have a plan to collect the parking fees that would be Ks 500, Ks 300 and Ks 200 per hour depending on the type of the car parking.

Before 2010 old paradigm as “abundant and free” parking and after 2010 as optimal parking supply and price” in Yangon. The public have merely practice to paying parking fees. Most people park their cars free of charge, and even if private parking lot is created, there will be no vehicle to use it. Parking fees and renting of parking spaces in downtowns have been prohibited by the YCDC since 2014 under the previous government. It suspended plans of collecting parking fees in three years later in 2017 and 2018 due to the problems with car increasing and public objections. For many areas, in the downtowns, vehicle owners were forced to pay illegal fees to unauthorized vendors. Some are parking in housing compound and the parking fee is collected by the housing committee and those revenue paid to individual instead of government revenue. Therefore, the project really has to be implemented because the vehicle owners and drivers are facing the problem of collecting the charges of parking fees in Yangon City. That would cure traffic congestion and it is looking for ways of increasing its revenue. Without the use of a parking fee for on-street parking and near non-existing enforcement of illegal parking, streets will degrade the accessibility and the city will lose opportunities for parking revenue and transport management.

3.6 Management Plan on Overview of Parking Problem to Eliminate Traffic Woe

Government policies were changed in 2010 to improve of social life which included trade policy and vehicle permit policy granted to import the used cars and new cars continuously year after year. There are advantages and disadvantages to this development. The disadvantages are insufficient car parking space, road traffic of transportation sector and waste of time, money and environmental such as air pollution that were indirectly affected. Relevant departments need to work together to address these issues. Parking management refers to policies and management's program that is important.

The law was enacted in 1990, and it is the formation of the YCDC in order to carry out the development works of the city of Yangon, moreover, it mentions that "Stipulation of conditions for traffic, parking of vehicles, and slow-moving vehicles policy" is one of the policies, implementation duties and responsibilities of YCDC. Transportation task is under the Road Transportation Administration department under the Ministry of Transport and to be law enforcement is the responsibility of the traffic police under the Ministry of Home Affairs. These above departments are key management areas for traffic flow and parking management. Furthermore, residential compound implementation is controlled by Department of Human Settlement and Housing Development under the Ministry of Construction.

Under the control of Yangon regional government, YCDC has now been trying to create smart car parking system at six townships in the downtown area since 2018. They aim to reduce the traffic congestion and to park systematically and safety. The six were Pabedan, Latha, Landmadaw, Kyauktada, Pazundaung and Botahtaung townships. The parking system should be so smart that would consist of necessary smart items such as high technology, and the parking fee will the use of electronic system rather than manual collecting various fees depending on time and place. Regional government will provide the necessary cooperation. The processes had finished including the tender selection stage and conducting it in March and April 2020. Unexpectedly due to the COVID 19 crisis, it was suspended. However, the project really needs to be implemented.

YCDC have a next plan to reduce parking demands by collecting the parking fees at downtown area. There is already designated non parking zone such as Bo Aung Kyaw street, Merchant street, Kanna street, Lanmadaw street and Bogyoke

Aung San street although currently vehicles are parking freely without any law enforcement there. YCDC is not very strict because they do not provide any supply for this parking situation. After implementation the smart car parking system, they will collect parking fee between 8:00 hour to 18:00 hour.

YCDC are now upgrading the lane system and traffic light to reduce the traffic congestion. Traffic sign and Parking sign are standing to be clear visible on roadside not only in downtown area but also in other townships. Parking sign boards with exact instruction as non-parking area sign and parking area sign and on right way side only park sign and so on give clear message to drivers and road users.

Construction of building car parking is also made with parking regulation especially high-rise building as per YCDC instruction as below:

- If a 4-storey and above building is constructed on plots of land (50ft x 50ft), a car park must be included on the ground floor.
- If DB building 115ft x 50ft and above building is constructed on plots of land, a car park must be included.
- A place for one car parking 18ft x 16ft must be required
- Car ramp slope -9 degree (1:6.25)
- If the building includes Mechanical parking and car lift, specification and queuing space must be placed.

Table (3.2) Minimum Required Parking Area for High Raise Buildings

No.	Usage Design	Minimum required Parking area	Remark
1.	Area related to Housing	1vehicle per room	Need Additional 20%
2	Area related to Commercial area	100m ² (1076 ft ²) per car	No need additional 20%
3.	Cinema	10 seats per car	Need Additional 20%
4.	Warehouse	800m ² 8612ft ² per car for loading	Need Additional 20%
5.	Factory	350m ² (3768 ft ²) per car	Need additional 20%
6.	Pool	40m ² (430ft ²) per car	Need additional 20%
7.	GYM	300m ² (3230 ft ²) per car	Need additional 20%
8.	Specialist Clinic	150m ² (1615 ft ²) per car	Need additional 20%
9.	Hospital	4 bed per car	Need additional 20%

Source: YCDC Building Rule and Regulation

YCDC have a parking regulation for various situations of construction that can be seen in Table 3.2 but needs to have law enforcement and regulation adjustment as per current situation.

The department of transport sector also tries a part of their side to reduce traffic congestion and upgrades the public transportation to reduce the parking problem by using the public transport. In 2017, new regional government introduced Yangon bus Service (YBS) that was replaced from the old service Ma Hta Tha. Public transport system, Yangon Bus Service (YBS) was upgraded under the Yangon Region Transport Authority (YRTA), and long-term plans were setup to reduce the numbers of vehicles, road congestion and subsequent problems might be significantly reduced. They are upgrading the payment system of cash-paid system to card system to improve Bus facilities for the passengers. Buses are not allowed to enter the downtown areas and its starting and ending point is recognized at a big park near downtown area because of traffic congestion take avoided. In downtowns inner road area is running with 3 bus lines. Today YRTA is running with 102 bus lines in Yangon region. If collecting the price charges and bus service continue to upgrade, the commuter will turn to using the public transport.

Yangon has traffic police stations running with over 4000 police. The main traffic light areas have police almost the whole day, mostly with assigned system as mobile team working at the main congestion road in traffic peak hours. According to their duties, they have to watch and control the beyond the traffic rules, non-parking area and finding who are breaking the rules. But the system needs to be upgraded such as fine systems should be online electronic system instead of document system to be effective.

Residential compound implementation is controlled by Department of Human Settlement and Housing Development under the Ministry of Construction. They implement many housing compounds in Yangon region to be higher status of living standard condition for public. There are kinds of housing for middle-income housing and low-cost housing and condominium which are implementing with private public partnership project. A condominium housing project includes specific parking area for 2 units per room although middle and low-cost housing projects are not yet for specific parking area.

YCDC is the main function of parking problem to be solved taking the responsibility of Yangon transportation, without the department in charge of

transportation planning or traffic demand management. According to the Ministry of Industry's Automotive policy vision, the vehicle will increase more. Their purpose of automotive policy is to increase the usage of vehicles with affordable price in each and every sector. In this policy, vehicle penetration ration in the designated period of time and the expected Unit in Operation (UIO) are shown as in Table 3.3.

Table (3.3) Vehicle Penetration Ration Up Coming Years

Step	Target Period	Vehicle Penetration Ratio	UIO (Unit)	Brand-new car sale/year (Unit)
1.	Short-term (initial stage 5 years)	4%	2,000,000	200,000
2.	Medium- term (Second stage 5 years)	8%	4,000,000	400,000
3.	Long-term (third stage 5 years)	20%	10,000,000	1,200,000

Source: Automotive Policy of Ministry of Industry (2019)

Furthermore, the government allows many car showrooms in Yangon and Motor manufacturing companies in Thilawa port and it can create job opportunities for unemployment and normal car permit can be easy to apply in car show room with online system. Recently, the government allowed government employees to import car permits by position.

Therefore, Yangon City Development Committee (YCDC) has considered a number of measures to improve parking and traffic congestion, including development of multi-store car parks; regulations requiring car buyers to have council issued car park recommendation letters; and banning car importers from issuing Yangon license plates. It might be part of the car parking problem to solve and it should be considered for other sectors as well such as parking policy, building permit, cooperation within departments. Nonetheless, illegal parking continues to add to traffic congestion in the city.

Further motorization will bring more traffic congestion, deterioration in traffic safety, and bad influences on daily economic activities if any effective measures are not taken.

CHAPTER IV

SURVEY ANALYSIS

4.1 Profile of Yankin Township

Yankin Township is located in the north central part of Yangon. It is situated between Latitude 16.83 and Longitude 96.16. It is approximately situated at elevation 55 feet above the sea level. It comprises fifteen wards (ward 1 to ward 16 there is no 10th wards) and the total area is 1.9421 square miles with 0.5 mile from East to West and 1.25 mile from North to South. Borders in touch are Thingangyun Township and South Okkalapa Township in the East, the Inya lake, Bahan Township and Mayangone Township in the West, Tamwe Township in the South, Mayangone Township in the North. Yankin is the one of the most prosperous areas in Yangon and the main Kabar Aye pagoda road is beside Yankin township. Yankin township is the main junction of intersection area between downtown and suburb.

Yankin is a thriving commercial hub of Yangon. Yankin center and Myanmar Plaza are leading shopping destination in Yangon and attracting shoppers from around the Yangon City. The main buildings and famous places exist in Yankin Township and they are Myakyntha Amusement Park, National Library of Myanmar, Central Bank of Myanmar, Passport issuing office and Myanmar Bank Association office. Also, A new Children Hospital opened in Yankin Township in 2011 occupies the site of an old Ministry of Mining building. Yankin has one Teacher Training Collage (TTC), two high schools, seven middle schools, thirteen primary schools, one pre-school and one private college. There are four markets and two of them are closely located in main road. The historical place in Yankin is Kalayana Temple, Mogaung Pagoda, and Nagalein Pagoda. The township has a large Tamil community a Hindu Temples, as well as a large Chinese temple called Fushan. There are two railway stations: Kanbae station and Bouthtaw station. Yankin was part of one of many public housing programs implemented by U Nu's government. The majority of households in Yankin Township live in apartments and condominiums. There are still implementing many condo projects with foreign investment companies. The following table shows the information regarding the population in Yankin Township.

