

**YANGON UNIVERSITY OF ECONOMICS  
DEPARTMENT OF APPLIED ECONOMICS  
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**A STUDY ON URBAN CAR PARKING SYSTEM IN  
YANGON CITY  
(CASE STUDY; SOUTH OKKALAPA TOWNSHIP)**

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MPA – 75 (21<sup>st</sup> BATCH-ONLINE)**

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

**A STUDY ON URBAN CAR PARKING SYSTEM IN YANGON CITY  
(CASE STUDY; SOUTH OKKALAPA TOWNSHIP)**

A thesis submitted as a partial fulfillment of the requirements for the  
Degree of Master of Public Administration (MPA)

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## **ABSTRACT**

This study analyzes the current car parking system and traffic congestion issues in South Okkalapa Township, an urban part of Yangon, considering the entire city's vehicle use. The 200 respondents are selected from the one who live near the densely populated main roads in five wards; descriptive method is conducted with 40 car owners from each neighboring ward. The study gathers data on respondents' living conditions, parking issues, and potential sustainable solutions through qualitative and quantitative methods. The main causes of parking problems and traffic congestion in South Okkalapa include high population density, and an imbalance between parking demand and supply. Ineffective assignment of proper parking spaces, street vendors, illegal parking in market areas, and the mix of commercial and residential zones exacerbate these issues. The increasing vehicle numbers due to socio-economic needs and vehicle import policies, combines with land use and traffic enforcement weaknesses, further complicate the situation. Local authorities prioritize the essential road expansions according to annual budgets, but this only provides temporary relief. It is also found that 98(49%) of respondents want organized, secure off-street parking and high-tech multi-storey parking solutions on public land. Implementation of PPP/BOT systems and the creation of a Smart City with efficient parking management are suggestions.

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## **LIST OF ABBREVIATIONS**

AI	Artificial Intelligence
BOT	Build-Operate-Transfer
CBA	Central Business Area
CBD	Central Business District
DB	Design Build
EVs	Electric Vehicles
GDP	Gross Domestic Product
ICE	Internal Combustion Engine
IIHS	Insurance Institute for Highway Safety
IoT	Internet of Things
ITS	Intelligent Transportation Systems
JICA	Japan International Cooperation Agency
PPPs	Public - Private Partnerships
STD	Standard
TOD	Transit - Oriented Development
UIO	Unit in Operation
YBS	Yangon Bus Service
YCDC	Yangon City Development Committee
YRTA	Yangon Region Transportation Authority
YRTP	Yangon Region Traffic Police Department

# CHAPTER I

## INTRODUCTION

### **1.1 Rationale of the Study**

As the population grows rapidly in today's world, so too do people's socio-economic needs, among which the parking system in the transportation sector plays a crucial role in ensuring ease and speed of use. A significant impact of the parking system is its effect on the local economy. One immediate consequence of insufficient parking is the increase in traffic congestion. Proper utilization of parking spaces is vital in urban planning to ensure the safety of pedestrians and the efficiency of public transport and to prevent loss of productivity in economic sectors. Inadequate parking spaces can deter potential customers from visiting businesses in the area, thereby reducing revenue for local facilities. This, in turn, affects the livelihoods of business owners and employees. Moreover, a lack of adequate parking infrastructure discourages investors from establishing new businesses in urban areas, hindering economic growth and development.

In addition, the study aims to improve parking and encourage the use of electric vehicles. It can propose solutions to the city's environmental sustainability goals, such as integrating green spaces into parking areas and promoting public transportation. Effective parking management requires policies and regulations that offer assistance. This study examines parking fees, zoning laws, time limits, and enforcement mechanisms to inform the development of effective policies. It can also provide guidelines for public-private partnerships in parking management, ensuring that solutions are economically viable and beneficial to all stakeholders. Any urban planning initiative must consider the social and cultural context of the city. In Yangon, owning a car is a right; adapting to new parking habits and systems means understanding residents' attitudes and behaviors.

Inadequate parking lot design and management, improper parking regulation enforcement, and the lack of public transportation options can contribute to the scarcity of parking spaces.

The study focuses on the urban parking system, spotlighting the challenges confronting businesses, residents, and the broader urban environment. Recent years

have witnessed a surge in urbanization and population growth, which, in turn, has escalated the demand for parking spaces, leading to a scarcity of parking options. This scarcity has precipitated many issues, including illegal parking, traffic congestion, and inconvenience for residents and tourists. Consequently, conducting a comprehensive analysis of the urban parking system and its associated problems is crucial for identifying the root causes and formulating effective solutions.

Focusing on Yangon, Myanmar's largest city and economic powerhouse, the study examines the unique challenges posed by its rapid urban and economic growth in urban planning and transportation management, with a particular emphasis on parking. Yangon, a city with a rich historical backdrop and a status as Myanmar's cultural and economic epicenter, has grown substantially over recent decades. The expanding middle class's impact on rising income levels and increased private vehicle ownership is closely related to this urban expansion. The burgeoning number of vehicles has underscored the inadequacy of existing infrastructure, especially concerning parking. A systematic investigation of Yangon's parking system is pivotal for grasping these dynamics and crafting a blueprint for a sustainable urban future.

This study analyzes the car parking issues in South Okkalapa Township and offers insights that could apply to other urban areas.

## **1.2 Objective of the Study**

The objectives of this study are

- (a) To describe the current car parking system and management in Yangon City.
- (b) To examine the challenges and problems of the car parking system and to identify ways to reduce the car parking problem in South Okkalapa Township.

## **1.3 Method of Study**

The study uses a descriptive method with a qualitative and quantitative approach. Basic information is collected by interviewing the residents of South Okkalapa Township. Using questionnaires including preferences and opinions, the 200 respondents are surveyed by randomly selecting 40 car owners from (4,5,7,10,14)

wards, five wards with a large population of households in South Okkalapa Township. The secondary data is obtained from official sources. Most of them are Yangon City Development Committee (YCDC), Especially the Department of Engineering (Roads and Bridges) and the Department of Urban Planning.

#### **1.4 Scope and Limitation of the Study**

The study mainly focuses on the survey content in South Okkalapa Township. It aims to provide a detailed analysis of the current car parking challenges, causes, and potential systems within the boundaries of South Okkalapa. The study primarily considers private vehicles' parking issues and their impact on residents, businesses, and visitors in the area. The area of this study is limited to the respondents the car owner living in South Okkalapa Township. The survey period is from March 2024 to May 2024.

#### **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 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 a conclusion with the findings and suggestions.

## **CHAPTER II**

### **LITERATURE REVIEW**

Car parking is one of the challenges of the booming urbanization process in the world's cities. As the number of vehicles per capita in urban environments continues to increase, placing these vehicles in densely populated cities has become the subject of intense scrutiny and debate. The literature on urban car parking problems is extensive and social. It reflects the complexity of this modern urban problem, which spans environmental and planning aspects.

#### **2.1 Importance of Car Parking System and Its Characteristics**

The importance of car parking systems is increasingly recognized in many large cities, where the primary cause of car parking issues is the imbalance between supply and demand for parking, a situation exacerbated by the rapid rise in traffic demand. Moreover, car parking systems are crucial in reducing traffic congestion and are integral to urban traffic management, as parking problems are closely associated with accidents and environmental pollution. Addressing these parking challenges necessitates using parking systems and adopting new technologies and techniques to devise more efficient solutions, enhancing planning and management.

For any car owner, parking represents a significant challenge, often leading to anxiety when deciding where to park. The car purchasing process includes the hurdles of locating a suitable parking spot and enduring queues in parking lots. However, the unavailability of spaces can lead to frustration, making car parking seem more hassle than convenience. Car parking systems are well-designed, and human behavior can significantly improve societal well-being, reduce the stress associated with parking, minimize vehicle dependency, and promote public transportation use through integrated design.

Previous research indicates that the problem of car parking primarily arises from individuals' desire to park directly in front of their destination. Car parking prices, distance, and travel time significantly influence parking behavior in different regions. As car ownership increases, so does the demand for parking spaces. Commercial areas and movie theaters typically experience longer car parking

durations, whereas areas near markets have shorter parking times due to the nature of the activities planned.

The rapid growth of vehicles (Ministry of Road Transport and Highways, India) underscores the importance of incorporating car parking considerations into the planning buildings and roads. The quest for vacant car parking spots exacerbates congestion and increases traffic jams. Even brief periods spent searching for car parking can significantly contribute to traffic flow, with average search times reaching 8.1 minutes in large cities. (Shoup, D., 2006)

The interplay between car parking and congestion in mid-sized US cities has been explored, finding that cruising for parking accounted for 14% of cars on the road but nearly 50% of traffic loss. Car parking challenges persist as lots fail to consider the current and future direct and indirect costs, with spaces being constructed on valuable land to meet demand, leading to the conversion of expensive land for parking. Illegal parking remains a widespread issue in cities globally.(Shoup, D., 2005)

Urban parking systems have evolved and significantly impacted cities. Such systems are recognized not merely as spaces for vehicle accommodation but as crucial components of modern urban mobility, sustainability, and hubs for economic activity and social life. Integrating innovative technologies, human-centered design, and strategic urban planning is vital for unlocking the full potential of car parking systems in fostering resilient and vibrant urban environments. The existing literature highlights the transformative role of modern car parking systems, paving the way for future urban planning paradigms.

An often-overlooked aspect of urban parking systems is the potential for revenue improvement through innovative pricing strategies and land use optimization, which can significantly affect local economies. A balanced approach to car parking can drive urban economic growth without compromising livability. Integrating technology in managing urban parking spaces, such as Artificial Intelligence (AI), the Internet of Things (IoT), and automation, enhances operational efficiency and provides real-time convenience for customers.

### **2.1.1 Brief Overview of Urban Growth and the Rising Need for An Effective Car Parking System.**

The migration from rural to urban areas, driven by education, the global shift towards a service-based economy, and the concentration of cultural and economic opportunities, has led to unprecedented growth in urban areas worldwide in recent decades. This expansion presents unique and complex challenges, not only due to population booms but also due to the physical sprawl of cities. Among these challenges, the need for efficient car parking systems is exceptionally pressing. (Urban Planning Department, YCDC, Union Of Myanmar)

As cities expand, so too does the number of vehicles within them. Automobiles have become an everyday necessity for city dwellers and commuters, dramatically increasing vehicle ownership. This surge has exerted immense pressure on existing urban infrastructure, much of which was not designed to handle the current traffic volume. Roads become congested, and finding available car parking spaces often becomes daunting for drivers, leading to wasted time and fuel and contributing to environmental pollution, all of which decrease productivity in the urban economy. (Litman, T., 2016)

Moreover, inefficient car parking systems have broader urban life and planning implications. Valuable urban space is consumed by car parking lots or garages that could be utilized for green spaces or public amenities. Such systems exacerbate traffic congestion as drivers searching for parking spaces contribute to increased vehicular presence on the roads. This scenario impacts the efficiency of public transport and the overall quality of life for urban residents. (Shoup, D., 2005)

Consequently, the demand for efficient car parking systems in urban areas has become more critical. Innovations such as automated systems to track available spaces, smart car parking solutions incorporating electronic payment options, and advanced booking systems are starting to address this issue. By integrating technology and intelligent design into urban planning, cities can optimize space utilization, reduce traffic congestion, improve environmental conditions, and enhance the urban living experience. (Fischer, T, et.al., 2022)



The evolution of cities necessitates an ongoing reassessment of their infrastructure needs. With continued progress, finding sustainable and intelligent solutions to challenges like car parking is critical to making cities more livable, environmentally friendly, and future-ready. (Morichi, S., 2009)

### **2.1.2 Characteristics of Effective Car Parking Systems**

There are various characteristics of effective car parking systems, but mainly the following are essential factors (Litman, T., 2016)

- (a) Integration of Technology
- (b) User-Friendly Design
- (c) Flexible Solutions
- (d) Sustainability

As urban areas expand, efficient car parking management is vital to economic vitality; ensuring environmental sustainability and improving quality of life has become critical. Technology integration, user-centered design, and the characteristics of effective car parking systems, including flexibility and sustainability, are essential in meeting the diverse needs of urban residents. Shoup, as the works of experts like Chester and Litman point out, continued research and innovation in this area is critical to future-ready intelligent cities. (Chester, M, et.al., 2011)

## **2.2 Road Facility, Road Traffic, and Road Network in Urban Area**

The expansion of urban areas, fueled by the allure of opportunities and modern amenities, alongside continuous population growth, necessitates cities to adapt their infrastructure to accommodate human and vehicle expansion while maintaining operational efficiency. The condition and performance of road infrastructure are pivotal to a city's economic activities, with a clear correlation existing between high-quality roads and urban prosperity, underscoring the need for ongoing expansion and rehabilitation of urban roads to support logistics, emergency services, and the daily commute. (Litman, T., 2006)

The advent of technology has laid the groundwork for modern road management and development, with Intelligent Transportation Systems (ITS) that utilize sensors and automation to mitigate traffic congestion and enhance road safety

measures, marking a significant step towards the digital transformation of urban landscapes. (Litman, T., 2016)

Investing in highways is tantamount to investing in the city's future. However, securing adequate funding for new highway construction and maintenance poses a significant challenge. This necessitates a comprehensive financial strategy exploring Public-Private Partnerships (PPPs) to finance the road improvements essential for a thriving urban future, with a combination of government subsidies and international aid playing a crucial role. (Chester, M, et.al., 2011)

Urban road facilities represent a complex and multifaceted public asset, where the development of clean infrastructure, technology integration, and financial engineering should be expanded to encompass social space management, ensuring that urban areas worldwide continue to evolve and adapt their road infrastructure to meet environmental and social needs in tune with urban life.