Table (4.1) Demographic Characteristics of Yankin Township

		Total	Percentage (%)
Number of Households		2004	
Number of Family Households		14637	
Gender	Male	32724	46.1
	Female	38222	53.9
Population	Total	70946	100

Source: Yankin Township General Administration Department (2021)

According to the Table (4.1), there are 2,004 households, 14,637 families with a total population of 70,946 living in Yankin Township. There are 32,724 males and 38,222 females in the total population. So, the number of females is larger than the number of males in Yankin Township.

4.2 Survey Profile of Study Area

Wards 1, 3 and 5 are located in the central of the Yankin Township and exist on a long main roadside. The area of Ward 5 is the largest among three wards followed by Ward 1 and Ward 3. The population of Ward 5 is the highest and Ward 1 is the least. Ward 3 is located along on the Yanshin main road, Ward 1 is located East bank along on the Yankin road and across Yanshin road. Ward 5 is located along Yanshin road near Myanmar Plaza. In term of religious building and structures, Ward 1 has one monastery and one religious building, Ward 3 has one religious building and Ward 5 has one monastery and one religious building. There are no other religious buildings and structures in these three wards. In commercial part, Ward 3 is apartment resident along main narrow road with many fashion shops, beauty salon, small market stores, private bank, fabric shop and phone galleries and it has evening market. Ward 1 has many various shops are in place on roadside and Ward 5 has one big market is called Yankin Myo Ma Zay, private banks, many companies and retailer shops are installing along the road. These three wards are very crowded area of central Yankin.

In term of education sector, there are one High School in Ward 1 and one middle School in Ward 3, one primary school and one private college in Ward 5 but there are no monastic educations in these wards. In term of health sector, there is no

private hospitals in these three wards. There is a large market named; Yankin Myo Ma Zay in Ward 5 and evening Market in Ward 3.

Table (4.2) shows the information regarding the population of Ward 1, 3 and 5. There are 40 households, 423 families with a total population of 2,141 are living in Ward 1. There are 988 male and 1,153 females in the total population. It can be seen that the number of females is larger than the number of males in this ward.

Table (4.2) Demographic Characteristics of Ward 1, Ward 3 and Ward 5

		Ward 1	Ward 3	Ward 5
Number of Households		40	55	133
Number of Family Households		423	463	1482
Gender	Male	988	749	2466
	Female	1153	1023	3464
Total Population		2141	1772	5930

Source: Yankin Township General Administration Department (2021)

There are 55 households, 463 families with a total population of 1,772, male 749 and female 1,023 living in Ward 3. The number of males is lower than the female in this ward.

In Ward 5, there are 133 households, 1,482 families with a total population of 5,930, male 2,466 and female 3,464. In this ward, the number of males is lower than the female.

4.3 Survey Design

The survey is mainly conducted in Wards 1, 3 and 5 of Yankin Township from November 2020 to January 2021. There are 15 wards in Yankin Township and three wards are selected, and these wards exist on main road and secondary road of central Yankin and furthermore it is an old apartment residential area crowded with various stall shops. A total of 150 random samples were chosen among three wards. Yankin township has become a popular residential area for foreigners and locals alike due to its location, it is not far from downtown and suburb. It is surrounded by the modern building which are mixing the residential, commercial, office properties and there are still many old apartments. It is a very convenient place for these middle and high-income families there and for their living standard requirement, the vehicle is one of

the facilities. For those consequence, the parking place has become a burden of Yankin township.

The structured questionnaire was constructed to consist of four main parts. The first section Part (A) is to obtain the demographic of the respondents. The second section Part (B) is about the living condition and ownership of respondent. The third section Part (C) is the analysis on causes of car parking problem. The fourth section Part (D) is analysis on respondents' opinion on possible way to reduce the car parking problems.

4.4 Characteristics of Respondents

This section discusses the results and the findings based on the analysis done on the data collected from respondents. The survey results and findings are shown in the following tables in each part of the conducted survey.

The total of 150 respondents; 50 respondents from each ward such as Ward 1, Ward 3 and Ward 5 of Yankin Township are included to give some findings regarding the car parking problem in this study. Table (4.3) shows the result of the characteristics of respondents.

Table (4.3) Characteristics of Respondents

Characteristics	Number of Respondent	Percentage (%)
<u>Gender</u>		
- Male	72	48
- Female	78	52
Total	150	150
<u>Age Group</u>		
- 21-30	31	21
- 31-40	47	31
- 41-50	48	32
- 51 and above	24	16
Total	150	100
<u>Marital Status of Respondents</u>		
- Married	83	55
- Single	55	37
- Divorce	7	5
- Widow	5	3
Total	150	100

<u>Education Level of Respondents</u>		
- Primary School	0	0
- Middle School	5	3
- High School	18	12
- Diploma	4	3
- Graduated	111	74
- Master	12	8
- Ph.D	0	0
Total	150	100
<u>Occupation of Respondents</u>		
- Own Business	52	34
- Government Staff	21	14
- Private Staff	54	36
- Pensioner	7	5
- Student	6	4
- Dependent	10	7
Total	150	100

Source: Survey Data (2021)

According to the table (4.3), there are 72 male respondents and 78 female respondents. Among the total of 150 respondents, 31 respondents (21%) are in the age group of 21-30, 47 respondents (31%) are in the age group of 31-40, 48 respondents (32%) are in the age group of 41-50 and 24 respondents (16%) are in the age group of 51 and above. This shows that the majority of respondents are those in 31-50 years old. This is because most car owners are household leaders and they spend their daily life, going to work at this age level. The least respondents are in the age group of 51 and above years because people at that age range tend to avoid driving cars.

Marital status of respondents, 83 respondents (55%) are married, 55 respondents (37%) are single, 7 respondents (5%) are divorcing, and 5 respondents (3%) are widow. So, the majority of this survey respondents are married, the second highest is single and the least one is divorce. Since married respondents are highest, it can be assumed that there is a high chance of relatively high family members in one apartment.

Education levels of respondents, there is no respondent in Primary schools and Ph.D group, 5 respondents (3%) are in middle school, 18 respondents (11.7%) are in

high school group, 4 respondents (3%) are in diploma, 111 respondents (74%) are in graduated group, 12 respondents (8%) are in Master group. The majority of this survey respondents' education level is in the graduated group. The most families are middle class and high-class families in graduated group.

Occupation of Respondents, 52 respondents (34%) are doing own business, 21 respondents (14%) are government staff, 54 respondents (36%) are private staff, 7 respondents (5%) are pensioner, 6 respondents (4%) are students, and 10 respondents (7%) are dependent. The respondent's number of private staff is 54 and it is the highest because they go and return to workplace daily and then doing own business is 52 and it is the second highest because they are mostly staying at home while running their own business and the least one is students.

4.5 Living Condition and Vehicle Ownership of Respondent in Yankin Township

Yankin Township has many old apartments and mini condominiums. Most Respondents are living in old apartment, some apartment buildings have 32 rooms, some have 24 rooms, and some have 8 or 6 rooms in one story bench. The selected 3 wards are existing in old apartment area. Their Living condition and ownership situation should be considered for parking place as one of the important parking issues. Table (4.7) shows the respondent's living condition in three wards.

Table (4.4) Living Conditions of Respondents

Living Condition	Number of Respondents	Percentage (%)
Own House	13	9
Own Apartment	113	75
Condominium	4	3
Rental	19	13
Others	1	0
Total	150	100

Source: Survey Data (2021)

As in table (4.4), 13 respondents (9%) are living in their own house, 113 respondents (75%) are living in own apartment, 4 respondents (3%) are living in condo, 19 respondents (13%) are living as rental, 1 respondent (0%) are staff housing. The number of respondents who are living in own apartment are 113 and it is the

highest because of survey area of these wards are in old apartment area and the least one is living in staff house. Table (4.5) shows vehicle ownership of individual and household level.

Table (4.5) Vehicle Ownership by Respondents

Vehicle Ownership	Number of Respondents	Percentage (%)
More than one	20	13
Only one	130	87
Nothing	0	0
Total	150	100
Vehicle ownership of Household		
Each by households	21	14
Between 32 and 20 by apartment	7	5
Between 20 and 10 by apartment	62	41
Under 10 by apartment	60	40
Total	150	100

Source: Survey Data (2021)

According to the table (4.8), there have 150 respondents for vehicle ownership. 20 respondents (13%) own more than one vehicle, 130 respondents (87%) own only one vehicle, the respondent number of vehicle ownership the highest is only one vehicle as 130 respondents. For as per household level vehicle ownership, there has 150 respondents: 21 respondents (14%) are in each by household, 7 respondents (5%) in between 32 and 20 by apartment, 62 respondents (41%) are in between 20 and 10 by apartment, 60 respondents (40%) are in under 10 by apartment. By looking at this table, it can be seen that between 20 and 10 cars are the highest percentage of a household building. It seems to be the difficult situation of parking place for many cars in one household building.

4.6 Causes of Car Parking Problem

The three wards are located in the area crossed by Yankin main road and Yanshin second street. Because that area is crowded with many shops and shopping centers, the parking problem occurs frequently. Therefore, it is needed to analyze the individual causes of the car parking problem in these areas.

Table (4.6) shows their location of apartment or housing place of the respondents and where they are parking in these areas.

Table (4.6) Location of Apartment/ House Place and Parking

Location of Apartment/House	Number of Respondents	Percentage (%)
On main road	51	34
On second street	73	49
On main road near traffic light	26	17
Total	150	100
Parking		
In front of apartment	42	28
Other vacant far from home	69	46
Public platform or pedestrian area	39	26
Other	0	0
Total	150	150

Source: Survey data (2021)

According to table (4.6), 51 respondents (34%) are living on main road, 73 respondents (49%) are living on second street and 26 respondents (17%) are living on main road near traffic light. Their vehicle parking place are 42 respondents (28%) can park in front of their apartment, 69 respondents (46%) can park in other vacant place far from home and 39 respondents can park in public platform or pedestrian area.

It was found that most of the apartments or houses are located on second street and on main road as 49% and 34% respectively and 46% of most respondents are parking in other vacant place far from home. According to data, most of the respondent's building are located on nearby main road and second street, their cars are parked at any available place at the intersection. The 42 respondents can park in front of the apartments which are vacant actually in road areas. They can park because they are living in ground floor and they make vacant for their vehicle parking. Table (4.7) shows respondents facing the most difficult time to find a place to park in this area.

Table (4.7) Difficult Time of Parking Place

Difficult Time	Number of respondents	Percentage (%)
During peak hour	60	40
Night stop	60	40
The whole day	30	20
Total	150	100

Source: Survey Data (2021)

In this table (4.7), the difficult times of parking place are mentioned as equal 40% ratio for during peak hour and night stop and then 20% answered for difficulty time the whole day that result seems related with table (4.4) which shows almost the same ratio with own business and private staff. The people who are owned business, deal the entire day, they find out that during the peak hour is most difficult time for parking. The private staff are dealing problems when they come back to home for night stop time. According to this table, the parking difficult time is the entire day and night. Table (4.8) explores the encounter problem they have, when they park their car.

Table (4.8) Encounter Parking Problem

Encounter Parking Problem	Number of Respondents	Percentage (%)
Yes	126	84
No	24	16
Total	150	100

Source: Survey Data (2021)

According to the table (4.8), there are many problems of parking as 84% of respondents and 16% are not affected. Many respondents are living in apartments which are existing on each roadsides, and the cars can be parked on the streets, therefore they have problems every day. There are a few respondents who answered “No” which means they have a parking place in a block of their house at the frontier side. Table (4.9) shows common problems and police case when their cars are parked.

Table (4.9) Encounter Common Problem and Police Case

Encounter Common Problem	Number of Respondents	Percentage (%)
No vacant space	72	48
Distance from the building	58	39
Spaces are too close together	20	13
Other	0	0
Total	150	100
Police case		
Thief case	94	63
Quarrel each other car owner	53	35
Other	3	2
Total	150	100

Source: Survey Data (2021)

In the table (4.9), 150 respondents answered that they have encountered problems while they park, mostly they do not have vacant space showing 72 respondents (48 %) and followed by the distance far from their building is 58 respondents (39%) and the least 20 respondents (13%) are spaces too close to each other and there are no other problems in above encountered common problem.

And then those difficult situations cause the crime events and police case, a total of 150 respondents answered that they have faced the police case when they park. 94 respondents (63%) highly faced thief case and 53 respondents (35%) faced quarrel cases of each other and the least 3 respondents (2%) are taken action by police because they are parking in restrict place where there is a white and red color line meaning “no parking place”. The above two findings show that the majority of common problems are “no vacant for parking” and parking away from the distance of building. In fact, car accessories are stolen from many parking places. Table (4.10) has shown the parking restriction area in these wards.

Table (4.10) Parking Restricted Area on Main and Downtown Streets in Yankin

Parking Restriction Area	Number of Respondents	Percentage (%)
20 meters (60feet) within the traffic light	62	41
School Area	4	3
Shopping mall area	26	17
Above all	58	39
Total	150	100

Source: Survey Data (2021)

According to the table (4.10), the first highest 62 respondents (41%) answered traffic light area and the second-highest 58 respondents (39%) answered above the area and 26 respondents (17%) answered shopping mall area and the lowest 4 respondents (3%) are school area.

The highest respondents mentioned about traffic light, and it should be regulated as parking restricted area, the second highest respondents mentioned that “all above area” because the main shopping center is located near the intersection of Kabaraye Pagoda Junction and Yanshin Road. In addition, the proximity of traffic lights and the presence of schools are on the main roads. In this table, most of the places of survey areas are not allowed for parking the car, being restricted according to the traffic rule, and it can occur in survey area. Table (4.11) shows the car parking and parking reasons within a week in restricted area.

Table (4.11) Parking Time Per Week at Restricted Area and Reason

Parking Time/Week	Number of responds	Percentage (%)
Sometimes	95	63
Frequently	39	26
Mostly	16	11
Total	150	100
Reason for park		
Short walking distance	47	31
No searching time	30	20
No parking fee	13	9
No police person	15	10
Easy park	45	30
Total	150	100

Source: Survey Data (2021)

According to table (4.11), parking times per week at restricted area, 95 respondents (63%) answered “sometimes”, 39 respondents (26%) answered “as frequently”, and 16 respondents (11%) “most time”. The highest 95 respondents are parking answered “sometimes” and the least are 16 respondents “mostly parking at restricted area”. In that table, we can see the restricted parking area that will be parked almost time because the number of respondents is the highest despite parked sometime.

Consequently, the reasons of parking are in those places: highly 47 respondents (31%) are short walking distance and followed 45 respondents (30%) can be easy to park, 30 respondents (20%) are no searching time, 13 respondents (9%) are no parking fee, and 15 respondents (10%) are no police person are there. In hindsight, most people park in restricted area because it is easier to get close to where they want to go, and it also saves time finding a parking place. From these data, it can concluded that raising of parking demand and not designated parking place in Yankin township are the main causes of the car parking problem.

Table (4.12) shows traffic polices assigning in their area to manage parking.

Table (4.12) Assigning Traffic Police for Parking

Number of Police	Number of Respondents	Percentage (%)
One or Two	53	35
Two or Three	10	7
Above three	0	0
Nothing	87	58
Total	150	150

Source: Survey Data (2021)

According to table (4.12), 53 respondents (35%) response one or two polices by assigning for parking in there, 10 respondents (7%) response two or three and 87 respondents (58%) response nothing police by assigning. As per this table result the highest 87 respondents said Nothing assign because it is related with above table (4.11) but sometimes one or two polices will have. Therefore, these wards area are in very lack of management of traffic police for parking. That is why vehicles do not follow the traffic rules and are able to stop any vacant thus situation of vehicle parking will be occurred chaotic, and traffic circuit as not well. Table (4.13) explore the adequate parking space at school area provide for school vehicle.

Table (4.13) Providing the Adequate Parking Space in School

Do the schools provide adequate space for parking?	Number of Respondents	Percentages (%)
Yes	21	13
No	128	87
Total	150	100

Source: Survey Data (2021)

In table (4.13), 129 respondents (87%) answered there is no provide adequate space for parking in school and 21 respondents (13%) answered school provide adequate parking space. High respondents found that there is no adequate parking space. There is no provide parking space in school area, it will occur school cars are parked on main roadside and it becomes a double-parking problem together with traffic congestion. Table (4.14) explore the adequate parking space at market area provide for shopping vehicles.

Table (4.14) Providing the Adequate Parking Space in the Market

Does the market provide the adequate space of parking?	Number of Respondents	Percentages (%)
Yes	11	7
No	139	93
Total	150	100

Source: Survey Data (2021)

Yankin has two municipal markets that exist on and near main road. Parking place for vehicle which come to these markets, situation find in table (4.14), 11 respondents (7%) answered that there are provide adequate space of parking and 139 respondents (93%) answered there are no provide adequate space. This table shows that main markets do not have parking place adequately that will occur shopping and sale vehicles are spread out surrounding the market. It also causes the parking problem as adequate parking space is not provided at markets. Table (4.15) shows the reason of inadequate parking space at market.

Table (4.15) Reason for Inadequate Parking Space at Market

Reason	Number of Respondents	Percentage (%)
On-street shopkeeper	18	13
no parking space specifically	132	88
Total	150	100

Source: Survey Data (2021)

Table (4.15) presents the reason of inadequate parking space at market and 18 respondents (13%) mentioned the reason “on street shopkeeper” and 132 respondents (88%) mentioned the reason “no parking space specifically”. Table (4.15) shows that there is not adequate parking space because of no designated specific parking for customer and seller vehicle since originally. Table (4.16) shows the situation of vehicle parking place at market.

Table (4.16) Vehicle Parking at Market

Where Vehicle Park	Number of Respondents	Percentages (%)
On main road	86	57
Illegal area	46	31
Double park	18	12
Total	150	100

Source: Survey Data (2021)

According to table (4.16), 86 respondents (57%) are highest they answered park on main road, 46 respondents (31%) answered park on illegal area and the least 18 respondents (12%) answered double parking.

The highest respondents are parking on main road and the less respondents park double, all these parking are not in good condition because as per Table (4.14) and Table (4.15) data. It will definitely occur vehicle will be parking on any vacant place. There is not any arrangement for vehicle parking place during the market peak time. It causes is no management in peak time and no designated parking place.

Table (4.17) shows the places where there is frequently double parking on the main road in three townships.

Table (4.17) Most Place Double Parking on Main Road

Most Place Double Parking	Number of Respondents	Percentage (%)
12 lone Tan and Pan tan	78	52
Near Market and shops	34	23
Junction of Yankin road and Kanbe road	11	7
Other	27	18
Total	150	100

Source: Survey Data (2021)

According to table (4.17), 78 respondents (52%) answered that it occurs on 12 lone Tan and Pan tan, 34 respondents (23%) answered near market and shops and 11 respondents (7%) answered junction of Yankin road and Kanbe road and other 27 respondents are not exactly answered. The highest respondents mentioned that place 12 lone Tan and Pan Tan are making double parking because of it is the crowded area

of Yankin township where have bank, school, many of mini store and fashion house existed. Overcrowding is one of the main causes of parking problem.