The global increase in population and reliance on automobiles has led urban areas to grapple with the consequences of increasingly congested roads, impacting commuting times and creating challenges that affect environmental health and urban quality of life, including economic losses due to time wastage, increased fuel costs, and delivery delays.

Smart investments in transportation infrastructure are imperative to foster business growth, enhance urban productivity, and tackle traffic challenges through effective urban planning that reduces travel distances and integrates residential with commercial areas through zoning laws supporting public transportation. Transitioning to sustainable urban planning involves prioritizing walkability and promoting bicycle use to diminish commute times. (Morichi, S., 2009)

Addressing urban traffic goes beyond physical and technological infrastructure to influencing human behavior. Implementing policies such as congestion pricing and dedicated lanes can motivate commuters to opt for carpooling or public transport, contributing to long-term shifts in transportation habits.

The complexity of traffic congestion, environmental degradation, and economic loss calls for a multifaceted approach that includes embracing technological innovation, rethinking urban planning, developing forward-thinking policies, and considering aspects of traveler behavior. An integrated strategy is essential for cities

to navigate the challenge of managing fast-moving highways and steering toward a sustainable, efficient, and healthy urban future.

Reflecting on the significant evolution of urban street networks over the past century, from primary roads to modern thoroughfares driven by urbanization and technological advances, it is crucial to appreciate the historical context when planning for future urban road infrastructure. The pressure exerted by rapid urbanization and motor vehicle usage has highlighted the limitations of urban road networks, leading to traffic congestion, extended commutes, and air pollution.

The efficacy of a road network hinges on the strength of its roads, with road capacity defined by various factors such as width, number of lanes, and speed limit. Congestion arises when traffic demand surpasses road capacity, compromising the network's functionality and safety. Intelligent traffic management systems, leveraging technology through real-time analytics and predictive modeling, promise to revolutionize traffic management by alleviating congestion and enhancing safety measures.

Future urban challenges necessitate the development of adaptive road networks with flexible designs that can accommodate changing urban dynamics, traffic patterns, and transportation modes. Although the historical development of road networks lays the foundation, urban road networks must evolve to address technological shifts, environmental concerns, and socio-economic pressures, moving towards more sustainable, efficient, and socially vibrant urban living models. Comprehensive strategies, informed by past experiences and current innovations, will pave the way for more innovative, more livable cities in the coming decades. (Litman, T., 2016)

### **2.3 Types of Car Parking in Urban Areas**

The challenge of accommodating increasing numbers of vehicles amid space constraints is faced by urban landscapes worldwide, requiring diverse and efficient types of car parking. The complexities of urban growth, spatial constraints, and sustainability concerns are reflected in the evolution of car parking solutions, from traditional to innovative intelligent systems. (Barter, 2011)

There are different types of car parking. We focus on different types of street parking, including on-street parking and off-street parking.

### **2.3.1 On-Street Parking**

On-street parking, which involves vehicles being parked in public spaces along the sides of public streets, often demarcated by signs, road markings, or delineated structures such as parking meters, is a longstanding practice in urban areas and plays a crucial role in the transportation systems of cities. This form of car parking, while providing a convenient option for drivers due to its direct access to destinations, entails several challenges and considerations. (Litman, T., 2006)

The convenience of on-street parking, however, can contribute to traffic congestion, particularly during peak hours when vehicles stopping to park obstruct the flow of passing traffic. This issue is highlighted by Shoup (2005) in "The High Cost of Free Parking," where it's argued that excessive reliance on on-street parking in congested urban centers can exacerbate congestion and significantly hinder urban mobility.

On-street parking also presents safety risks, with vehicles parked adjacent to moving traffic being susceptible to collisions. Pedestrians, too, face dangers when navigating between parked cars, a concern that has been underscored by the Insurance Institute for Highway Safety (IIHS) in its urban road safety studies. Moreover, the cost of on-street parking, particularly in high-demand areas, can be significant for users. The dynamics of demand and pricing for on-street parking can influence shopper behavior and the economic environment and even contribute to the city's revenue, suggesting that correctly pricing street parking can enhance the management of these limited spaces.

The efficient on-street parking management necessitates appropriate regulations, such as time limits and resident parking permits, alongside stringent enforcement to deter illegal parking, although this requires considerable municipal resources.

Given these complexities, many cities are exploring innovative solutions to better integrate their on-street parking strategies with broader transportation needs. These efforts fall within the ambit of ITS, representing a future-oriented approach to urban mobility planning that seeks to be more equitable and minimally disruptive to

urban life. Such strategies are essential for creating a balanced and effective urban transportation ecosystem that accommodates the needs of all city residents and visitors. (Litman, T., 2016)

### **2.3.2 Off-Street Parking (Surface and Structured)**

Off-street parking refers to off-street parking spaces designated for vehicles. It encompasses two types: Surface Parking and Structure Parking.

*Surface Parking:* Although surface lots require a substantial amount of land, they are relatively easy to build and often cost less. However, they can contribute to urban sprawl; land use is sometimes considered inefficient, especially in densely populated areas. (Urban Land Institute, 2019)

*Structure Parking:* Parking structures, including multi-level garages, save space and allow more cars to be parked per square meter of land. These are especially valuable in densely populated urban areas where land is scarce and expensive.

Construction of built-in parking structures is generally more expensive due to ventilation and maintenance costs. These expenses necessitate the charging of fees to users. However, organized parking can be financially sustainable in the long run, especially in areas with high real estate values (Litman, T., 2016).

Street parking stations and garages, in particular, provide a safer environment for vehicles, as they are typically easier to monitor than street parking. However, proper design and maintenance are required to ensure pedestrian safety and reduce the risk of accidents and crime.

Modern street parking incorporates more technology for a better user experience and management efficiency. This includes electronic payment systems, real-time information on parking availability, and advanced reservation systems. In a "new smart parking system" based on resource allocation and reservations, the International Parking & Mobility Institute. (n.d.). Highlights the efficiency gains from these techniques.

#### **(a) Automated/Mechanical Parking Systems**

Automated or mechanical parking systems are a very common system in urban space shortages. These high-tech systems are significantly better than conventional

methods and improve parking density. It is a potential solution for reducing the space required for each one vehicle in urban centers and increasing traffic lane clearance and space requirements. By removing pedestrians from parking spaces, minimizing the risk of accidents or vehicle-related incidents is enhanced by automated parking stations. Risks related to crime can be reduced due to automation.

Although the initial investment for these systems is substantial, they save time and money in the long run due to lower operational and personnel costs.

The implementing automated parking solutions may require changes to local building codes and regulations. Innovative systems need to comply with municipal codes and safety standards for parking systems. You need to meet the terms and conditions.

#### **(b) Underground Parking**

Underground parking, a form of off-street parking, is increasingly recognized as an effective solution to the spatial challenges in dense urban environments. By utilizing subterranean spaces, these parking structures are adept at preserving the aesthetic value of the cityscape, offering a more secure vehicle storage option while minimizing land use.

A primary advantage of underground parking is its contribution to land conservation, a benefit that is particularly significant in urban areas. Rather than consuming extensive ground-level areas, parking facilities are situated beneath the surface, allowing for the development of green spaces, pedestrian plazas, or other public amenities above. However, the construction of underground parking structures can be expensive due to factors such as excavation costs, soil stability issues, and the need to meet structural requirements and navigate complex engineering challenges. Additionally, operating expenses can be high, driven by the continuous need for ventilation, lighting, and climate control.

The vehicles parked in underground facilities are generally less exposed to environmental elements, thereby reducing the risk of damage from sun exposure, rain, or snow. Modern underground parking facilities incorporate technology solutions to enhance the user experience and operational efficiency, including sensors to monitor available spaces, automated payment systems, and electric vehicle charging stations.

While underground parking offers numerous advantages in terms of aesthetics and vehicle protection, it is associated with high costs. Challenges include the environmental impact and navigating regulatory hurdles. Its development necessitates careful planning to ensure effective integration into the urban landscape, requiring innovative design and comprehensive strategies.

**(c) User Shared Parking**

Shared parking is a collaborative approach to using a common parking space, serving as an innovative and efficient land-use strategy designed to optimize parking capacity. This method has become increasingly popular, particularly in urban settings where land is highly valued, by addressing the challenge of parking shortages caused by the differing peak parking demands of various users.

By diminishing the overall need for parking spaces within a development or area, shared parking effectively maximizes land utilization, conserves the natural environment, and cuts down on construction expenses. This approach facilitates more inventive and adaptable urban planning, reducing the area allocated solely for parking. Consequently, it opens avenues for commercial extensions, green spaces, or public areas, thereby enhancing the communal quality of life and fostering a more inviting urban environment.

Additionally, shared parking can mitigate the number of vehicles circulating in search of parking spots, thereby easing traffic congestion, improving air quality, and enriching the overall urban experience. However, as highlighted in "Shared Parking Management: Challenges and Solutions" by Litman, T. (2016), shared parking presents its own set of management challenges. These include ensuring coordination between various stakeholders, maintaining clear communication and signage, guaranteeing equitable access, and resolving potential legal issues, all of which demand robust management strategies.

Shared parking stands out for its space and cost efficiency, along with its environmental benefits and convenience for users, making it a mutually advantageous solution for software engineers, business owners, and community members alike. Nonetheless, its successful deployment hinges on strategic planning, regulatory backing, effective management, and, occasionally, the adoption of smart technologies.

#### **(d) Parking in a Residential Area**

Parking in residential areas is an important aspect of urban planning and design, often requiring a balance between satisfying residents' needs and maintaining the quality and sustainability of the urban environment. Residential parking demand is mainly driven by household car ownership. The challenge of traffic congestion is a challenge that comes from the need for adequate parking while combating issues such as environmental concerns and inadequate land use.

Typically, Residential parking requirements to ensure that new developments provide a certain amount of parking, or at least initially, limits, are set by local governments. However, these regulations sometimes result in excessive parking, increasing development costs, and encouraging car dependence.(Litman, 2016)

Managing visitor parking in residential areas without causing inconvenience to residents or visitors is a unique challenge. Strategies include providing on-street parking, using shared parking rules, or issuing temporary permits.

Residential parking policies must consider equity issues. For example, Low-income households may not have access to off-street parking options and may face disproportionate challenges from limited on-street parking. Additionally, parking solutions need to accommodate individuals with disabilities adequately.

Residential parking is a multifaceted issue that requires careful consideration and strategic planning. Residents' needs, balancing environmental concerns and future growth pressures requires re-evaluating existing regulations; a comprehensive forward-thinking approach embraces innovative solutions and considers the broader impact of parking on community life and urban sustainability.(Shoup, 2005)

In evaluating parking systems, it is essential to distinguish between on-street and off-street parking, each with its advantages and disadvantages.

#### **(e) Central Business Area Parking**

The parking management in the city's business centers is limited in space, and addressing the complex challenges associated with high demand and congestion requires a multifaceted approach. Here are some key strategies for effective parking management in central business areas.



For business groups in big cities, due to the abundance of offices and retail stores, parking demand is often high. Central business areas usually have limited land space for parking spaces and are limited by the urban environment and the preference for commercial and office space. This restricted area is for passengers, and high demand from shoppers and employees has resulted in a shortage of parking spaces.

Previous studies have estimated that the average occupancy rate of parking spaces in central business areas is about 85% during peak hours. The ratio of vehicles to parking spaces in the central business district is approximately 1:10, resulting in a shortage of available parking.

Many commercial centers implement parking fees and regulations to manage demand and encourage the use of parking spaces. These include metered parking to encourage short stays and long-term parking, which may include time constraints and pricing strategies. Cities that implement dynamic pricing strategies have seen a 20% reduction in parking congestion and a 30% increase in revenue from parking fees.

Despite space limitations, Multi-Level Parking lots in central business areas, there are underground parking spaces and street parking spaces to accommodate vehicles. Effective use of available spaces and innovative parking solutions such as automated parking systems can maximize parking capacity.

Central businesses can use smart parking technologies to improve parking management and accessibility. These technologies include real-time parking availability apps, it includes sensor-based parking systems and digital payment platforms, which improve user experience and reduce traffic congestion due to circling for parking. Cities that have implemented smart parking technologies have seen a 25% reduction in parking search time and a 15% increase in overall parking utilization rates.(Litman, 2017)

Public transit in multimodal transportation, cycling infrastructure, pedestrian-friendly amenities, and encouraging multimodal transportation such as ride-sharing services can alleviate traffic congestion and reduce demand for parking in the Central Business District (CBD). Transit-Oriented Development (TOD) strategies allow pedestrians to easily access the business center without relying on private vehicles, reducing the need for large parking spaces and major transit. (Chester, M, et.al., 2011)

By coordinating these strategies, cities can improve parking management in central business areas and improve mobility, it will reduce traffic congestion, and create more vibrant and livable urban environments.

### **2.3.3 On-Street Parking and Off-Street Parking (Advantages and Weakness)**

Although on-street and off-street parking are commonly used in urban areas, there are several advantages and weaknesses accordingly.

#### **On-Street Parking:**

When cars are parked on the road, any space on the sidewalk or street is called on-street parking (Shoup, 2005). On some streets, you can always park your car on the street, but sometimes there are restrictions.