Table (4.18) shows the reason of double parking and the number of times per day, it will make traffic congestion in these areas.

Table (4.18) Most Time and Reason of Double Parking

Most Time Double Parking	Number of Respondents	Percentage (%)
Morning	14	9
Evening	24	16
Night	4	3
Morning and Evening	108	72
Total	150	100
Reason of Double Parking		
Narrow road	28	19
On street shopkeeper	34	23
Both	74	49
Other	14	9
Total	150	100

Source: Survey Data (2021)

In table (4.18), mostly double parking of the day is both morning and evening time with 108 respondents (72%) as the highest and nighttime with 4 respondents (3%) as the least because of the mentioned time is the peak time of road using so it makes double parking frequently on road. And the reason of occurring the double parking in those area answered 150 respondents. Most 74 respondents answered both narrow road and on street shopkeeper and the least 14 respondents answered that there is no parking place.

This table show that difficult parking to get one place in there because there have many shops and the road are not wide-ranging, and most are used during the peak hour. Furthermore, we can see the table (4.17) in that the place is been making double parking where are crowded areas.

Table (4.19) shows the reason of crowded car parking in surrounding the Myanmar plaza.

Table (4.19) Reason of Crowded Car Parking Surrounding Area of Myanmar Plaza

Reason	Number of Respondents	Percentage (%)
Taxi	46	30
Passenger loading zone	25	17
High parking meter fee in underground parking	4	3
All of them	75	50
Total	150	100

Source: Survey Data 2021

Myanmar plaza exists on corner of two roads near traffic light and ahead of Yanshin road so there is main junction place of Yankin Township. In table (4.19), the reason of crowded car parking surrounding area of Myanmar plaza was answered by 46 respondents (30%) because of taxi and 25 respondents (17%) answered passenger loading zone, 4 respondents (3%) answered high parking meter fee in underground parking and 75 respondents (50%) are all above reasons.

The high respondent mentioned that all above reasons because many taxis are parking in the surrounding area of plaza along the roadside looking for customer and drop-off the passenger even at this place sign standing on “NO Parking”, bus bay area. Most time are double parking in there. High underground parking meter fee might be reasonable price although its rate depends on hour basis for long time it would be high cost. Therefore, according to these reasons, action is rarely taken for illegal parking. Weak of law enforcement are caused of chaotic parking. Table (4.20) shows can access free parking in housing compound area at three townships.

Table (4.20) Free Park in Housing Compound Area

Can Free Park in Housing Compound Area	Number of Respondents	Percentage (%)	Reason
Yes	27	20	Resident person
No	93	62	No resident person
Yes, with cost	30	18	No resident person but pay for parking fee
Total	150	100	

According to table (4.20), vehicles can be parked in housing compound area which is private housing complex, 27 respondents answered positive, and 93 respondents answered negative and the remaining 30 respondents answered, they can park with cost. The largest 93 respondents (62%) gave a reason that they are not living in private housing and the least 27 respondents (20%) gave reason that they are living in this housing and it have a parking place as two place per unit in there. Another 30 respondents (18%) are not living in there but can access because of they give parking fee for that one place. Table (4.21) shows the cost condition of parking fee in housing compound area, they pay who are not living in housing.

Table (4.21) Parking Fee in Housing Compound Area

Yes, with Cost	Number of Respondents	Percentage (%)
Cheaper	4	13
Reasonable	9	30
Expensive	17	57
Total	30	100

Source: Survey Data (2021)

Their (30 respondents) parking cost classified with table (4.21) can be seen for parking fee condition that answered the highest and 17 respondents (57%) out of 30 respondents mentioned as the expensive cost. This table show that most vehicle are parking on free space as roadside any vacant because of high parking fee in private housing area and it limited. Table (4.22) shows the parking place for visitor cars when they come to there for something.

Table (4.22) Car Parking Place for Visitor

Parking Place	Number of Respondents	Percentage (%)
On street near the shop	145	97
In housing compound	2	1
If other	3	2
Total	150	100

Source: Survey Data (2021)

In table (4.22), Yankin is crowded with the shops on each side of roads so many customers and visitors are frequently come and typically their vehicles park

where most can find, the highest 145 respondents (97%) answered on street near the shop and the remaining respondents are very least point. At this table shown, it is crowded with not only resident cars but also customer and visitor cars on roadside cause of shopping place and its road always full of parking in and out and happening the double parking.

4.7 Respondent's Opinion on Possible Ways to Reduce the Car Parking Problem

In several effective ways to be reduced the various car parking problems which should be suitable with location, their demand needs and geographically. The appropriate ways most effective solution of parking requirement. The problems can be defined in term of management failure and inefficient supply and policy. There is no neutral stage because of it will be difficult to evaluate exactly result. Therefore, evaluated with 4 likers scale to get exact result what respondent's requirement.

(i)Possible Way-1 On-street Parking

According to the vehicle parking behavior, on-street parking is the most choice of parking place. It can easy access the destination although, if there is no management, it will occur the traffic congestion and looking for one parking place will affect waste of time, fuel. Table (4.23) shows the respondent's perceptions of the way of on street parking.

Table (4.23) Overall Mean Score for Possible Way-1 (On street Parking)

SDA, Strongly Disagree = 1, DA, Disagree = 2, A, Agree = 3, SA, Strongly Agree = 4

No	Description	Number of Respondent				Average Score
		SDA	DA	A	SA	
27.	Systematic on-street parking would be reduced the parking demand	6 4%	15 10%	62 41%	67 45%	3.27
28	The on-street parking should be only the visitor car and passenger transit.	18 12%	27 18%	54 36%	51 34%	2.92
29	Congestion fee should be had a good effect on double parking problem.	11 7%	12 8%	61 41%	66 44%	3.21
30	The traffic light area and bus stand area should be restricted the parking.	9 6%	6 4%	50 33%	85 57%	3.41
Overall Mean Score						3.20

Source: Survey Data (2021)

According to table (4.23), the respondents 57% answered for “strongly agree on the No.30 statement” and also the highest average score 3.4 among four statements, it could be said that on street parking should be restricted at the traffic light area and bus bay for traffic flow. The overall mean score of possible way-1 on-street parking is higher than 3, it could be said that respondents agreed that systematic way on street parking can solve the parking chaos. There are only the parking roadsides greater than supply the ways of on-street parking management such as find congestion fee, systematic arrangement, and designated parking place they all accept to be reduce the parking problem. For the question “*The on-street parking should be only the visitor car and passenger transit,*” the score is nearly to agree (2.92) but it is the lowest mean score in Possible Way-1.

(ii) Possible Way-2 (Off-street Parking)

Off-street parking refers to create the parking lot where may be built public land space, parking garage and sometime commercial parking lot as a private parking. Parking charges are depending on the management system so it may be free charges

or limit time free or charging full. Table (4.24) shows the respondent's perceptions of the way of off-street parking.

Table (4.24) Overall Mean Score for Possible Way-2 (Off-street Parking)

SDA, Strongly Disagree = 1, DA, Disagree = 2, A, Agree = 3, SA, Strongly Agree = 4

No	Description	Number of Respondent				Average Score
		SDA	DA	A	SA	
31.	off-street parking facilities should be introduced to reduce the congestions carriageway especially central business area.	11 7%	4 3%	62 41%	73 49%	3.31
32.	If vacant of public land area, it should be created the off-street parking.	12 8%	7 5%	45 30%	86 57%	3.37
33.	You agree to pay the off-street parking fee to local authority, it will cheaper than commercial.	7 5%	14 9%	54 36%	75 50%	3.31
Overall Mean Score						3.33

Source: Survey Data (2021)

According to table (4.24), there are a three statement the highest respondents 57% answered strongly agree on the No.32 statement and also the highest average score 3.37 among three statements it could be said that respondents wish to create the off-street parking it can be available on land or public area. The overall mean score of possible way-2 off-street parking is higher than 3, it could be said that respondents agree to implement the off-street parking with reasonable cost. They will implement the off-street parking significantly to reduce the parking demand on roadside and also traffic congestion, the respondents agree to cover the incurred cost that they prefer cheaper cost led by the local authority rather than commercial that can see statement No.33 statement.

(iii) Possible Way-3 (Parking facilities)

Parking facilities refer to the convenience for parking user moreover; it has to safety security system and good management. If parking lot is noting this kind of

facilities, it merely just garage field and demand will not interest. The facilities costs higher for suppliers and so these charges would be covered from vehicle owner. The price should be reasonable for demand. Table (4.25) shows the respondent's perception of the parking lot facilities.

Table (4.25) Overall Mean Score for Possible Way-3 (Parking Lot Facilities)

SDA, Strongly Disagree = 1, DA, Disagree = 2, A, Agree = 3, SA, Strongly Agree = 4

No	Description	Number of Respondent				Average Score
		SDA	DA	A	SA	
34.	Commercial parking (parking facility company) facilities should be facilitated in Yankin township.	10	29	68	43	2.96
		7%	19%	45%	29%	
35.	We can pay any parking facilities charges of our township.	7	14	81	48	3.13
		5%	9%	54%	32%	
36.	Parking lot should be designated less time and cost effective for us.	11	4	49	86	3.4
		7%	3%	33%	57%	
37.	The parking Management should focus on quality of parking such as the convenience and safety of walking from a parking space to destinations, and the attractiveness and security of parking facilities.	7	2	54	87	3.47
		5%	1%	36%	58%	
Overall Mean Score						3.24

Source: Survey Data (2021)

According to table (4.25), 58% of respondents strongly agreed on the No.37 statement, with its average score being the highest of the four statements at 3.47, it could be said that respondents prefer the quality of parking facilities, it will make parking much more convenient. The overall mean score of possible way-3 facilities of parking lot is higher than 3, it could be said that respondents agree that they want to park their vehicle into the parking lot where there are complete facilities. They can solve to meet this parking problem with parking lot system which can access relevant facilities and it incurred costs are also the respondent can pay but the less average score 2.96 that on the facilitator by commercial parking (parking company) statement

No.34. Therefore, it should be implemented by leading local authority or partnership system instead of heading the only private company.