#### **Advantages:**

- ❖ Street parking is convenient for short-term tourists or shoppers who require quick access to businesses or homes.
- ❖ For retail businesses, on-street parking can enhance visibility and increase foot traffic, as parked cars signal active business zones and encourage people to stop and shop.
- ❖ Typically, on-street parking is more affordable compared to off-street parking options.
- ❖ On-street parking spaces designated for short-term visitors can accommodate a significant number of users throughout the day, catering to the needs of both shoppers and residents.
- ❖ On-street parking can facilitate easy access to storefronts, boosting the economic vitality of commercial districts.

#### **Weaknesses:**

- On-street parking spaces are frequently in short supply, which can exacerbate traffic congestion, particularly in densely populated urban areas.
- The act of parking and walking on busy streets can present safety risks for both drivers and pedestrians.

- Municipalities are responsible for the expenses associated with maintaining on-street parking infrastructure and enforcing parking regulations.
- Parked vehicles reduce visibility at intersections and can cause traffic congestion, especially in areas with high parking demand.
- The search for on-street parking contributes to increased emissions and air pollution due to the additional driving time involved.

### **Off-Street Parking (Parking Lot)**

Off-street parking is space for cars on private property off public roads. It can be both indoor and outdoor. Private spaces in street parking also include garages and driveways (parking network.com). Street parking users are different from monthly renters and regular users in the short and long term. In most urban areas, some areas are reserved for parking at a short distance from the parking lot, such as a parking lot called street parking.

#### **Advantages:**

- Off-street parking garages can accommodate a larger number of vehicles compared to traditional on-street parking, significantly alleviating parking demand in congested areas.
- Off-street parking does not violate parking and pedestrian rules and reduces the risk of accidents compared to on-street parking.
- Many Off-street parking stations have electronic payment options along with advanced amenities such as security monitoring and electric vehicle charging stations.
- Traffic congestion can be reduced by shifting on-street parking to off-street parking.
- Off-street parking garages provide designated parking spaces for drivers, reducing the time and fuel spent searching for an available parking space.

**Weaknesses:**

- Constructing and maintaining off-street parking lots incurs significant expenses; these costs are often passed on to users in the form of higher parking fees.
- On-street parking is more convenient for drivers than on-street parking, especially for short-term visitors.
- Large off-street parking areas can overwhelm urban landscapes, diminishing their aesthetic value and replacing other important land uses.
- The ample provision of off-street parking can promote car usage, leading to higher traffic volumes and greater dependence on private vehicles instead of public transportation.

The development and operation of extensive parking facilities carry significant environmental impacts, such as the consumption of land and the increase in impervious surfaces, which contribute to urban runoff and pollution. Both on-street and off-street parking systems are integral to urban planning and transportation management, with the optimal application of each depending on the specific urban forms, objectives, and the needs of residents and visitors.

**2.4 Reasons for Parking Problems in Some Selected Neighboring Countries**

Urbanization in countries like Myanmar, Thailand, China, and India has led to a significant influx of people into urban areas, escalating vehicle ownership and, subsequently, an increased demand for parking spaces.

In Thailand, the population is steadily growing, with an average annual growth rate of approximately 0.3%. Urbanization is occurring at a rapid pace, with the urban population growth averaging around 2% per year. Bangkok, the capital, is experiencing one of the highest rates of urban growth, with an annual population increase of over 3%. Despite this swift urbanization, Thailand is encountering challenges in developing its infrastructure, particularly concerning transportation and parking. Cities like Bangkok have seen a surge in vehicle ownership rates due to rapid urbanization. The city grapples with a severe parking shortage, exacerbated by limited infrastructure development. With a population exceeding 10 million, Bangkok's demand for vehicles has been stimulated by economic factors such as rising incomes

and ongoing urbanization. The city registers approximately 1.8 million vehicles but has only about 750,000 legal parking spaces available, leading to widespread illegal parking on streets and sidewalks.

The critical need for comprehensive urban planning and infrastructure development is starkly highlighted by the parking and transportation challenges that accompany rapid urban growth. The expansion of public transportation networks, the development of multi-level parking structures, and the implementation of smart parking technologies represent innovative solutions that could mitigate some of the pressures these rapidly urbanizing cities face. (Ajeng, C, et.al., 2018)

China, the world's most populous country with over 1.4 billion inhabitants, presents a significant case study in this context. Despite a slowdown in overall population growth, urban areas in China continue to see substantial increases in population due to rural-urban migration. China has witnessed an unprecedented rate of urbanization, with urban dwellers now constituting more than 60% of the population. Cities such as Beijing, Shanghai, and Guangzhou have experienced significant growth, primarily fueled by rural-to-urban migration.

This rapid urbanization in China has outstripped the development of necessary infrastructure, leading to a scarcity of parking spaces in urban areas. Although the Chinese government has made substantial investments in transportation infrastructure, including roads and public rail systems, parking infrastructure has lagged. The result is a significant imbalance in car ownership rates versus available legal parking spaces. For instance, Beijing alone, with a population exceeding 21 million, has more than 6 million registered vehicles but only about 1.5 million legal parking spaces. This discrepancy leads to traffic congestion and widespread illegal parking practices.

The economic prosperity and development in China's urban centers have spurred an increase in vehicle ownership rates. However, the challenges of high land costs and limited space for parking infrastructure development have made it difficult to meet the growing demand for parking. This situation results in significant traffic congestion and illegal parking, underscoring the urgent need for innovative solutions and strategic planning to address these issues effectively. (Morichi, S., 2009)

India, with its rapidly expanding population currently exceeding 1.3 billion people, is witnessing significant urban growth driven by both internal migration and

natural population increases. It is projected that by 2050, over 60% of the country's population will reside in urban areas, which are undergoing rapid urbanization. Cities such as Delhi, Mumbai, and Bangalore have experienced considerable growth due to migration from rural regions. This swift urbanization has resulted in increased vehicle ownership rates, amplifying the demand for parking infrastructure. A major challenge faced by Indian cities is the limited development of infrastructure, with a pronounced shortage of parking spaces being a critical issue. Cities like Mumbai and Delhi are grappling with a parking crisis attributed to insufficient investment in parking infrastructure and the rapid pace of urbanization, as reported by India's Ministry of Housing and Urban Affairs in 2021.

In Mumbai, a city home to over 20 million people, the disparity between the number of registered vehicles, which stands at about 2.5 million, and the availability of only approximately 700,000 legal parking spaces has led to rampant illegal parking and consequent traffic congestion. Economic factors such as rising incomes and the increasing desire to own vehicles are fueling this demand in Indian cities. However, the limited parking infrastructure, coupled with high land costs, poses significant challenges in providing adequate parking spaces, thereby exacerbating traffic congestion and illegal parking practices.

The parking predicaments in India are mirrored in neighboring countries like Thailand and China, where rapid urbanization, infrastructure development challenges, inadequate enforcement mechanisms, cultural attitudes, and economic considerations interact in complex ways to intensify parking issues. These scenarios underscore the urgent need for comprehensive solutions that address the multifaceted nature of parking challenges, including the enhancement of infrastructure, the implementation of effective enforcement mechanisms, and the consideration of cultural and economic factors in urban planning. (Das, D, et.al., 2017)

## **2.5 Review of Previous Studies**

Yangon, Myanmar's most significant commercial hub, has seen unprecedented growth in recent years, both economically and demographically. This urban growth, combined with increased accessibility to vehicles, has culminated in the city grappling

with pronounced parking challenges. This review synthesizes prior research to gain a comprehensive understanding of Yangon's parking predicament.

Yan-Ling, W, et.,al. (2016) focused on the current state of parking problems in Beijing. The research method is descriptive based on secondary data and primary data. Variables include residential parking provision, congestion charging, public transport development, and purchase restriction policies. This study systematically and thoroughly analyzes what Beijing's problems are in the current situation and the causes of this problem. This result shows that there are two types of measures to solve the problem of increasing the supply of transport vehicles, which are increasing reasonable parking spaces and strengthening demand management to properly direct and control transport demand. as appropriate as a vehicle purchase restriction policy.

Amini and Shanker (2017) focused on the parking problem in the central business district of Sabzevar city, Iran. This study is a descriptive approach based on primary and secondary data and qualitative assessment based on traffic speed and density. The variables are the number of vehicles, land use patterns, and traffic volume. The main finding of the study is that downtown areas increase vehicle ownership, parking demand as well as high land values. Therefore, based on different types of parking needs, find ways to minimize the problem in favor of public transportation, collect parking fees, develop traffic policies, and finally build an automated parking system. Multi-level dynamic. Traditional parking systems are generally unsafe and inefficient. The automatic multi-level parking system is more economical, space-saving, safer, and more secure than the traditional system. It plays an important role in reducing traffic congestion and solving parking problems.

Parmar, J. et al. (2019) focused on the demand characteristics of parking systems in urban areas. This article reviews previous studies focusing on parking characteristics and develops models of parking choice behavior, both at the aggregate and disaggregated levels. This also discusses different methods and various approaches like linear regression, least squares regression, unit plot techniques, logistic models, principal component analysis, theory and random utility game, Gaussian mixture model, and gray correlation analysis are used to develop parking demand forecast. Models. This study aims to reveal, between parking policy and traffic management, how parking becomes a traffic obstacle. This result shows that

parking support policy is important and part of traffic planning and management. Increasing the parking supply is not the solution to the parking problem. Therefore, limiting the movement of private vehicles can be achieved by restricting parking. Improving parking efficiency and paying attention to sustainability will help transportation planners develop sustainable parking ecosystems.

Phyu Mon Linn (2022) Myanmar, this study focused on the parking problem of Yankin Township in Yangon City and analyzed it using a descriptive approach using primary and secondary data. The study's main findings are to develop advanced parking technologies for increased vehicle usage, set up parking policies, enforce traffic rules, and improve public transport sectors. It plays a vital role in reducing traffic congestion and solving parking problems.

The reviewed studies prove Yangon's car parking problem is multifaceted and rooted in its historical growth, recent economic shifts, and infrastructural lag. To solve the parking challenges, a confluence of targeted policy measures, technological interventions, and public cooperation is needed. The body of existing research serves as a foundational guide, directing future studies and interventions toward a more sustainable urban mobility landscape in Yangon.



## **CHAPTER III**

### **CAR PARKING SITUATION AND MANAGEMENT PLAN IN YANGON CITY**

Yangon's car parking situation and management plan are undergoing significant changes to address the problems of traffic congestion and parking shortages in Yangon's busy city center. As the number of vehicles in Yangon increases significantly due to rapid urbanization and economic issues, parking management also needs to be efficient.

Traffic management solutions by the government to solve traffic congestion and improve the parking system. Road upgrading issues, the expansion of parking systems (smart car parking) and changes in car import policy, especially the transition of car import permits to electric vehicles (EVs) in 2023, which banned the import of Internal Combustion Engine (ICE) models and encouraged the purchase of EVs, caused a 46% drop in new car sales and a control over vehicle growth.

Yangon's economic parking system and parking difficulties have become a difficult problem to solve in many urban areas of Yangon, and efforts should be made to develop a more efficient and user-friendly parking management system from all sides.

#### **3.1 Background of Car Parking System and Road Traffic in Yangon**

Myanmar's largest city, Yangon, has been significantly impacted by rapid parking and transportation development and increased vehicle ownership. Tens of thousands of cars have poured into Yangon after the easing of international economic sanctions, creating severe congestion in the capital, which struggles with outdated infrastructure. In 2007, there were about 180,000 cars on Yangon's roads, and before 2010, after policy changes in the Yangon Region, the number of passenger and private vehicles increased rapidly to over one million. According to the registration records of the Directorate of Road Transport, in 2010-11, the number of cars in the Yangon region was only about 26,330, and in 2020-21, there were 92,000 cars, an increase of about 70 % in ten years. It is described by Table (3.1).

**Table (3.1) Number of Vehicles Registered by Type in Yangon**

<b>Year</b>	<b>2010-11</b>	<b>2015-16</b>	<b>2016-17</b>	<b>2017-18</b>	<b>2018-19</b>	<b>2019-20</b>	<b>2020-21</b>	<b>2010-21 Total Growth %</b>
<b>Vehicles</b>								
Passenger	159854	325963	331786	331782	344132	355589	352509	
Truck (Light Duty)	15828	124245	129169	130960	132405	123757	120116	
Truck (Heavy Duty)	11263	17675	17379	17729	16496	13644	12944	
Bus	11388	15543	14756	15293	17914	16411	16145	
Others	11463	30411	30757	33453	33599	31901	31473	
Two Wheeler	50660	235711	289863	330494	352522	365075	370248	
Three Wheeler	145	3875	5632	8637	11298	11610	12013	
Trawlargi	658	2914	4093	4489	3519	3317	3361	
Heavy Machine	71	528	633	849	1125	1168	1193	
<b>Total</b>	<b>261330</b>	<b>756865</b>	<b>824068</b>	<b>873666</b>	<b>913010</b>	<b>922472</b>	<b>920002</b>	<b>252%</b>

*Source: Road Transport Administration Department (2023)*

According to the Table (3.1), it can be concluded that the total number of vehicles registered in Yangon during the decade of 2010–21 increased from 261330 to 920002 (by 252%). Studies have shown that as the number of vehicles increases, traffic jams can last up to 90 minutes during peak periods of 15 minutes. The ban on bicycles and motorbikes in the city has made it more difficult for residents to travel, and the city is also facing challenges.

To improve urban transportation, the government reduced the import of vehicles in 2010, and from 2012, only individuals who opened bank accounts in foreign currency were allowed to import cars.

As the number of cars increases, parking shortages occur not only in Yangon but also in other townships. Middle-income families are becoming car owners, with some families using more than one vehicle. In the past, parking placement (or building construction) was not a big problem. Vehicle owners park in roadside public

spaces; there was convenient parking on sidewalks, especially in downtown areas, due to high land values, the growth of other commercial buildings, and the scarcity of parking spaces. Efforts to address these issues include expanding roads and bridges and changing the vehicle import policy. However, these measures have not sufficiently alleviated traffic congestion. Yangon's traffic congestion and parking problems are due to rapid urbanization; these are multifaceted problems arising from inadequate infrastructure and lack of comprehensive urban planning. As the city evolves, public transportation and finding sustainable solutions that include improvements in traffic management and urban planning are critical to easing traffic congestion and improving the quality of life for its residents. As parking managers, population growth Management needs to be aware that traffic congestion can lead to more parking problems. The basic chart of population growth in the Yangon metropolitan area every year from 2011 to 2023 is shown in Table 3.2.

**Table (3.2) Population of Yangon (Urban Area 2011-2023)**

<b>Year</b>	<b>Population (Number)</b>	<b>Growth Rate</b>	<b>Growth (Number of Population)</b>
2011	4,471,308	2.06%	90,267
2012	4,563,564	2.06%	92,256
2013	4,657,462	2.06%	93,898
2014	4,753,425	2.06%	95,963
2015	4,851,365	2.06%	97,940
2016	4,951,323	2.06%	99,958
2017	5,053,341	2.06%	102,018
2018	5,157,461	2.06%	104,120
2019	5,243,989	1.68%	86,528
2020	5,331,800	1.67%	87,811
2021	5,421,806	1.69%	90,006
2022	5,514,454	1.71%	92,648
2023	5,610,241	1.74%	95,787

*Source: Yangon Population Data (Urban Area)*

YCDC and other government bodies are working on solutions to improve parking conditions, including introducing smart parking systems and expanding parking infrastructure. For residents of Yangon, this likely means that parking solutions are part of broader urban planning and traffic management initiatives. Finding parking in densely populated areas and near major commercial areas can be challenging, necessitating innovative solutions such as multi-story parking structures or designated parking zones.

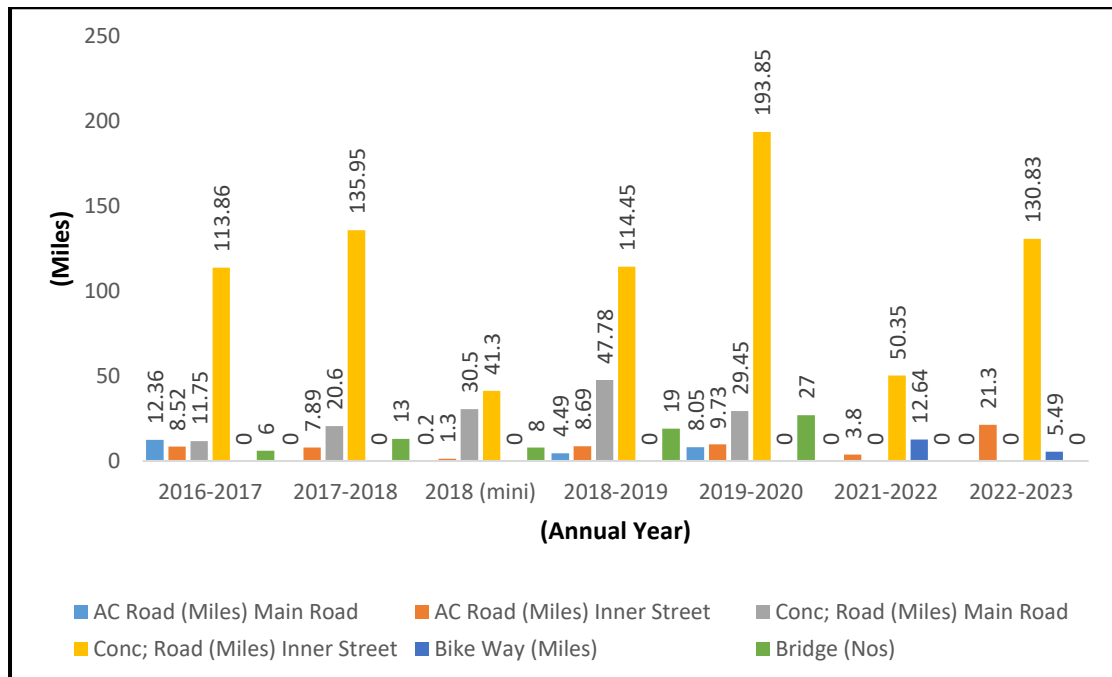
Residents and vehicle owners in Yangon are concerned about the current infrastructure, Private parking lots or street parking may need to be relied upon until more comprehensive solutions are implemented. Yangon City is modernizing its urban infrastructure, and with efforts to reduce traffic congestion and improve parking availability in the city, YCDC is expanding and repairing roads and bridges depending on the availability of the annual budget. Table (3.3) shows the yearly expansion and repair of roads and bridges in Yangon by YCDC from 2016 to 2023 financial year.

**Table (3.3) Road and Bridge Expansion and Repair (2016 – 2023)**

No	Years	AC Road (Miles)		Concrete Road (Miles)		Bike Way (Miles)	Bridge (Unit)
		Main Road	Inner Street	Main Road	Inner Street		
1	2016-2017	12.36	8.52	11.75	113.86	-	6
2	2017-2018	-	7.89	20.60	135.95	-	13
3	2018 (mini)	0.20	1.30	30.50	41.30	-	8
4	2018-2019	4.49	8.69	47.78	114.45	-	19
5	2019-2020	8.05	9.73	29.45	193.85	-	27
6	2021-2022	-	3.80	-	50.35	12.64	-
7	2022-2023	-	21.30	-	130.83	5.49	-
<b>Total</b>		<b>25.1</b>	<b>61.23</b>	<b>140.08</b>	<b>780.59</b>	<b>18.13</b>	<b>73</b>

*Source: Engineering Department (Road & Bridge) (YCDC) (2023)*

**Figure (3.1) Chart of Road and Bridge Expansion and Repair (2016-2023)**



Source: Engineering Department (Road and Bridge), YCDC

There are paid parking spaces in private shopping malls, but the parking fees are high, and many people park on the side of the road, causing traffic congestion problems worse for the economy and the environment. YCDC is now building intelligent parking lots in six townships in the city to reduce traffic congestion and is also implementing parking policies. Although YCDC has been working on widening the busy downtown streets to provide parking space, parking shortages remain as they are filled with unruly street vendors.

According to Japan International Cooperation Agency (JICA's) research, the leading causes of traffic congestion in Yangon are illegally parked cars and street vendors. Yangon has a population of about 7 million people, and they spend many hours on the roads to commute from the city's outskirts to the city center for their daily jobs, at least 3 hours. According to YCDC data, the vehicle speed was about 30 (km/h) in 2007 and dropped to 10-15 (km/h) in 2015.

For a population of 7 million people in Yangon, approximately 4,000 buses are operated by the Yangon Region Transportation Authority (YRTA) as private-public vehicles, and the roads are inadequate. Economic and social problems of time delay for the urban population are also caused by poor parking management and law enforcement.

In Yangon's strategic urban development plan, Yangon's traffic control objectives are:

- (a) Ensuring road safety
- (b) To maintain smooth traffic flow and
- (c) To prevent adverse effects caused by traffic, such as parking on the road,

Limitation/prohibition is a procedure to achieve the above objective for traffic control.

### **3.2 Car Parking System in Yangon**

YCDC and other government bodies are developing solutions to improve parking conditions, such as introducing smart parking systems and expanding parking infrastructure.

This likely means that parking solutions are part of broader urban planning and traffic management initiatives for Yangon residents. Finding a parking space near densely populated and significant commercial areas can be challenging, necessitating innovative solutions such as multi-story parking structures or designated parking zones.

The residents and vehicle owners in Yangon are concerned about the current infrastructure; private parking lots or street parking may need to be relied upon until more comprehensive solutions are implemented. Yangon is modernizing its urban infrastructure, and with efforts to reduce traffic congestion and improve parking availability in the city, more attention may be paid to residential parking needs.

Yangon's Central Business Area (CBA) is densely populated, and it faces significant parking challenges due to heavy traffic and limited parking spaces. YCDC and other relevant authorities have recognized these challenges and are taking steps to address them, especially the excess demand for parking spaces, which results in traffic congestion.

Yangon, Myanmar's once bustling capital city, is facing rapid urbanization due to increasing car ownership. This rapid growth has led to severe traffic congestion, particularly in the CBA, making parking a significant challenge for city residents and visitors. Recognizing these challenges, the YCDC and other stakeholders have started implementing intelligent parking initiatives to reduce parking difficulties and improve city traffic flow. These initiatives' nature, implementation, expected outcomes, and

broader implications for Yangon's urban mobility. To address these challenges, YCDC has led the adoption of smart parking technologies. Smart parking allows drivers to quickly find parking spaces; it refers to using technology to reduce traffic congestion and better use existing parking infrastructure. These systems typically include parking availability and digital signage, a combination of real-time data collection about mobile applications, and automated payment systems to provide drivers with easier and more efficient parking.

There are several key strategies involved in implementing smart parking initiatives in Yangon. Sensors and cameras are installed in parking lots to monitor the availability of spaces. This information is distributed to drivers in real-time via digital signage around the city and mobile applications so they can search for available parking without needing to. Traditional parking payment methods are being replaced by cashless transaction systems that can be completed through mobile apps or digital kiosks. This provides convenience for drivers, reduces opportunities for corruption, and increases revenue transparency for parking management. To manage parking demand in high-traffic areas, dynamic pricing models are being explored. Prices vary by time of day; prices may vary depending on the day of the week or current parking demand, encouraging drivers to park in busy areas or at peak times. Recognizing the amount of investment required for such technology-driven solutions, YCDC submitted a tender to 18 private companies specializing in smart parking solutions; among the applicants being China, 4 companies from Israel and Singapore are interested in joint ventures with local companies. These partnerships aim to improve private sector expertise and capacity while meeting public objectives for traffic management and urban mobility.

The main goal of these smart parking initiatives is to ease traffic congestion in Yangon CBA through more efficient and time-saving parking. The system aims to reduce traffic congestion and congestion by providing real-time information on parking availability. Automated payment systems are expected to streamline the parking process and reduce delays and potential conflicts over payment.

In addition, Incentive pricing models encourage rational use of parking resources. This is expected to eliminate spaces in high-demand areas and reduce the need for new parking infrastructure. This approach is consistent with broader

sustainable urban mobility goals, such as reducing carbon emissions from parked vehicles or cruising for parking.

Smart parking initiatives in Yangon are part of a larger vision to improve mobility in the city. By addressing the most visible and critical issues of parking and traffic, these initiatives lay the foundation for broader changes in how residents and visitors live in the city.

In the long run, the successful implementation of smart parking will lead to wider public transport improvements, pedestrian-friendly urban planning, and the adoption of other modes of transportation, such as cycling. It also underscores the importance of technology integration in urban management and serves as a model for other cities and regions in Myanmar facing similar challenges.

Yangon's smart parking initiatives represent an important new step in solving the city's traffic and parking challenges. By leveraging technology, these initiatives improve parking efficiency and promise to contribute to the broader goals of sustainable urban mobility. Especially infrastructure investment; Road upgrades and road widening have provided on-street parking and eased traffic congestion. Public acceptance and challenges remain, but early adoption of smart parking technologies has positioned Yangon as a leader in urban innovation in Southeast Asia. As these initiatives evolve, they are flexible in meeting the needs of fast-growing cities. The importance of responsive governance provides valuable lessons on technology integration in urban planning.

### **3.3 Car Parking Fees and Management in Yangon**

Car parking management in Yangon, Myanmar's largest city and commercial hub, has become a critical issue due to rapid urbanization, the dramatic increase in car ownership, and the emergence of traffic congestion on the roads. YCDC to regulate parking, several measures aimed at reducing traffic congestion and improving urban mobility have been initiated.

Historically, Yangon's urban infrastructure, including its parking systems, was not designed to accommodate the dramatic increase in vehicles. The city's streets, which retain their colonial appearance, are quickly filling up with cars, causing chronic traffic jams and a dire shortage of parking spaces. This situation is exacerbated



by the lack of comprehensive parking management policies and informal earmarking of public spaces for private parking, resulting in inefficient use of available spaces and frequent traffic jams.

One of YCDC's key strategies to address the issue is the introduction and adjustment of parking fees in the city. The move aims to prevent long parking in congested areas, increase parking turnover, and reduce the tendency of drivers to use their cars for short trips within the city. By implementing a tiered pricing structure based on location and time, authorities sought to manage demand more efficiently, encouraging motorists to consider alternative modes of transportation or park in less congested areas.

To modernize the parking collection process and reduce opportunities for corruption, Yangon has started implementing automatic payment systems. These include electronic payment methods and smart parking technologies that enable real-time tracking of parking space availability and digital payment options. Such systems not only streamline the parking process but also provide valuable information that can be used to further refine parking management strategies.

Despite these efforts, many challenges are encountered in the implementation of parking fee collection and management of parking spaces in Yangon. Among them are limited land for parking lot development, a Lack of history of investment in public transport alternatives, and a cultural preference for private vehicle ownership. In addition, enforcement of parking regulations and charging have been hampered by inconsistencies in policy application and public opposition to the enforcement of parking restrictions.