(iv) Possible Way-4 (Residential Parking)

Residential area is required parking space, it is related with car ownership. The area will be dominated by parking space with resident person, visitor, customer, and worker on and off the street. This place purpose for long-term parking demand of resident person and must enough land space. Table (4.26) shows respondent's perception of parking space available in residential area.

According to table (4.26), there has three statements the highest respondents 52% answered strongly agree on the No.39 statement and also the highest average score was 3.31 among the three statements it could be said that respondents wish to get permission for their road part of the resident parking area. The overall mean score of possible way- 4 residential parking is higher than 3, and also it could be said that respondents agree to make residential parking in their resident area.

There is a old resident area its more densely developed and all vehicle park on roadside. By implementing the residential parking or parking lot near resident area is one of the solving ways of their parking problem because the respondents are eager to get resident parking area and to develop parking lots near their resident how much problem they have for one parking place to find. And, for land requirement, the place has many illegal tenants, the respondent agree to revoke these tenants and residential parking to be popped, see No.40 statement.

Table (4.26) Overall Mean Score for Possible Way-4 (Residential Parking)

SDA, Strongly Disagree = 1, DA, Disagree = 2, A, Agree = 3, SA, Strongly Agree = 4

No	Description	Number of Respondent				Average Score
		SDA	DA	A	SA	
38.	Develop parking lot on the nearby resident place which helps us in providing space for parking vehicles for shopkeepers and commuters.	6	9	69	66	3.3
		4%	6%	46%	44%	
39.	You would like your resident area to be included as part of a Resident Permit Parking Area.	10	11	51	78	3.31
		7%	7%	34%	52%	
40.	Yankin township has many invasions buildings and tents in the residence area. If these invasions buildings and tents revoke, can create the resident car parking area.	13	11	55	71	3.23
		9%	7%	37%	47%	
Overall Mean Score					3.28	

Source: Survey Data (2021)

(v) Possible Way-5 (Central Business Area Parking Management)

Parking Management is needed to be effective and efficient parking system for current and potential parking problem area that is mixed commercial and residential area or central business area. Table (4.27) shows respondent's perception of parking management in central business area.

According to table (4.27), there has four statements the highest respondents 69% answered strongly agree on the No.43 statement and also the highest average score 3.59 among four statements it could be said that respondents have a plan in plaza for passenger loaded- unloaded zone and it also according to the time arrangement because of there is many taxi parking on roadside and a double parking. The overall mean score of possible way- 5 parking management in CBA is higher than 3.45, it could be said that respondents strongly agree to make effective parking management in central business area by a management because it is very crowded with parking chaos, and therefore there must be specific rules and regulation to be implemented effectively, to meet the parking requirements. The problem can be

solved by managing the necessary things such as setting up the marketplace for street vendors such as caterers based on statement No.42 and to be designated as specific area for taxi parking which is based on statement No.44.

Table (4.27) Overall Mean Score for Possible Way-5 (CBA Parking Management)

SDA, Strongly Disagree = 1, DA, Disagree = 2, A, Agree = 3, SA, Strongly Agree = 4

No	Description	Number of Respondent				Average Score
		SDA	DA	A	SA	
41.	The shuttle school bus service should be promoted to avoid the individual vehicle using.	11 7%	6 4%	52 35%	81 54%	3.35
42.	All on-street shopkeeper should be transferred to new place made by local authority and impound the encroachment done by shopkeepers from the roads.	8 5%	6 4%	55 37%	81 54%	3.39
43.	Load-unload zone should usually be used in Plaza, and it should be working as systematic time plan.	5 3%	5 3%	37 25%	103 69%	3.59
44.	To be arranged the designate parking area for Taxi and must make effective regulation by local authority to reduce the double parking and congest the traffic flow in surrounding the Myanmar plaza.	5 3%	7 5%	53 35%	85 57%	3.45
Overall Mean Score						3.45

Source: Survey Data (2021)

(vi) Possible Way-6 (Parking Regulation and Policy)

Parking regulation and policy are the main tools of parking management while applied appropriately management, significantly reduce of the parking space requirement each particular situation. Table (4.28) shows the respondent's perception of parking regulation and policy for the effective management.

According to table (4.28), there are four statements the highest respondents 53% answered strongly agree on the No.45 statement and also the highest average score 3.39 among four statements it could be said that respondents strongly agree that have a parking regulation effectively managed for parking problem and the second highest respondents 53% answered agree on No.46 statement that police can control the traffic and parking arrangement will help problem. The overall mean score of possible way- 6 parking regulation and policy is just agree at 3, it assumed that respondents agree with strict parking regulation and policies surely to be effectively managed for the parking problem but disagreed with some of the policies in this way the statement No.47 that limit the car permit policy will not affect parking problem.

Table (4.28) Overall Mean Score for Possible Way-6 (Parking Regulation and Policy)

SDA, Strongly Disagree = 1, DA, Disagree = 2, A, Agree = 3, SA, Strongly Agree = 4

No	Description	Number of Respondent				Average Score
		SDA	DA	A	SA	
45.	The car parking regulation might be effectively managed the parking problem.	9 6%	4 3%	57 38%	80 53%	3.39
46.	If the police can manage the parking arrangement it would be helpful of parking problem.	9 6%	16 11%	80 53%	45 30%	3.07
47.	If the limitation of car permit policies by the government, it will reduce the parking requirement problem.	14 9%	61 48%	42 22%	33 21%	2.63
48.	The reinforcing the public transport will affect the reduction of the private car using and reduce the parking requirement.	14 9%	28 19%	65 43%	43 29%	2.91
Overall Mean Score						3.00

Source: Survey Data (2021)

4.8 Respondents' Opinions on Possible Ways

The overall mean score for all possible 6 ways of respondents' opinions to be reduced the parking problem is 3.26. According to this result, it is reached between

agree and strongly agree on above all possible ways the highest score of among of these is 3.45 in that way 5, parking management in central business area and the remaining ways are between 3.00 and 3.33. Therefore, it can be concluded that by applying all the above possible ways in appropriate places, the parking problem in Yankin Township can be solved. Table (4.29) shows the respondent's opinions on above possible 6 ways of parking problem solution.

Table (4.29) Overall Means Score for All Possible Ways

Possible Way	Description	Overall Mean Score
Way-1	On-street parking	3.20
Way-2	Off-street parking	3.33
Way-3	Parking lot facilities	3.29
Way-4	Residential Parking	3.28
Way-5	CBA Parking Management	3.45
Way-6	Parking Regulation and Policy	3.00
Grand Total Mean of All Possible Ways		$(19.55/6) = 3.26$

Source: Survey Data (2021)

CHAPTER V

CONCLUSION

5.1 Findings

This study focused on, the condition of parking problem in developing urbanization area of Yankin township in Yangon. To get one place of car parking is becoming burden to resident people, so this study investigates the major causes of parking problem in this township and the respondents would mostly prefer ways to reduce problem of parking. In this study findings are expressed below.

By studying the point of respondents' nature, for gender part almost equal ratio of male and female, and age has between 30 old to 50. Most of their marital status is married and in term of education most are graduated persons, and their occupation mostly are own business, and private company staff so it seems that respondents were of working age and have many experiences on this problem.

From study of respondent's living condition and vehicle ownership of household level found that 75% of respondents are living in apartment and at least one person own one vehicle in between 20 and 10 of household in one building are most answered (41% of respondents) therefore it seems that there is no imbalance between ownership of vehicle and parking place in each household because of one household building has 32 or 24 rooms. That condition must be occurred parking problem.

Most of the apartment are existed in main road and moreover in ground floor are full of various shops so the respondent's cars can park on each roadside only and the difficult time to get one place is almost the whole day and the most problem happens (48% of respondents) that "there is no vacant place for parking". That result can be seen that they are parking on road far from home and might be restricted area, it is caused of loss of vehicle things by thief (63% of respondents) as a police case and fighting for place each other car owners.

Result can be found as another point that many vehicles are parked in restricted area showing mostly “sometimes” (63% of respondents) so the restricted area always have parking vehicles there the reason is being close to their destination and easy parking as (both 63% of respondent), it is the cause of very closely restricted are around these wards and there are no police who are working for full day depicting (88% of respondents) answered due to the lack of traffic police management.

There is also weak parking management in schools and markets. Especially during peak hours and there are school buses although there is not enough parking space in school area showing (87% of respondents) and Market as well showing (93% of respondents). Some schools have two shifts to per day, so traffic jams occur at least during these times. In markets, shopper and seller cars are mostly parked at the main road depicting (57% of respondents) and they have to wait for some time to get place and thus double parking and traffic congestion occur. It is causes found that there is no designated parking place in schools and markets during the peak time.

Residential and commercial areas are crowded with beauty salon, banks, companies, on street vendors and various shops in roadside, so there are not only resident’s cars but also visitor’s cars frequently park on roads showing (97% respondents), due to the double- parking problem. At a big shopping mall, there are underground parking lot because 50% respondents answered that taxi driver are waiting for their passengers for long hours and there are loading unloading on roadside without following the traffic rule and parking meter is charging depending on “per-hour” rate.

In housing compound and condo, are still rules for parking being implemented in Yankin township and thus they have enough parking space for their resident’s person with two parking lot per unit but not allowed the outside vehicle without cost. Parking cost is expensive in housing compound showing (57% respondents) and so only a few valuable cars can be parked there. Therefore, it is the causes of car park on the roadside.