Car parking fees and the move towards smarter parking management systems are already showing promise in solving Yangon's traffic congestion. By making parking in high-demand areas less convenient and more expensive, these measures discourage citizens from walking; we encourage you to consider other options, such as cycling or using public transport for short trips. This move is gradual but contributes to the broader goal of improving urban mobility and reducing the environmental impact of traffic congestion.

Recognizing the scale of the challenge, YCDC sought partnerships with private companies specializing in smart parking and traffic management solutions.

These partnerships aim to harness private sector innovation and efficiency in solving public challenges. Through these partnerships, Yangon hopes to accelerate technology-driven solutions for parking and congestion management that will become a model for other cities in Myanmar and the region.

Yangon's parking fees and management strategies will continue to evolve to respond to Yangon's changing needs. Potential future directions include expanding the smart parking initiative to cover more areas of the city; this includes further refining the pricing model to better manage demand and integrating parking management with comprehensive transportation planning efforts. The ultimate goal is to reduce reliance on private vehicles and balance, to create a multi-purpose transportation system, and to improve the life ability of Myanmar's largest city.

In addition, to green spaces; there is growing recognition of the need for comprehensive urban planning that includes pedestrian-friendly spaces and efficient public transportation networks. As part of this vision, parking management will shape the development of the city. It will play an important role in promoting sustainable urban patterns and improving the quality of life for all Yangon residents.

In Yangon, parking collection and management represent an important part of the city's efforts to address traffic congestion and improve urban mobility. Although challenges remain, the strategic implementation of these measures provides a way forward with smart parking techniques and collaborative approaches with the private sector. By continuously adapting these strategies, Yangon can be expected to set a model for other fast-growing cities in the region and beyond to achieve a more sustainable and efficient urban environment.

### **3.4 Development of Car Parking Spaces in Yangon**

The development of parking stations in Yangon, the business capital of Myanmar, is a fast-paced urban challenge. A growing population and increased traffic on the roads have become major concerns. Yangon's comprehensive approach to the development of parking spaces, the difficulties encountered in this journey, and the potential to create a more orderly and efficient urban environment through better parking infrastructure.

Rich in colonial heritage and the center of Myanmar's economy, Yangon has experienced unprecedented growth over the past decade. The easing of vehicle import restrictions in 2011 has exacerbated parking shortages and traffic congestion, along with the incompleteness of the city's historic urban planning. The city's existing infrastructure is ill-equipped for sudden increases in vehicles, leading to chaotic parking situations and frequent co-opting of roads and sidewalks as temporary parking spaces. Recognizing the urgent need for a solution, the YCDC and other relevant authorities have put in place strategic plans aimed at developing parking spaces to ease Yangon's traffic congestion. These initiatives include the introduction of smart parking systems; this includes building multi-story car parks and finding public-private partnerships to finance and manage these developments.

The cornerstone of Yangon's approach is the implementation of smart parking systems designed to optimize the use of available spaces. These systems utilize technology to provide real-time information on parking availability, reducing the time drivers spend searching for parking and improving traffic flow. The introduction of such systems represents a significant step forward in using technology to solve urban challenges.

Another key to the strategy is the construction of multi-story parking lots in densely populated areas and business districts where parking demand is highest. These buildings not only increase the amount of parking but also free up street space, contributing to a safer and more walkable urban environment.

Since the development of parking lots requires substantial investment, YCDC actively seeks to work with private entrepreneurs. These partnerships aim to leverage private capital and expertise in parking infrastructure construction and management to accelerate the pace of development and introduce efficiency and innovation into the process.

Despite these efforts, the development of car parks in Yangon is facing many challenges. Limited availability of land, especially in urban areas, is a significant barrier, as are land acquisition and high construction costs. In addition, regulatory barriers and bureaucratic inefficiencies can hinder project approval and implementation. Development efforts can be further complicated by residents' objections to the potential impact of new construction on their neighborhoods.

The development of adequate parking spaces has a profound impact on urban mobility and urban life as a whole. By reducing the need for on-street parking, these facilities help ease traffic congestion. It can help improve traffic flow and improve road safety. Additionally, by encouraging the use of parking, the city can restore streets and sidewalks for pedestrians, promoting a more livable and sustainable urban environment.

In the future, Yangon's parking development strategy will need to continue to evolve to meet the needs of the growing population and traffic. This includes adopting innovative solutions such as automated parking systems that can further increase parking efficiency. To encourage the use of mass transport, the integration of public transport hubs and parking facilities is required.

Additionally, as the city continues to grow, there will be a need for a more comprehensive approach to urban planning that incorporates parking management into comprehensive transportation and land use plans. This could include the development of comprehensive policies to manage parking demand, such as implementing maximum parking spaces for new developments and promoting alternative modes of transport.

The development of parking facilities in Yangon is a key element in the city's efforts to address traffic congestion and parking challenges. Strategic implementation of smart parking systems: By building multi-story parking lots and promoting public-private partnerships, Yangon City is taking significant steps to improve urban mobility and the quality of urban life. However, continued innovation, investment, and integrated urban planning are essential to fully address the parking needs of a rapidly growing city and ensure a sustainable and efficient urban future.

Once known as Rangoon, booming Yangon stands as a testament to Myanmar's rapid urban and economic expansion. Among the backgrounds of this development, the city faces an important urban planning challenge in developing adequate parking spaces. It is a comprehensive approach adopted to increase Yangon's parking infrastructure. It will explore the challenges faced and potential avenues to promote a more systematic and efficient urban environment.

Intermingled with colonial heritage and contemporary hustle and bustle, Yangon's streets have seen a sharp rise in car ownership since import policies were

eased in the early 2010s. While this influx symbolizes economic dynamism, it also creates a severe parking shortage and exacerbates the city's congestion. Yangon's existing infrastructure, which has been under-improved since colonial times, has proven inadequate for growing demand, leading to creative solutions where parking lots dominate streets and sidewalks.

Recognizing the urgency of the situation, the YCDC along with other stakeholders, has launched a strategic campaign to improve Yangon's parking infrastructure. This campaign includes the deployment of smart parking systems, including the construction of multi-level parking structures, and the exploration of PPPs to facilitate these developments.

At the forefront of Yangon's strategy is the implementation of smart parking technologies. These innovations are designed to maximize the efficiency of parking space use through real-time availability monitoring. Therefore, the time spent by drivers in searching for parking is reduced. This initiative represents a significant leap toward the integration of technology into urban management practices.

Construction of multi-level parking structures has been prioritized to address the shortage of parking in densely populated and commercial areas. These facilities not only bolster the city's parking capacity but also free up street space and contribute to safer, more pedestrian environments.

The substantial financial outlay required for the development of parking infrastructure necessitates the pursuit of PPPs. These partnerships include private sector capital and the design of parking facilities. By bringing together construction and operational expertise, we aim to accelerate development and introduce efficiency and innovation in the urban fabric.

The development of car parks in Yangon is full of challenges. The scarcity of land, especially in the city center, is a major obstacle, combined with the prohibitive costs associated with land acquisition and construction. Regulatory hurdles and bureaucratic inaction often delay project approval and implementation, and local opposition due to concerns over the potential impact of new construction on communities adds another layer of complexity.

Increased parking significantly influences urban mobility and the urban experience. By reducing reliance on on-street parking, these initiatives will ease

traffic congestion; it promises to improve traffic flow and improve road safety. In addition, strategically relocating parking to designated buildings realigns streets and sidewalks for pedestrians and promotes a more vibrant and sustainable urban neighborhood.

As Yangon evolves, the parking development strategy needs to adapt to meet the needs of the city. Innovative solutions such as automated parking systems improve parking efficiency. In addition, integrating public transport hubs and parking can be aligned with broader sustainable urban mobility goals and encourage mass transit use.

A holistic urban planning approach combining parking management with comprehensive transport and land use strategies is essential. New developments include comprehensive policies to reform parking requirements, including the organization of maximum parking and the promotion of alternative modes of transportation.

Efforts to reform Yangon's parking infrastructure are an important part of the urban development narrative. Strategic implementation of smart parking systems: Through the construction of multi-story parking structures and the cultivation of PPPs, the city is trying to alleviate its traffic and parking woes. However, on the way forward, innovation, Substantial investment, and the rapidly expanding parking needs of a rapidly expanding metropolis require cohesive urban planning to ensure a sustainable and efficient future for all residents.

### **3.5 Challenges of Car Parking System and Future Directions in Yangon**

Yangon, Myanmar's economic hub is at an important transition in its urban development trajectory. The city is experiencing rapid population growth; struggling with increasing car use and infrastructure constraints, it faces many challenges that require innovative solutions and strategic vision. It explores the key challenges facing Yangon today and potential future directions for the city's sustainable and inclusive growth.

One of Yangon's most pressing problems is severe urban congestion, which affects daily life and business activities. The city's road network, largely unchanged since colonial times, is ill-equipped to handle the current traffic congestion.

Inadequate public transport systems exacerbate this congestion and lead to an over-reliance on private vehicles.

Yangon needs to invest in a comprehensive public transportation system to ease traffic congestion. Expansion of Yangon Bus Service (YBS); these include the development of mass transit lines and the introduction of bike-sharing schemes. Allowances: Encouraging the use of- public transport through better service quality and integrated ticketing systems can significantly reduce the number of private vehicles on the roads.

Rapid urbanization has resulted in significant urban sprawl, often with little new development in infrastructure and services. Rising costs of living in the inner city have pushed lower- and middle-income families to the suburbs, exacerbating socio-economic disparities.

Affordable housing projects strategically located near employment centers and accessible to essential services are important. Implementing zoning laws that encourage mixed-use development can also help reduce the need for long-distance commutes, making the city more livable and environmentally sustainable.

### **3.5.1 Street Parking and Illegal Parking**

On-street parking and illegal parking have become significant problems in Yangon, Myanmar's largest city and economic hub, reflecting broader challenges of urban development and management. The rapid increase in car ownership combined with insufficient public transport options and limited urban planning has left Yangon's streets often congested and chaotic, with cars parked unruly on the side of the road. This situation not only worsens the traffic congestion but also hampers the safety of pedestrians and public transport.

Parking in Yangon is usually not only in designated areas but also in parking lots. The road system without parking space was implemented in early 2013 in 20 sections, mainly Pyay Road, Ba Yint Naung Road, Kannur Road, Baho Road, and Insein Road. A distance of 200 feet within the traffic light has been designated as a bus stop location. In some parts of the city, particularly in downtown areas and near major markets or business centers, there is insufficient street parking, forcing drivers to rely on street parking. Although this practice is essential for many people, it

significantly reduces road capacity and causes dangerous traffic jams on Yangon's roads.

Illegal parking has worsened Yangon's already congested traffic situation. Parking lots: Parking lots are often parked on sidewalks or driveways and even in front of entrances, mainly due to the scarcity of parking spaces. Not only does it create inconvenience for other road users, but Illegal parking can block routes for emergency vehicles and fire; response times for ambulance and police services may be delayed.

Vehicles parked on sidewalks push pedestrians into the road, increasing the risk of collisions. Buses and other public transport vehicles often struggle to navigate roads clogged with illegally parked cars, causing delays and inefficiencies in the public transport system.

YCDC and other relevant officials are making various efforts to solve the problem of street parking and illegal parking.

Efforts have been made to strengthen existing parking regulations, including towing and fines for illegally parked vehicles, implementing and adjusting parking fees in some areas to discourage long-term parking on the street.

YCDC is expanding parking spaces, including multi-story car parks, to provide alternatives to street parking. YCDC is implementing a four-story parking garage in South Okkalapa Township, which will have a storage facility for selling vehicles and low-cost parking spaces, but currently, there is limited parking space.

For Yangon to effectively address the challenges of on-street parking and illegal parking, a multi-pronged approach is needed, considering both infrastructure development and urban mobility strategies.

Strong Developing an efficient and affordable public transportation system can reduce reliance on private vehicles and reduce the demand for parking. Technology-driven solutions such as real-time parking availability apps and automated payment systems can improve the efficiency of parking management. Comprehensive urban planning and policy reforms that prioritize pedestrian-friendly spaces, Manage the growth of vehicle ownership, and promote sustainable urban mobility are critical to long-term solutions.



The problems of parking and illegal parking in Yangon show the challenges of urban management in the context of the city's rapid growth and development. Addressing these issues requires not only immediate actions but also a vision for sustainable urban development that balances the needs of all residents and users.

### **3.5.2 Car Parking and Charging System**

As part of efforts by the YCDC, parking facilities are being increased by introducing "smart" parking. After the installation of these smart parking lots, YCDC plans to resume parking fee collection in six townships in Yangon. They are currently evaluating bids from companies to build these facilities. Depending on the type of parking, the parking fee is 200 per hour. 300 500 kyat is set. The measures are aimed at clearing the roads of illegally parked vehicles and making traffic in the city smoother. Smart car parks are open during office hours from 8 am to 6 pm, and you can park for free at night and in the morning.

In addition, Yangon is providing electric (EV) owners with EV charging stations. The charging stations are part of a growing infrastructure to support the adoption of electric vehicles in the city. Public chargers can be used at charging stations (levels 1-2, up to 50 kW); they come in a variety of varieties, including fast power chargers (level 3) and private areas without public charging. The availability of these stations aims to make Yangon more sustainable by encouraging the use of electric vehicles, which will make Yangon more sustainable and eco-friendly.

Yangon, Myanmar's largest city and commercial capital, is experiencing a transformation in its approach to urban mobility and environmental sustainability. The city's efforts to modernize parking lots and adopt (EVs) have helped tackle traffic congestion. It is a significant factor in reducing carbon emissions and promoting cleaner transportation alternatives.

In response to growing car ownership and congestion in downtown Yangon, the YCDC has started to modernize parking spaces by introducing "smart car parks". These smart parking lots are designed to optimize the use of parking space. It aims to improve traffic flow and reduce the time drivers spend searching for parking. By using technology such as automated ticketing and payment systems, as well as real-

time space availability indicators, smart parking will increase the efficiency and convenience of urban parking in Yangon.

YCDC announced the restoration to regulate more parking and manage urban congestion. There are six townships in the city such as Latha, Pabedan, Kyauktadar, Lanmadaw, Bothataung, and Pazundaung. There will be an increase in parking fees in Botahtaung and Pazundaung. Needed to tackle traffic congestion and raise municipal revenue, the move is a marked policy shift from previous years when parking charges were suspended due to implementation challenges and public opposition. 200 Kyats per hour, depending on the type of parking; 300 Kyats is planned to charge 500 kyats, and the fee is set according to the layer. This structuring approach aims to balance the practicalities of parking demand and supply in densely populated urban areas with the need to generate revenue.

Along with the modernization of parking facilities, Yangon is seeing the emergence of infrastructure to support electric vehicles, a key part of the city's strategy to reduce environmental impact and promote sustainable transportation. The introduction of EV charging stations is a pioneering initiative that recognizes the global shift towards electric mobility and the need to reduce dependence on fossil fuels. As more charging stations become available, Yangon is positioning itself as a city that offers environmentally friendly transportation options that are consistent with its commitment to combating climate change.

Efforts to modernize parking lots and promote electric vehicles in Yangon are laudable but not without challenges. Successful implementation of smart parking and widespread use of EVs requires technology, significant investment in infrastructure, and public awareness is required. In addition, exploring the complexities of urban planning, addressing the concerns of residents and businesses, and ensuring the affordability and accessibility of these services are critical to their success.

However, these challenges are not the same as innovation in sustainable urban mobility. It presents opportunities for Collaboration and leadership. Learning from the experiences of other cities, connecting with stakeholders, by prioritizing transparency and inclusiveness, Yangon can overcome barriers and become more organized; it will realize its vision for an efficient and environmentally friendly transportation system.

As Yangon evolves, the city's approach to parking management and the promotion of electric vehicles will play a key role in shaping the urban landscape. The introduction of smart parking and initiatives to develop EV charging infrastructure are steps in the right direction, reflecting a commitment to address the immediate challenges of traffic congestion and environmental sustainability. By continuing to invest in these areas, Yangon can improve the quality of life of its residents, reduce its carbon footprint, and become a model for Myanmar and other cities.

In conclusion, Yangon's transformation of parking lots and acceptance of electric cars will modernize urban infrastructure. It is indicative of the city's broader efforts to improve traffic management and promote sustainable transportation solutions. Although ambitious, these initiatives underscore Yangon's commitment to creating a more livable and environmentally friendly city for future generations. The continued support of all stakeholders as these programs are implemented, Collaboration, and inclusion will be essential to their success and to the realization of Yangon's vision for a greener and more efficient urban environment.

### **3.5.3 Tackling Car Parking Problems and Traffic Congestion**

The traffic congestion problem in Yangon, Myanmar's largest city and business center, causes significant traffic congestion and affects the mobility and livability of the entire city. An effective management plan to address parking issues requires a strategic, strategic plan that meets a city's unique challenges and opportunities, even a multifaceted approach.

In 2010, the government implemented reforms to improve social life, including trade policies and vehicle permits. Disadvantages are insufficient parking space; and indirect costs such as traffic and air pollution in the transport sector; Relevant departments should cooperate to solve these problems. Parking management refers to the important policies and management plan.

In 1990, the YCDC was formed to carry out development activities in Yangon. Enacting terms and conditions for parking and slow vehicles; Policy" means YCDC's policies; One of the implementation duties and responsibilities. Transportation is under the responsibility of the Road Transport Directorate under the Ministry of Transport, and law enforcement is the responsibility of the traffic police under the

Ministry of Interior. The above departments are the main management areas for traffic flow and parking management.

Under the control of the Yangon Region Government, YCDC has been trying to implement a smart parking system in six townships in the city since 2018. It is intended to reduce traffic congestion and ensure orderly and safe parking. The six townships are Pabetan, Latha, Kyauktada, Lanmadaw, Pazuntaung and Botataung. The parking system should be very smart, which requires high-tech smart devices, and the parking fee will be used electronically instead of manually collecting various fees based on time and location.

There is an upcoming plan to reduce parking fees by charging parking fees in downtown Yangon. Currently, there are parking stations such as Bo Aung Kyaw Road, Merchant Street, Kannar Road although they have been parked in parking lots such as Lanmadaw Road and General Aung San Road, it is reported that vehicles are currently not allowed to park freely. After the implementation of the smart parking system, parking fees will be collected between (08:00)am and (18:00)pm hours.

YCDC is now upgrading the lane system and traffic lights to reduce traffic congestion. Street signs and parking signs are visible not only in the city but also in other townships. Inform drivers and road users of parking signs with specific directions, such as no parking signs, and right-side parking only signs.

According to the YCDC instructions, the construction of high-rise buildings is also carried out according to the regulations for parking.

- ❖ If a building with 4 floors and above is constructed on a plot of land (50 feet x 50 feet), the ground floor must include parking.
- ❖ If the Design Build (DB) building is constructed on a plot of 115 feet x 50 feet and above, parking shall be included.
- ❖ Parking area shall be 18 feet x 16 feet.
- ❖ Ramp slope -9 degrees (1:6.25)

If the building has a mechanical parking lot and a car lift, there must be a specification and queuing space.

**Table (3.4) Minimum Required Parking Area for High Raise Buildings**

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

*Source: YCDC Building Rule and Regulation*

The YCDC has parking regulations for various construction situations, which can be seen in Table 3.4, but the current situation requires enforcement and regulation.

In the transport sector, they are also making efforts to reduce traffic congestion and upgrade the public transport sector to reduce the problem of parking. In 2017, the new regional government replaced the YBS with Mahtatha from the old service. To upgrade the public transportation system under the YRTA and reduce the number of vehicles. It is reported that long-term plans have been established to significantly reduce road congestion and related problems. They are upgrading the payment system of the bus to a card system to make the buses better for passengers. It recognizes its start and end point at Thakinmya Park, near the city center, to avoid traffic congestion by not allowing buses into city areas. Three bus lines are running on the main roads in the city. Today, YRTA operates 102 bus lines in the Yangon region. If fares and bus service continue to be upgraded, commuters will shift to public transport.

Yangon has traffic control police stations with more than 4,000 policemen. Police are present almost daily at major traffic lights, most of them working in mobile teams on busy roads. According to their duty, they have to supervise traffic rules and regulations. But to be efficient, it is necessary to upgrade the good systems, which are online electronic systems instead of paper systems.

Many housing projects in the Yangon region are being implemented by the government in cooperation with private companies to raise the standard of living of the people. There are various types of middle-income and low-cost housing and condominiums under private and public planning and implementation. Condominium housing projects include designated parking spaces for 2 units per unit, but mid-range and low-cost housing projects do not have designated parking spaces.

YCDC operates bus stops to facilitate the movement of vehicles by the Yangon Region Transportation Supervision and Control Committee. Upgrading roads, responsible for road marking signs and street painting works. The objective of the government's motor vehicle policy is to increase the use of motor vehicles at affordable prices in various sectors. In this policy, the vehicle penetration quota and expected Unit in Operation (UIO) during a given period are shown in Table 3.5.

**Table (3.5) Vehicle Penetration Ration Upcoming Years**

<b>Step</b>	<b>Target Period</b>	<b>Vehicle Penetration Ratio</b>	<b>UIO (Unit)</b>	<b>Brand-new car sale/year (Unit)</b>
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)*

The YCDC has considered several measures to improve parking and traffic congestion, including developing multi-use car parks. Regulations require car buyers to issue parking endorsement letters from the council, and Yangon has been banned

from issuing car importation plates. If part of the parking problem is the parking policy and building permit, other aspects such as inter-departmental collaboration should be considered. However, illegal parking adds to the traffic congestion in the city.

The city recently started using a traffic clearing system. Repairing outdated traffic control points, the traffic congestion problems were solved prudently by upgrading. Installing an automated system at all traffic stops is estimated to cost US\$ 40 million. This can alleviate the traffic problem to some extent.

Additional vehicle use will cause traffic congestion; Deterioration in traffic safety and lack of effective action will devastate day-to-day business operations.

To eliminate Yangon's traffic congestion, the following points should be considered.

1. Using smart technologies.
2. Upgrading infrastructure and roads.
3. Setting up car import policy and parking regulations.
4. Providing awareness about parking regulations.
5. Coordination of urban land use and transportation sectors.
6. Adaptation of sustainable parking management strategies.

In summary, regulatory reforms to address Yangon's parking problems and impact on traffic congestion, infrastructure development, technology integration, and a comprehensive management plan that combines public cooperation and sustainable urban planning are needed. By adopting this multi-pronged approach, Yangon can significantly improve its urban mobility, improve the quality of life for its residents, and move towards a more sustainable and efficient urban future.

## CHAPTER IV

### SURVEY ANALYSIS

#### 4.1 Profile of Survey Area

During the caretaker government in 1958, Yangon's slums, such as Kapali Ward and Sinmin Ward, were abolished, and South Okkalapa became a new township. South Okkalapa Township began to emerge after the systematic identification and placement of Thakata New Town. There are 13 wards in South Okkalapa Township from No (3) to No (15). No (1) and No (2) Wards were included in the boundaries of North Okkalapa Township, dividing South Okkalapa Township and North Okkalapa Township. In counting the wards of South Okkalapa Township, it was called starting from Ward No (3). South Okkalapa Township is a beautiful township built in a rectangular shape. In addition, South Okkalapa Township emerged as a focal point within the boundaries of Yangon, and new towns emerged. Thingangyun District, including Thingangyun, South Okkalapa, Tamwe, and Yankin townships, are included.

South Okkalapa Township is located in the eastern part of the Yangon Region, between 16 degrees and 18 degrees' north latitude and 96 degrees and 98 degrees' east longitude. The area of South Okkalapa Township is 3.93 square miles.

North Dagon is east of South Okkalapa Township, and to the west is Yankin Township. Thingangyun Township is located in the south, and Mayangone Township is located in the north. South Okkalapa Township is a flat plain.

In South Okkalapa Township, Ngamoeyeik Creek and Kyaikkasan Creek flow south to north. South Okkalapa Township is located at an average height above sea level (30 feet).

There are Inno City, City Mark, One Stop Mark, Nandawin Market, Padatha Market and Ruby Market of business center in South Okkalapa Township. There is Bandula Transport Company (Parami-Bus Terminal), which provides Yangon's main transportation services. In addition, there is a historical Okkalapa Pagoda, a women's and children's hospital. It is a township with 2 private hospitals and 32 private banks. Government High School 5 Nos, Secondary schools 8 Nos, primary schools 30 Nos, monastic schools 3 Nos, private high school 1 No, business companies 43 Nos,



municipal market 9 market, shopping centers 3 Nos. Above 180 feet, 3 bridges, and 120 feet of 1 wooden bridge in the township, there are 435 roads, and the length is 87.8 miles. As for public transportation, there are Bautto Station and Parami Station, and as a bus line, there are YBS vehicles from Parami terminal to other townships.

There is an industrial zone in South Okkalapa Township. However, there are no large factories because the industrial district that existed when the city was founded has been converted into an industrial zone. There are only medium and small factories. Only KORACE garment factory is a large factory in the (14) Ward. The garment factory and medium support the people in the township to get employment from small factories. People who live in the township are mostly government employees. Company employees trading and restaurant businesses. According to the General Administration Department's 2022-2023 fiscal year (project) calculation, the average production and service value (Per Capita GDP) of each person is estimated at an average of (3,921,533 Kyats) per year. It is a township with a good economy and high standard of living, and the markets are crowded with traders every day.

**Table (4.1) Demographic Characteristics of South Okkalapa Township**

		<b>Total</b>	<b>(%)</b>
Number of Households		23798	
Number of Family Households		32026	
Gender	Male	74582	47.3
	Female	83220	52.7
<b>Total Population</b>	<b>Total</b>	<b>157802</b>	<b>100</b>

*Source: General Administration Department of South Okkalapa Township (2023)*

According to Table (4.1), there are 23,798 houses in South Okkalapa Township. There are 32,026 households and a total population of 157,802. The total population is 74,582 males and 83,220 females. Therefore, the number of women is more than the number of men in South Okkalapa Township.

A densely populated neighborhood connected with the main roads of South Okkalapa Township; Parami Road, Tantumar Road, Waizayandar Road, and Metta Road. The primary data were collected from 200 households living at a rate of 40 households per ward.

In Ward No. 4, there is mainly Bandula Transport (Parami Car-Terminal) and the bustling Nandawin market and Padamyar market. It is a densely populated neighborhood, with 1 secondary school, 3 primary schools. A total of 3,921 families live in 2,403 houses and the population is 16,021.