These above parking problems are solved by taking possible way of the respondent’s choice. Possible way 1: On-street parking that is chosen with overall means score of 3.2 and one of its statements is systematic on-street parking management to get respondents’ choice showing average mean score of 3.27 which show “strongly agree”, even though the lowest score is that the use of visitor’s cars and transit of average score is 2.92. So, it is found that the respondents prefer to get

systematic on street parking with cost and fine but do not want to the parking lot meant for only visitors and transit.

For possible way 2: Off-street parking has respondent's choice showing overall mean score of 3.33 and one of these statements is that vacancy of public land area should be created and thus the off-street parking has the highest respondents showing average score of 3.37 and the next option average score of 3.31 meaning that respondents prefer to pay cheaper rate and it is led by local authority rather than commercial companies. Therefore, it can be found that the respondents agree to develop off-street parking in their area with reasonable price.

Moreover, the Parking lot Facilities are found as a possible way 3: it has respondent's choice showing overall means score of 3.29. Respondents want to get parking lots according to possible way 2 with quality parking facilities for which the respondents strongly agree showing average score of 3.47. It incurred cost to agree to cover by respondents but lower score of 2.96 showing that parking facilities should be offered by commercial companies. Therefore, the respondents strongly agree on that to be implemented for off-street parking lot with relevant facilities and charging system is implemented by government rather than private company showing 50% of respondents who strongly agreed.

Possible way 4: is "Residential Parking", showing overall mean score of 3.28 and respondents would like their road to be included as part of a resident permit parking area showing the highest respondent's choice statement with average score of 3.31 and thus agree to reveal parking lot by revoking illegal tenants with average score of 3.23. It can be seen that resident people want to implement residential parking lot near their resident area and the land can access this area.

For possible way 5: CBA Parking Management, it has respondent choice showing overall mean score of 3.45. For all the statements, average score levels are above 3 that respondents are strongly agree on the arrangement of parking system in central business area with the appropriate policies and regulation. That result can be found in the central business area which is crowded with shops, banks, markets, big shopping mall and schools. Therefore, there must have necessary arrangement for parking management such as passenger loaded- unloaded zone that should be designated in shopping mall area, marketplace for on-street vendors and to be set up for effective regulation for double parking.

For the last possible way 6: Parking regulation and policies, it has overall mean score of 3.00, and one of these statements that parking regulation might be effectively managed to solve the parking problem which is the highest with average score of 3.39. Although it can find weak average score of 2.63, limits of car permit policy will be reduced for the parking problem to be solved. It can find that respondents strongly agree to be setting up the effective regulation and policy for parking management to reduce the parking problems, but some policies do not take effects on parking problem that limitation of car permit policy and reinforcing the public transportation system.

All these ways offer overall mean score of respondent choice of possible ways to reduce the parking problem resulting 3.26. It is between “agree” and “strongly agree” on these ways showing that respondents prefer to make parking management of central business area is the highest score of 3.45 among of these and the remaining possible ways reached between 3.00 and 3.33. It means that all possible ways for applying on relevant area to get effective and efficient parking management should be reduced to solve parking problems, but policy on limit of car permit and developing the public transportation system would not affect their parking problem.

According to the research data, it is found that parking is not a designated place, cars are parked as a usual stop even in restricted areas and double parking occur on anyplace of roadside. This clearly indicates that there is no parking management such as policy, supply of parking lot for high demand, lack of law enforcement and weakness of taking action for a violator of existing transport regulation. People want to solve this problem by applying the appropriate ways on their township.

5.2 Recommendations

Our country is a developing country that can see most causes of parking problem together with urban developing. The causes of problem are under various condition depending on location. However, generally almost all are the same in developing countries. If the city is developing and the living standard of people also high at the same time, every related factor should be matched for improvement, especially, the central business area is burdened with the traffic and parking is getting worse since the old decade therefore there is no parking place in commercial density area and thus double parking can be seen in central area.

Parking management refers to policy and program. To comply with the parking regulation and policy to be set for a driver, management also should provide parking space because supply and law enforcement are directly related, for example, if there is parking lot program without any regulation and taking action for on-street parking, this program would fail. Moreover, if parking lot or other supply are not provided by the government; it will not be able to take an action. Therefore, Parking management should have effective implementation plan for urbanization development. Mixture of the residential and central business areas that can be managed the off-street parking lots. The parking facilities are also important to attract demand if there are no good facilities provided, and the parking lot will be occupied with many vacancies because of the demand comparing costs and benefits. The off-street parking program is successfully running, and thus it will reduce on-street parking and used for temporary parking. In survey area, there are many vacant lands owned by the government, but there are no plans to solved parking problem, such as implementation of the off-street parking lot since it is necessary to make the departmental integration, parking is taken as actions of YCDC, and its vacant land is owned by Department of Urban Housing Development. Therefore, it is important to create a parking lot by integrating the departments under the Yangon regional government.

From the point of view of policies, Current parking policies in Myanmar, all condos must be allocated as 1.2 parking space per unit under the condominium rule. More relevant policies should be set up. On-street parking regulation should be practiced because on-street parking is not good for public and it should be fined or with cost. Residential parking policy related to the department needs to supervise to follow parking rule into new building construction and it must consist of designated parking area for residents. It is suggested that on-street parking should be charging system as a cost and fine for illegal parking and it should be higher than the off-street parking lot fees. The implementation of off-street parking should be departmentally integrated, and parking programs and policy and law enforcement should be balanced. Moreover, the plan is very important for urbanization development, and thus the regional government should whatever make urbanization plan for future development. In Yangon, parking problem is the main issue in the central area, without considering the consequences of future development. Other big cities should be prepared the urbanization plan in the future condition. Therefore, various causes of parking problems should be applied with appropriate solving ways, depending on the nature of urban to be treated as the parking issue.

REFERENCES

- Ajeng, C., Tae-Hyoung & Gim, T. (2018). *Analysis on-Street Parking Duration and Demand in a Metropolitan City of the Developing Country: A case study of Yogyakarta City, Indonesia*. Seoul National University. Licensee MDPI, Basel, Switzerland.
- Akihito Nagahama, Diachi Yanagisawa, Katsuhiro Nishinari (2019). *Impact of next-nearest leading vehicles on followers' driving behaviors and traffic stability in mixed traffic*. University of Tokyo Japan.
- Amini, E. & Shankar, B. (2017). Challenges of vehicle parking in central business district: Iran, from University of Mysore, India. *International Journal of Engineering and Technology*, 9(3). Doi.10.21817/ijet/2017/v9i3/170903518
- Asian Development Bank (ADB) (2011). *Parking Policy in Asian Cities*. Paul Barter Singapore: Author.
- Asian Development Bank (ADB) (2014). Maubin-Phyapon Road Rehabilitation Project (RRP MYA 47086) [Sector assessment: Transport].
- ASPO, planning advisory service (1966). *Parking in Residential Area* (Report No.214) American Society of Planning Officials Received 1972: Publisher.
- Aung, M. T.& Belkin, A. (2018). *Green Pedestrian Linkage for Yangon CBD with its Open Spaces*. Paper presented at the E3S Web conferences 91, 05001 (2019). Retrieved from <http://doi.org/10.1051/e3sconf/20199105001>
- Borough Council., (1992). *Code of Eddystone Borough*. Retrieved from <http://eddystoneborough.org>
- Das, D., & AliAhmed, M. (2017). Transportation Engineering: Level of Service for on-Street Parking. *KSCE (Korean Society of Civil Engineers) Journal* 00(0),1-11. Doi:10.1007/s12205-017-15381-1
- Dr. Sharma, K. M., Prjapati, P. & Jain, M. (2017). Problem of Parking and their Possible Solutions with Special Reference to Kota City, Career Point University India. *CPUH-Research Journal* 2017, 2(1), 18-24.
- Gandhi, N. & Juremalani, J. (2019). On-Street Parking Problems in CBD area & Remedial Measures- A Case Study of Godhra City. *International Journal of Civil Engineering and Technology*, 10(04), pp. 221-223. India.

- Gautam, S. (2019), Get my Parking webpage. *Issue with parking in Indian Metropolises*. Retrieved from <http://blog.getmyparking.com>.
- Gwilliam, K. (2002). *Cities on The Move*. A World Bank Urban Transport Strategy Review. The World Bank Washington DC.
- Hossam El-Din I. S. Ahmed, Ph.D. (2017, November) *Toward a Better Quality of Life*. Paper presented at the Technical University, Berlin campus for the 1st International Conference, Egypt. Retrieved from <https://ssrn.com/abstract=3163473>
- IPSOS Business Consulting (2013). *Automotive in Myanmar 2013*.
- Iwasaki, H. (2016). *Urban Transport*, [Myanmar Transport Sector Policy Note] Asian Development Bank, Mandaluyong City, Philippines.
- JICA Study Team (2012). *Review of the Current Urban Planning and Land Issue*. The Project for the strategic Urban Development Plan of the Greater Yangon.
- J R Cho, J oh, Chang-Ho Park (2001). “*Parking policy and its effects on traffic flow in CBD areas in developing countries*” Paper presented at the 9th World Congress on Transport Research 2001 conference, Seoul, Korea.
- Litman, T. (2006). *Parking Management Best Practices*. *Civil Engineering 2006*, American Planning Association’s Planner Press.
- Liu, Y., et al., (2012). *Metropolis Parking Problem and Management Planning and Solution for Traffic Operation and Effectiveness*. Hindawi Publishing Corporation, *Mathematical Problems in Engineering*. Doi:10.1155/2012/678952
- Lohani B.N. (2005) *Asian Urbanization Transport Development and Environmental Sustainability; Is Sustainable Transport Still Possible for Asian cities?* Regional and Sustainable Department, Asian Development Bank (ADB)
- Michael A.P Taylor. (2017). *Vulnerability Analysis for Transportation: Critical Infrastructure, Service and Location Networks*. South Australia University.
- Ministry of Industry. (2019). *Automotive Policy*. The government of the Republic of the Union of Myanmar.
- Morichi S (2005). Long-term strategy for transport in Asian megacities. *Journal of the Eastern Asia Society for Transportation Studies*, 6(2005), pp.1-22.
- Morichi S (2009). Sustainable Transport Development in East Asian Megacities. *International Journal of Environmental and Sustainable development*, 8(2009), pp.229-246.