In Ward No. 5 mainly includes 1 high school and 4 famous monasteries. 3,439 families are living in 2,170 houses and a population of 16,129 people.

In Ward No. 7 also has 1 high school, including 1 secondary school, 3 primary school temples, gas stations and religious buildings. It was found that 3,599 married households and a total population of 18,352 people live in 2,904 houses.

In Ward No. 10 is located in the most central part of South Okkalapa Township. City police station, National Stadium Park, Heymawan Market, Women's and Children's Hospital, 1 middle school and 3 elementary schools. In the house 2,379, it was found that there are 2,743 households and a population of 13,024.

In Ward No. 14 is located at the Okkalapa Pagoda. Dagon Myotthit(North) Township is connected to Thitsar Road Bridge and is bordered by ThingGanGyun Township in the east, with 3,044 houses. It is a densely populated neighborhood with 3,754 households and 19,389 people.

**Table (4.2), Demographics Characteristics in the Five Wards to be Surveyed**

		<b>Ward-4</b>	<b>Ward-5</b>	<b>Ward-7</b>	<b>Ward-10</b>	<b>Ward-14</b>
Number of Households		2,403	2,170	2,904	2,379	3,044
Number of Family Households		3,921	3,439	3,599	2,743	3,754
Gender	Male	7,528	7,627	8,768	6,309	8,988
	Female	8,493	8,502	9,584	6,715	10,401
<b>Total Population</b>	<b>Total</b>	<b>16,021</b>	<b>16,129</b>	<b>18,352</b>	<b>13,024</b>	<b>19,389</b>

*Source: General Administration Department of South Okkalapa Township (2023)*

It can be seen that there are more women than men in all five wards to be surveyed.

## **4.2 Survey Design**

The survey was conducted from March 2024 to the end of May 2024 in Ward Nos. 4, 5, 7, 10, and 14 and was mainly collected from South Okkalapa Township. There are 13 wards in South Okkalapa Township, and five wards have been selected. These neighborhoods are located on the main road and related roads of South Okkalapa Township. On the main roads are shopping centers, restaurants, and a lot of beauty salons and shops selling goods. The streets in the neighborhood are densely populated, and there are parking spaces in front of some houses, causing parking difficulties. A total of 200 random samples were collected in the selected neighborhoods at a rate of 40 per ward. South Okkalapa Township is a suburban township of Yangon. Residential houses. Business centers, A mix of offices and modern buildings; It is surrounded by old apartments. According to the data (2023) of the General Administration Department, the poverty rate is only 16.19%, and it is a township where middle- and high-income families are comfortable and have a lot of vehicle ownership and vehicle use according to their living standards.

Due to the dense population and large number of vehicles, the management of parking space has also become a burden for South Okkalapa Township.

The survey questionnaires are structured in four parts. The first part (a) is to get the information of the respondents. The second part (b) is the housing ownership and living conditions of the respondents. The third part (c) is an analysis of the causes of the parking problem in South Okkalapa Township. The fourth part (d) is an analysis of respondents' opinions regarding potential ways to examine and propose sustainable parking solutions in South Okkalapa Township.

## **4.3 Survey Result**

This section discusses the findings based on the analysis of the detailed information obtained from the survey respondents in South Okkalapa Township. The survey results and findings for each part of the survey are shown in the tables below.

### **4.3.1 Characteristics of Respondents**

Out of a total of 200 respondents, which has a large number of households in South Okkalapa Township, Ward No. 4, 5, 7, 10 and 14 with each 40 respondents

from each ward this study provided some findings on urban parking management and potential ways to examine and propose sustainable parking solutions. Table (4.3) shows the characteristics of the respondents.

**Table (4.3) Information of Respondents**

<b>Characteristics</b>	<b>Number of Respondent</b>	<b>Percentage (%)</b>
<b><u>Age Group</u></b>		
- 20-40	67	33.5
- 40-60	109	54.5
- 60 Over	24	12
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Place (Ward)</u></b>		
- 4 Ward	40	20
- 5 Ward	40	20
- 7 Ward	40	20
- 10 Ward	40	20
- 14 Ward	40	20
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Gender</u></b>		
- Male	94	47
- Female	106	53
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Occupation</u></b>		
- Own Business	82	41
- Government Staff	49	24.5
- Private Staff	48	24
- Unemployed	4	2
- Retired	11	5.5
- Other	6	3
<b>Total</b>	<b>200</b>	<b>100</b>

<b>Characteristics</b>	<b>Number of Respondent</b>	<b>Percentage (%)</b>
<b><u>Educational Background</u></b>		
- Primary School	0	0
- Middle School	4	2
- High School	73	36.5
- Diploma	37	18.5
- Graduated	78	39
- Master/ Ph.D	8	4
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Marital Status</u></b>		
- Single	28	24
- Married	131	65.5
- Divorce	16	8
- Widow	25	12.5
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Household Size</u></b>		
- 1-3	56	28
- 3-6	96	48
- above 6	48	24
<b>Total</b>	<b>200</b>	<b>100</b>

*Source: Survey Data (2024)*

According to Table (4.3), there are 94 male respondents and 106 female respondents. Out of a total of 200 respondents, the 67 respondents (33.5 %) were in the age group of 20 to 40, the 109 respondents (54.5 %) were in the age group of 40 to 60, and the 24 respondents (12 %) were in the age group of 60 and above. It shows that most of the respondents are between 40-60 years old. This is because most of the car owners are the heads of the household and they spend their daily socio-economic lives working for the family. The lowest number of respondents were in the 60-year-old age group, and people of that age group were reluctant to drive, either for health reasons or not. Because it is usually avoided depending on age.

In South Okkalapa Township's parking situation survey, an average of 40 respondents were randomly selected from wards No(4, 5, 7, 10, 14), and 20 % of each ward was surveyed.

By marital status, the 28 respondents (14%) were single. The 131 respondents (65.5%) were married, the 16 respondents (8%) were divorced and the 25 respondents (12.5%) were widows/widowers. Therefore, most of the respondents of this survey are married, the second most were singles, and the least were divorced. Since married respondents are the most likely, it can be assumed that there is a relatively high probability of family members in an apartment.

In terms of education level, there were no respondents in the primary schools group, the 4 respondents (2 %) are secondary level, the 73 respondents (36.5%) are high school level and the 37 respondents (18.5%) are diploma level; the 78 respondents (39%) are the other degree and the 8 respondents (4%) are master's/doctorate group level. The educational level of the majority of the respondents in this survey is graduate and they belong to middle-class and upper class families.

The 82 respondents (41%) are self-employed, and the 49 respondents (24.5%) are government employees, the 48 respondents (24%) were private employees, the 4 respondents (2%) were unemployed and the 11 respondents (5.5%) were retired. The 6 other respondents (3%) are dependent. They are church employees. Among the respondents, the number of private employees was 48. The 49 respondents are government employees and the 82 are self-employed. Out of a total of 200 respondents, the 179 of them are people who travel to outside workplaces every day, and a small number of them are unemployed, retirees and other dependents.

Regarding the population in the household, the 56 households with 1 to 3 family members; the 96 family members (3 to 6), the 48 households with (6 or more) family members were registered, and the households with (3 to 6) and (6 or more) family members were the most, in terms of (72 %) and were the households with population components in the households, such as economy, there are many social issues and the use of vehicles. According to the survey collected, vehicle ownership is more than other family members.

### 4.3.2 Housing Ownership and Living Situation of the Respondents in South Okkalapa Township

There are many private houses, mini-condos, and high-rise condominiums in South Okkalapa Township. Most of the respondents have lived in South Okkalapa Township for 1 to 5 years, and there are only a few respondents who have lived for less than 1 year. According to the survey, more people are living in alleys than on the main roads in South Okkalapa Township. As a family income, there are many families with income above 500,000 kyats per month, and they usually use private vehicles and taxis for their businesses. It was found that they carry out social activities and other matters. Table (4.4) shows the housing ownership and living conditions of the respondents in the five wards.

**Table (4.4) Housing Ownership and Living Conditions of Respondents**

<b>Housing Ownership and Living Conditions</b>	<b>Number of Respondent</b>	<b>Percentage (%)</b>
<b><u>Housing Type</u></b>		
- Own House	39	19.5
- Own Apartment	98	49
- Rental Apartment	47	23.5
- Other	16	8
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Long Time Living</u></b>		
- Less than 1 year	41	20.5
- 1-5 year	103	51.5
- More than 5 year	56	28
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Road or Street</u></b>		
- On Main Road	64	32
- On Second Street	136	68
<b>Total</b>	<b>200</b>	<b>100</b>

<b>Housing Ownership and Living Conditions</b>	<b>Number of Respondent</b>	<b>Percentage (%)</b>
<b><u>Monthly Income</u></b>		
- Under 500,000 MMK	8	4
- 500,000 – 1,000,000 MMK	143	71.5
- Above 1,000,000 MMK	49	24.5
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Vehicle Used</u></b>		
- Private vehicle	139	69.5
- Taxi	21	10.5
- Bus	22	11
- Other	18	9
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Quality of Infrastructure</u></b>		
- Excellent	7	3.5
- Average	151	75.5
- Poor	42	21
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Local Transportation Facilities</u></b>		
- Satisfied	14	7
- Neutral	138	69
- Dissatisfied	48	24
<b>Total</b>	<b>200</b>	<b>100</b>

*Source: Survey Data (2024)*

Table (4.4) shows that the 39 respondents (19.5 %) are live in their own houses, the 98 respondents (49 %) are live in their apartments, the 47 respondents (23.5 %) are live in rented apartments, and the 16 respondents (8 %) are religious buildings/charities and staff housing. The number of 98 respondents living in their apartment, which was the highest in the survey area in apartments and the lowest in religious buildings/charities and staff housing. The minimum length of stay in the



township is 41 respondents (20.5%) of those who live less than (1) year, and most of them are between (1 and 5) years, the 103 respondents (51.5%) and the 56 respondents (28%) are who live for more than (5) years. The survey found that a total of (159) people (79.5%) have been living there for more than (1) year. Most of them live the 136 respondents (68%) in alleys, and the 64 respondents (32%) live on main roads. As a whole family one month income, only the 8 respondents (4%) have an income of less than 500,000 kyats, and there are 143 respondents (71.5%) family members with an income of 500,000 to 1000,000 kyats and the 49 respondents (24.5 %) families with a monthly income of over 10,000,000 kyats. It is considered from the survey that there are many family members of the respondents in South Okkalapa Township who have a decent income. As for daily vehicle use, the number of private vehicle users is the highest, reaching 139 people (69.5%). The least were others (bicycles, sidecars, railways, and pedestrians) at 18 respondents (9%). It was found that taxi users were 21 respondents (10.5%) and bus users 20 respondents (10%). The 7 people (3.5%) think that the quality of basic facilities (roads, sidewalks, public buildings) in the township is the best among the residents of the township. The survey found that 151 respondents (75.5%) said it was fair and 42 respondents (21%) said it was weak. The 14 respondents (7%) said they were satisfied with the state of satisfaction with local transportation (parks, shopping areas, schools, etc.) in South Okkalapa Township. The survey found that 138 respondents (69%) said it was a normal feeling and 48 respondents (24%) said they were not satisfied. Most of them were considered satisfied, while those who were not satisfied (24%) thought that it was because of parking difficulties and delays.

According to Table(4.4) , it seems results there is a problem with parking lots of cars as most of the households live in high-rise apartments.

#### **4.3.3 Cause of Car Parking Problem in South Okkalapa Township**

The following data are evaluated cause of car parking in South Okkalapa Township according to the collected survey results.

**Table (4.5) The Vehicle Ownership and Access to Car Parking of People Living in South Okkalapa Township**

<b>Cause of Car Parking Problem</b>	<b>Number of Respondent</b>	<b>Percentage (%)</b>
<b><u>Own Vehicles</u></b>		
- One	163	81.5
- Two	32	16
- Three or more	5	2.5
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Parking Types</u></b>		
- Private garage or driveway	28	14
- Shared parking facility	43	21.5
- Street Parking	125	62.5
- Other (-----)	4	2
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Parking Times</u></b>		
- Less than 1 hour	68	34
- 1-4 hours	98	49
- More than 4 hours	34	17
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Parking Places</u></b>		
- On-street	142	71
- Designated parking lots	34	17
- Private property	16	8
- Other (-----)	8	4
<b>Total</b>	<b>200</b>	<b>100</b>

*Source: Survey Data (2024)*

According to Table (4.5), there are 200 respondents for vehicle ownership regarding the occurrence of parking problems. A maximum of 163 respondents (81.5%) own only one vehicle; the 32 respondents (16%) are own (2) vehicles; the only 5 respondents (2.5%) are own more than 3 vehicles. Of the 200 respondents who

usually park their cars at home, the 125 respondents (62.5%) park their cars on the street. The 28 respondents (14%) have own garages. The 43 respondents (21.5%) are users of shared parking. At least, only 4 people (2%) use parking in other places of according to the survey. The 34 people (17%) are who parked their vehicle for more than 4 hours. The 68 respondents (34%) are who stopped for less than 1 hour and 98 respondents (49%) of those who stopped for the most (1 to 4 hours) responded. The regarding parking, the 16 respondents (8%) are used private parking. According to the survey, the 34 people (17%) used designated parking spaces, the 8 respondents (4%) used other parking spaces, and the 142 respondents (71%) used on- street parking.