- Myanmar Times. (2018). *Yangon considers smart-parking system to ease traffic woes*. Retrieved from mmtimes.com/news/Yangon.
- Parmar, J., Das, K., Sanjaykumar M. D. (2019). Land used based parking policy: a case study in Delhi, Central road research Institute. *Journal of traffic and transportation engineering*, 7 (1), 111-124.
- Pasadena, Department of Transportation (2003, August). *Pasadena Parking*. Banerjee & Associate, Indian: Author.
- Patel, M. & Dave, S. (2014) 11th Transportation Planning and Implementation Methodologies for Developing countries, Mumbai India. *Transportation Research Procedia* 17(2016) 576-585.
- Paul Barter (2016). *On-street Parking Management*. Federal Ministry for Economic Cooperation and Development (BMZ) Berlin, Germany.
- P.C. Box, (2004) “Crub-parking problems overview”, *Journal of Transporting Engineering*. Vol.130, no.1, pp.1-5.
- Rodrique, J.P. and T. Notteboom (2013): *The Geography of Transport Systems*. 3rd Edition
- Ruby.D, Marschall, Meier, Mock and Westlind, (2021). *Motor Vehicles*, chapter 278, North Dakota.
- Sen, S. Ali-Ahmed, M. & Das, D. (n.d.). A Case Study on On-street Parking Demand Estimation for 4-Wheelers in Urban CBD. *Journal of Basic and Applied Engineering Research* 2016, 3(3), pp.254-258.
- Sharaf, A., Murad M., & Khalid A. (2016). Parking Problems in Abu Dhabi; UAE towards an intelligent parking management system. “ADIP: Abu Dhabi Intelligent Parking” *Alexandria Engineering Journal*, (55) 2679-2687.
- Shoup, D. (2005). *The High Cost of Free Parking*. American Planning Association, Washington. DC, USA.
- Shoup, D. (2006), “Cruising of Parking”. *Transport policy*, vol.13, no.3 Retrieved from <http://www.shoup.bol.ucla.edu/Cruising.pdf>
- Spiliopoulou, C. & Antoniou, C. (2012, September) *Analysis of illegal parking behavior in Greece*. Paper presented at the Second Joint EPA-Polis Parking Workshop, Helsinki.
- Sulistiyono, S., (2018, July). *Traffic engineering and Management: On-street parking and its impact on road performance*. Paper presented at the Brawijaya University, Department of Civil Engineering, Malang, East Java, Indonesia for MATEC Web conferences 181(2018).

- Thanh, T.T.M., & Friedrich, H. (2016, July). *Legalization the illegal parking, a solution for parking scarcity in developing countries*. Paper at the presented Transport Research Society for World Conference on Transportation Research, Shanghai.
- The Government of the Republic of the Union of Myanmar. Myanmar Data. CD-ROM. 2010
- The World Bank, 2011. Vietnam Urbanization Review: Technical Assistance Report., p.263.
- Union of International Associations, 2019. *Inadequate road and highway facilities*, Institute and documentation center, Brussels.
- Urban Planning Department, Yangon City Development Committee, Yangon, Union Of Myanmar.
- Vasallo, A. (2015). Parking Woes in Developing Countries. *Journal of International Parking Institute* pp32-35.
- Yan-Ling, W., Xin, W. & Ming-Chun, Z. (2016). Department of Transportation Engineering, Beijing Institute of Technology. *Procedia Engineering*. (137) 777-785.
- Yangon City Development Committee, *Building Rule & Regulation and LS duties*. Union of Myanmar.
- Yangon City Development Committee urbanization (2012), *The Project for the Strategic Urban Development Plan for the Greater Yangon, (Final Report 1)*. Nippon Koei Co, ltd. International Development Center of Japan: Publisher.
- Ye, S. (2011). *Research on Urban Road Traffic Congestion Charging Based on Sustainable Development*. Paper presented at the International Conference on Applied Physics and Industrial Engineering 2012 China.
- Young, W., Thompson, R.G., & Taylor, MA., (1991). A review of urban car parking models. *Transport Review 11(1)*, 63-84
- Yu, Y., Li, J., Guan, H., & Wang, C. (2015). Automated Extraction of Urban Road Facilities Using Mobile Laser Scanning Data. *IEEE Transaction on Intelligent Transportation Systems*, 16 (4). Doi:10.1109/TITS.2015.2399492
- Zhao, Z. & Yi, Z. (2019). A comparative Study of Parking Occupancy Prediction Methods Considering Parking Type and Parking Scale from Tsinghua University, China. *Journal of Advance Transportation*, Hindawi, Volume 2020 Article ID. 562458, 12 pages

WEBSITES

<http://encyclopedia.uis.org>
<https://en.wikipedia.org/wiki/Yankin>
<https://mmbiztoday.com>
<https://securipedia.eu/mediawiki/index>.
<http://www.airpark.org>.
<https://www.cpuh.in/academics/academic>
<https://www.elsevier.com/local/aej>
<https://www.hindustantimes.com/mumbai-news>
<https://www.ipsosconsulting.com>
<https://www.lawinsider.com/dictionary/road-facility>
<http://www.matec-conferences.org>.
<http://www.planning.org/bookservice>.
<http://www.parking.org/tpp>
<https://www.researchgate.net/publication>
<https://www.sciencedirect.com>
<https://www.slideshare.net>
<https://www.thejakartapost.com>
<https://www.wbdg.org>
<https://www.worldbank.org>
<http://www.yangoncity.com.mm/maps/townships>

APPENDIX

Survey Questionnaire

Hello, my name is Phyu Mon Linn, and I am MPA student from Yangon University of Economics. The questionnaire is in support of my Master of Public Administration Thesis which is titled “**A Study of Car Parking Problem in Yankin Township.**” All persons will remain anonymous, and the responses will be used specifically for my Thesis only.

Part (A) Characteristics of Respondent. Please tick () only your answer.

1. Gender Male Female
2. Marital Status Married Single Divorce Widow
3. Age
 20 and below 21 to 30 Year 31 to 40 Year
 41 to 50 Years 51 and above
4. Level of Education
 Primary school Middle school High school
 Diploma Master Ph.D
5. Occupation
 Own Business Government Staff Private Staff
 Government Pensioner Student Dependent
Other (.....)

Part (B) Living Condition and Ownership of Respondent in Yankin Township

Please tick (☐) only your answer.

- 1. Please mention where do you stay in Yankin Township?
 - Quarter 3
 - Quarter 5
 - Quarter 1
- 2. Please mention your living condition
 - Own house Own apartment rental
 - Other (.....)
- 3. How many rooms / households in your apartment?
.....
- 4. I belong to car more than one. (If you have not a car, no need to answer next question.)
 - Yes (number of cars.....) No but I have only one car
 - I have not a car
- 5. How many households own a car in your apartment?
 - Each Between 32 and 20 Between 20 and 10
 - Under 10 Other.....

Part (C) Causes of Car Parking Problem. Please tick (☐) only your answer.

- 1. Where does your apartment/house in Yankin township?
 - On Main road on second street main road near traffic light area
- 2. Where do you park the car?
 - In front of apartment Other vacant far from home
 - Public platform or pedestrian area Other
 (Please specify)
- 3. If you can park always in front of your apartment, why do you chance please?

- 4. What time most difficult to get car parking?
 - During peak hour Night stop The whole day

5. Do you have ever encountered problem parking on your township?
 Yes No
6. If yes, what is the most common problem you encounter when you parking?
 No vacant space
 Distance from the building
 Spaces are too close together
 Other (please specify)
7. What crime have you been faced when you parked?
 Thief
 Quarrel each other car owner
 Other (please specify)
8. There is/ are a parking restriction on our downtown street or main street.
 20 meters (60 feet) within the traffic light
 School area
 Shopping Mall area
 Above all
9. What purpose do you come here (Yankin)?
 For work For shop For visit My residence
10. How many times per week do you park in restricted area?
 Sometime Frequently Mostly
11. Why do you park restricted area?
 Short walking distance No searching time No parking fee
 No police person Easy park
12. How many police assigned on main road to manage the traffic flow and parking?
 One or Two Two or Three Above Three Nothing
13. Do they (police) work full day?
 Yes No
14. How many schools are there on main road of Yankin township?
.....
15. Do the schools provide adequate space for parking?
 Yes No
16. How many markets near or on the main road in Yankin?
.....

17. Does the market provide the adequate space of parking?
 Yes No
18. If no, why was happen?
 On-street shopkeeper no parking space specifically
19. Where do you park or where the vehicles do they park you see to come markets?
 On main road Illegal area Double park
20. What is the peak hour of market time?

21. Where do you find mostly the double parking on main road?

22. When does happen the double parking in that area would be traffic congestion?
 Morning Evening Night Morning and evening
23. Why does it happen double parking in there?
 Narrow road On-street shopkeeper Both
 Other (If specify)
24. Myanmar plaza have a big underground parking, why surrounding area are there most crowded car parking and congestion the traffic flow?
 Because of Taxi
 Passenger loaded- unload zone
 High parking meter fee in underground parking
 All of them

25. In Yankin township have a housing apartment; can you park in a housing compound area as a free?

- Yes No Yes, with Fee

If yes, why do you chance to park in housing area?

.....

If no, why don't you chance?

.....

If yes with fee, the cost is.....

- Cheaper Reasonable Expensive

26. Yankin is one of the economic area it's crowded the shop each side of roads and the visitor car frequent parking. Where do they park do you see always?

- On street near the shop In housing compound
 If other..... (Please specify)

Part (D) Respondent's Opinion on Possible Ways to Reduce the Car Parking Problem

1 = Strongly disagree 2 = Disagree 3 = Agree 4 = Strongly agree

	(i)Possible Way-1 (on-street parking)	1	2	3	4
27.	Systematic on-street parking would be reduced the parking demand.				
28.	The on-street parking should be only the visitor car and passenger transit.				
29.	Congestion fee should be had a good effect on double parking problem.				
30.	The traffic light area and bus stand area should be restricted the parking.				
	(ii)Possible Way-2 (Off-street parking)				
31.	Off-street parking facilities should be introduced to reduce the congestions carriageway especially central business area.				
32.	If vacant of public land area, should be created the off-street parking.				
33.	You agree to pay the off-street parking fee to local authority it will cheaper than commercial.				
	(iii)Possible Way-3 (Parking lot facilities)				
34.	Commercial parking (parking facility company) facilities should be facilitated in our township.				

35.	We can pay any parking facilities charges of our township.				
36.	Parking lot should be designated less time and cost effective for us.				
37.	The parking Management should focus on quality of parking such as the convenience and safety of walking from a parking space to destinations, and the attractiveness and security of parking facilities.				
	(iv)Possible Way-4 (Residential parking)				
38.	Develop parking lot on the nearby resident place which helps us in providing space for parking vehicles for shopkeepers and commuters.				
39.	You would like your resident area to be included as part of a Resident Permit Parking Area.				
40.	Yankin township has many invasions buildings and tents in the residence area. If these invasions buildings and tents revoke, can create the resident car parking area.				
	(v)Possible Way-5 (CBA Parking management)				
41.	The shuttle school bus service should be promoted to avoid the individual vehicle using.				
42.	All on-street shopkeeper should be transferred to new palace made by local authority and impound the encroachment done by shopkeepers from the roads.				
43.	Load-unload zone should usually be used in Plaza, and it should be working as systematic time plan.				
44.	To be arranged the designate parking area for Taxi and must make effective regulation by local authority to reduce the double parking and congest the traffic flow in surrounding the Myanmar plaza.				
	(vi)Possible Way-6 (Parking Regulation & Policy)				
45.	The car parking regulation might be effectively managed the parking problem.				
46.	If the police can manage the parking arrangement it would be helpful of problem.				
47.	If the limitation of car permit policies by the government, it will reduce the parking requirement problem.				
48.	The reinforcing the public transport will affect the reduction of the private car using and reduce the parking requirement.				

Thank you so much for your participation in this survey!

Mean Score Calculations

Question 27

Respondent Opinion Possible way 1				
Systematic on-street parking would be reduced the parking demand				
Respondents	SDA	DA	A	SA
150	6	15	62	67
	4%	10%	41%	45%
Total Score	6	15	62	67
Mean Score	3.27			

Question 28

Respondent Opinion Possible way 1				
The on-street parking should be only the visitor car and passenger transit.				
Respondents	SDA	DA	A	SA
150	18	27	54	51
	12%	18%	36%	34%
Total Score	18	27	54	51
Mean Score	2.92			

Question 29

Respondent Opinion Possible way 1				
Congestion fee should be had a good effect on double parking problem				
Respondents	SDA	DA	A	SA
150	11	12	61	66
	7%	8%	41%	44%
Total Score	11	12	61	66
Mean Score	3.21			

Question 30

Respondent Opinion Possible way 1				
The traffic light area and bus stand area should be restricted the parking and it will be support traffic flow.				
Respondents	SDA	DA	A	SA
150	9	6	50	85
	6%	4%	33%	57%
Total Score	9	6	50	85
Mean Score	3.41			

Mean Score for Possible way - 1	$12.81/4 = 3.20$
---------------------------------	------------------

Question 31

Respondent Opinion Possible way 2				
	On street parking should be removed and off-street parking facilities should be introduced to reduce the congestions carriageway especially central business area.			
Respondents	SDA	DA	A	SA
150	11	4	62	73
	7%	3%	41%	49%
Total Score	11	4	62	73
Mean Score	3.31			

Question 32

Respondent Opinion Possible way 2				
	If vacant of public land area, should be created the off-street parking.			
Respondents	SDA	DA	A	SA
150	12	7	45	86
	8%	5%	30%	57%
Total Score	12	7	45	86
Mean Score	3.37			

Question 33

Respondent Opinion Possible way 2				
	You agree to pay the off-street parking fee to local authority it will cheaper than commercial			
Respondents	SDA	DA	A	SA
150	7	14	54	75
	5%	9%	36%	50%
Total Score	7	14	54	75
Mean Score	3.31			

Mean Score for Possible way – 2	$9.99/3 = 3.33$
---------------------------------	-----------------

Question 34

Respondent Opinion Possible way 3				
	Commercial parking (parking facility company) facilities should be facilitated in our township.			
Respondents	SDA	DA	A	SA
150	10	29	68	43
	7%	19%	45%	29%
Total Score	10	29	68	43
Mean Score	2.96			

Question 35

Respondent Opinion Possible way 3				
	We can pay any parking facilities charges of our township.			
Respondents	SDA	DA	A	SA
150	7	14	81	48
	5%	9%	54%	32%
Total Score	7	14	81	48
Mean Score	3.13			

Question 36

Respondent Opinion Possible way 3				
	Parking lot should be designated less time and cost effective for us.			
Respondents	SDA	DA	A	SA
150	11	4	49	86
	7%	3%	33%	57%
Total Score	11	4	49	86
Mean Score	3.4			

Question 37

Respondent Opinion Possible way 3				
	The parking Management should focus on quality of parking such as the convenience and safety of walking from a parking space to destinations and the attractiveness and security of parking facilities.			
Respondents	SDA	DA	A	SA
150	7	2	54	87
	5%	1%	36%	58%
Total Score	7	2	54	87
Mean Score	3.47			

Mean Score for Possible way - 3	$12.967/4=3.24$
---------------------------------	-----------------

Question 38

Respondent Opinion Possible way 4				
	Develop parking lot on the nearby place which helps us in providing space for parking vehicles for shopkeepers and commuters.			
Respondents	SDA	DA	A	SA
150	6	9	69	66
	4%	6%	46%	44%
Total Score	6	9	69	66
Mean Score	3.3			

Question 39

Respondent Opinion Possible way 4				
	You would like your road to be included as part of a Resident Permit Parking Area.			
Respondents	SDA	DA	A	SA
150	10	11	51	78
	7%	7%	34%	52%
Total Score	10	11	51	78
Mean Score	3.31			

Question 40

Respondent Opinion Possible way 4				
	In Yankin township is many illegal building and temporary tent in residence area if so to revoke the illegal building or tent to make a resident permit parking area			
Respondents	SDA	DA	A	SA
150	13	11	55	71
	9%	7%	37%	47%
Total Score	13	11	55	71
Mean Score	3.23			

Mean Score for Possible way - 4	9.84/3=3.28
---------------------------------	-------------

Question 41

Respondent Opinion Possible way 5				
	The shuttle school bus service should be promoted to avoid the individual vehicle using.			
Respondents	SDA	DA	A	SA
150	11	6	52	81
	7%	4%	35%	54%
Total Score	11	6	52	81
Mean Score	3.35			

Question 42

Respondent Opinion Possible way 5				
	All on-street shopkeeper should be transferred to new palace made by local authority and impound the encroachment done by shopkeepers from the roads.			
Respondents	SDA	DA	A	SA
150	8	6	55	81
	5%	4%	37%	54%
Total Score	8	6	55	81
Mean Score	3.39			

Question 43

Respondent Opinion Possible way 5				
	Load-unload zone should usually be used in Plaza, and it should be working as systematic time plan.			
Respondents	SDA	DA	A	SA
150	5	5	37	103
	3%	3%	25%	69%
Total Score	5	5	37	103
Mean Score	3.59			

Question 44

Respondent Opinion Possible way 5				
	To be arranged the designate parking area for Taxi and must make effective regulation by local authority to reduce the double parking and congest the traffic flow in surrounding the Myanmar plaza.			
Respondents	SDA	DA	A	SA
150	5	7	53	85
	3%	5%	35%	57%
Total Score	5	7	53	85
Mean Score	3.45			

Mean Score for Possible way - 5	$13.79/4 = 3.45$
---------------------------------	------------------

Question 45

Respondent Opinion Possible way 6				
	The car parking regulation might be effect managed the parking problem.			
Respondents	SDA	DA	A	SA
150	9	4	57	80
	6%	3%	38%	53%
Total Score	9	4	57	80
Mean Score	3.39			

Question 46

Respondent Opinion Possible way 6				
	If the police can manage the parking arrangement it would be helpful of problem.			
Respondents	SDA	DA	A	SA
150	9	16	80	45
	6%	11%	53%	30%
Total Score	9	16	80	45
Mean Score	3.07			

Question 47

Respondent Opinion Possible way 6				
	Limit the car permit policies by government will be reduced the parking problem.			
Respondents	SDA	DA	A	SA
150	14	61	42	33
	9%	41%	28%	22%
Total Score	14	61	42	33
Mean Score	2.63			

Question 48

Respondent Opinion Possible way 6				
	The reinforcing the public transport will be affected the private car using and reduce the parking problem.			
Respondents	SDA	DA	A	SA
150	14	28	65	43
	9%	19%	43%	29%
Total Score	14	28	65	43
Mean Score	2.91			

Mean Score for Possible ways 6	12/4=3
--------------------------------	--------

Means score for Way 1	3.2	
Means score for Way 2	3.33	
Means score for Way 3	3.29	
Means score for Way 4	3.28	
Means score for Way 5	3.45	
Means score for Way 6	3	
Total means score	19.55	
Total ways	6	
Grand Total Mean Score for all Possible 6 ways		3.258333333