The surveyed areas of five wards are connected to main roads, and usually, households have one vehicle according to business and property. It was found that they own one or more vehicles, and many people are living in the narrow courtyards and collective high-rise apartments in the neighborhood. It was found that they were also placed in shared parking lots. Respondents typically have shopping malls that conduct business during the day; As they have to go to schools and crowded places to do business, when they arrive at the workplace, most people park their vehicles within (1 to 4 hours) and there are many users of street parking. As YCDC is working on widening the main roads in South Okkalapa, parking on the main roads is convenient and it is found that it is difficult to park only during the morning market time before school/delivery time. Residents living on the streets in the neighborhood, if there are emergencies due to the narrowing of the road area and street encroachers, the fire truck, as it is not convenient for vehicles such as ambulances to enter, it has been verified that they usually park their vehicles on the side of the main road. The collective high-rise apartments, a large number of family members living in housing estates; Due to the large number of vehicles owned by families and the lack of parking space due to land constraints during the original construction, the vehicles are moved to the street and other convenient spaces.

According to the survey, it was found that most people want to park in designated parking areas, but due to space constraints, they have to park in roadside parking lots.

**Table (4.6) Perceptions Toward Cause of Car Parking Problem in South Okkalapa Township**

The opinions of the respondents residing in South Okkalapa Township are evaluated as follows.

**SDA= Strongly disagree = 1      DA = Disagree = 2      N = Neutral = 3**  
**A = Agree = 4                      SA = Strongly Agree = 5**

No	Description	Number of Respondents					Mean Score	STD Deviation
		SDA	DA	N	A	SA		
1	It's not easy to find parking in the frequent stops.	10 5%	42 21%	88 44%	26 13%	34 17%	3.16	1.17
2	I don't think the parking management situation in the township is good.	23 11%	28 14%	54 27%	55 28%	40 20%	3.31	1.31
3	I think the current parking regulations in the township are non-effective.	14 7%	28 14%	48 24%	20 10%	90 45%	3.72	1.36
4	There is ample parking at your residence.	26 13%	28 14%	68 34%	33 16%	45 23%	3.22	1.34
5	I see the parking situation as an important issue for parking in the township.	8 2%	20 10%	72 36%	74 37%	26 13%	3.45	0.92
6	The township needs more parking spaces.	2 1%	30 15%	82 41%	32 16%	54 27%	3.53	1.08
<b>Overall Mean Score and STD Deviation of Car Parking Problem</b>							<b>3.40</b>	<b>1.20</b>

Source: Survey Data (2024)

According to Table (4.6), in examining the cause of the parking problem in South Okkalapa Township, the ease of finding parking, parking management situation in the township, current parking regulations, are according to the opinions of the respondents about how important the parking space is for the township, in question number (3), the 90 respondents (45 %) strongly agree, and the highest score is (3.72),

and it can be said that the current parking rules in the township are ineffective. The score for the question "It is not easy to find parking in a place with frequent parking" is almost the lowest mean score (3.16).

The total mean score of six possible questions in solving parking problems is greater than (3). The current parking system in the township needs to be treated as an important issue and the current parking regulations need to be implemented effectively.

#### 4.3.4 Respondents' Opinions on Examining Sustainable Parking Solutions in South Okkalapa Township

The opinions of the respondents on examining sustainable parking solutions in South Okkalapa Township are evaluated as follows.

**Table (4.7) Respondents' Opinions on Potential Ways to Examine**

<b>Opinions on potential ways to examine</b>	<b>Number of Respondent</b>	<b>Percentage (%)</b>
<b><u>Current car parking conditons</u></b>		
- Severe	39	19.5
- Moderate	161	80.5
- Not a problem	-	-
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Believe most contribute to the parking problem</u></b>		
- Increase in number of cars	40	20
- Inadequate parking spaces	102	51
- Poor urban planning	-	-
- Insufficient public transportation	56	28
- Other (-----)	2	1
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Prefer of Parking solutions</u></b>		
- Multi-level parking structures	102	51
- Expanded street parking	34	17
- Improved public transportation	62	31
- Other (-----)	2	1
<b>Total</b>	<b>200</b>	<b>100</b>

<b>Opinions on potential ways to examine</b>	<b>Number of Respondent</b>	<b>Percentage (%)</b>
<b><u>Solve car parking problem in Urban</u></b>		
- Better public transportation	19	9.5
- More parking areas	124	62
- Stricter regulations	56	28
- Other (-----)	1	0.5
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Reduced of Car parking Problems</u></b>		
- Effective	114	57
- Somewhat effective	84	42
- Not effective	2	1
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Green areas to parking spaces change</u></b>		
- Yes	141	70.5
- No	4	2
- Maybe	55	27.5
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Use of Technology</u></b>		
- Yes	155	77.5
- No	31	15.5
- Maybe	14	7
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Security fee for parking</u></b>		
- Yes	171	85.5
- No	5	2.5
- Depends on the price	24	12
<b>Total</b>	<b>200</b>	<b>100</b>

<b>Opinions on potential ways to examine</b>	<b>Number of Respondent</b>	<b>Percentage (%)</b>
<b><u>Reduced By Collective Car Rental</u></b>		
- Yes	145	72.5
- No	27	13.5
- Maybe	28	14
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Alternative use of Bicycles</u></b>		
- Yes	161	80.5
- No	3	1.5
- Maybe	36	18
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Municipal Laws support punishments</u></b>		
- Yes	192	96
- No	8	4
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Government prioritize funding</u></b>		
- Yes	166	83
- No	12	6
- Depends on the situation budget	22	11
<b>Total</b>	<b>200</b>	<b>100</b>
<b><u>Need better public awareness campaigns</u></b>		
- Yes	179	89.5
- No	21	10.5
<b>Total</b>	<b>200</b>	<b>100</b>

Source: Survey Data (2024)

The 39 respondents (19.5%) out of 200 respondents said that the township's current parking problem condition is severe to examine sustainable parking solutions

in South Okkalapa Township. The 161 respondents (80.5%) said that the situation was moderate and no respondents said that there was no problem at all. The 40 respondents (20%) answered about the factors that cause the most problems of parking because of the increase in the number of cars. The 102 respondents (51%) due to insufficient parking space, the 56 respondents (28 %) and 2 respondents (1 %) said that it was due to insufficient public transport, and none said that it was due to poor urban planning.

From parking solutions, 200 respondents answered what type of parking solution they liked, and among them, the 102 respondents (51 %) liked multi-level parking structures, the 34 respondents (17%) liked the road extension parking lot. According to the survey there are 62 respondents (31%) people who like good public transportation and other 2 respondents (1%). The 19 respondents (9.5%) said that it is better to take a bus as an opinion in solving the urban planning parking problem. The 124 respondents (62%) said that more parking spaces are needed and the 56 respondents (28%) wanted strict regulations and only 1 respondent (0.5%) wanted to solve the problem in another way. When asked about the effectiveness of the fact that building more parking spaces can reduce the parking problem, the 114 people (57%) responded that it is effective. The 84 respondents (42 %) answered that it was fairly effective and 2 people (1 %) answered that it was probably effective. The 141 respondents (70.5%) answered that they think that if the green land in the township is used as a parking lot, it will alleviate the problem. The 4 respondents (2%) answered that they don't think so. The remaining 55 respondents (27.5%) gave the opinion that maybe.

The 77.5% of 200 respondents think that modern digital technology should be used to solve the parking problem. Other 31 respondents (15.5%) do not think so and the 14 respondents (7%) expressed their uncertainty about reducing by collective car rental. The 171 respondents (85.5 %) think that they are responsible for the security of the parking lot and the security fee for parking should not be collected. The 5 respondents (2.5 %) do not think that they should be responsible for the fees. There are 24 respondents (12%) who want to act depending on the monetary rate collection.

The 145 of 200 respondents (72.5 %) said that sharing taxi services such as buses would reduce the parking problem. The 27 respondents (13.5%) said it was



unexpected and the remaining 28 respondents (14%) said it was possible. The 161 respondents (80.5%) answered that they thought they would promote the use of bicycles as a convenient solution for people's transportation. The 3 respondents (1.5%) said they should not, while 36 respondents (18%) said they could. In order to solve the problem of parking, The 192 respondents (96%) of the respondents who asked whether parking should be strictly prohibited by municipal law answered that there should be a penalty under the law, and the 8 respondents (4 %) answered that it should not be given.

The 166 respondents (83%) think that the local government should prioritize the funding of the parking problem over other projects. There are 12 respondents (6%) said that it should not be carried out and 22 respondents (11%) said that it should be carried out depending on the situation. Traffic rules when asked about the need for public awareness about traffic rules, out of 200 respondents, the 179 respondents (89.5%) answered that they think it is necessary, and the 21 respondents (10.5%) answered that they do not see it as necessary.

Regarding the current parking situation in South Okkalapa Township, it was found that 19.5 % of the respondents and 80.5 % of the respondents said that the situation was fair and that they have difficulty parking, and these respondents are those who live in narrow streets and high-rise apartment buildings in the neighborhood. The most common way to cause parking problems is the increase in the number of cars; Most of them answered that it was because of insufficient parking space. In the public transportation system, the train, they answered that it was because of insufficient buses. The survey found that most of the respondents liked the multi-level parking structure operation and that the public transportation system should also be given second priority in the solutions to the parking problem.

In solving the problem of urban parking, most of the respondents said that more parking spaces are needed and should be supported by strict regulations. Most of the respondents think that the problem of parking can be solved by building more parking spaces, and if some green land in the township is used as a parking lot, the problem can be solved. Most people accept that the use of technology in the parking system will ensure that there is enough parking available and that even if service charges are levied, they should be paid.

Out of 200 respondents, the 161 respondents (80.5%) gave the opinion that bicycle replacement should be used as a way to make public transportation easier and reduce environmental damage. The strict municipal laws against illegal parking. According to the survey, it was found that 96% of the respondents supported the idea that it should be supported by laws.

The 166 respondents (83%) accepted that local governments should implement priority funding programs to solve the parking problem to fulfill the socio-economic life of the township's households. traffic rules According to the current survey, most of the respondents accept the opinion that awareness activities are also necessary regarding traffic rules.

#### 4.3.5 Opinions of the Respondents Regarding the Potential Ways to Propose for South Okkalapa Township

There are many ways to reduce parking problems that are appropriate to the geography and needs of the residents of South Okkalapa Township, but the availability of township funds and effective management will need to be evaluated based on the status of policies and responders' compliance. Therefore, the needs of the respondents were evaluated with a 5 Likers Scale to get the specifics.

##### Possible Way-1 (On Street Parking)

Regarding parking issues, it is found that the majority of people think that by properly parking on the street, the parking problem can be reduced. Good vehicle management can reduce traffic congestion and save fuel and time. Table (4.8) shows the opinions of the respondents for the on-street parking system.

**Table (4.8) Perceptions Toward Possible Way-1 (On Street Parking)**

**SDA= Strongly Disagree = 1      DA = Disagree = 2      N = Neutral = 3**  
**A = Agree = 4      SA = Strongly Agree = 5**

No	Description	Number of Respondents					Mean Score	STD Deviation
		SDA	DA	N	A	SA		
1	Proper on-street parking will reduce the need for parking spaces.	8 4%	20 10%	50 25%	74 37%	48 24%	3.67	1.07

2	On-street parking should be temporary for guest cars and passengers.	10 5%	20 10%	64 32%	52 26%	54 27%	3.60	1.13
3	Charging should have a positive effect on the congestion caused by double parking.	22 11%	62 31%	52 26%	44 22%	20 10%	2.89	1.17
4	Traffic light area and bus stop area should be restricted for parking.	4 2%	8 4%	50 25%	62 31%	76 38%	3.99	0.99
<b>Overall Mean Score and STD Deviation of Possible Way-1</b>							<b>3.54</b>	<b>1.09</b>

Source: Survey Data (2024)

According to Table (4.8), maximum 76 respondents (38%) “strongly agree with statement 4” and the highest average score of 3.99 in all four survey questions. It can be said that parking space at traffic lights and bus stops should be limited. In a possible way, the total mean score of 4 survey questions is higher than 3, so it can be said that the respondents agree that having a street parking system can solve the parking problem. The score for the question "Should tolls be levied on the occurrence of traffic congestion due to double parking" to reduce the parking problem was almost, the lowest mean score (2.89) in the possible way-1. This is because they are unwilling to face with traffic congestions, posed by double parking.

### **Possible Way-2 (Off-Street Parking System)**

Off-Street Parking means designated parking spaces on municipal land (public land) vacant lots; It refers to the construction of multi-story parking buildings and the construction of modern smart parking. The management's approach to charging (or free) parking depends on local authority policies. Table (4.9) shows the opinions of the respondents for the Off-Street Parking System.

**Table (4.9) Perceptions Toward Possible Way-2 (Off-Street Parking)**

**SDA= Strongly disagree = 1**

**DA = Disagree = 2**

**N = Neutral = 3**

**A = Agree = 4**

**SA = Strongly Agree = 5**

No	Description	Number of Respondent					Mean Score	STD Deviation
		SDA	DA	N	A	SA		
1	Especially in front of shopping malls and markets, street parking signs should be installed to reduce road congestion.	14 7%	24 12%	64 32%	42 21%	56 28%	3.51	1.20
2	If public land (Municipal Land) is vacant, street parking should be created.	12 6%	14 7%	36 18%	40 20%	98 49%	3.99	1.22
3	Street parking charges should be paid to local authorities.	34 17%	22 11%	38 19%	56 28%	50 25%	3.33	1.40
<b>Overall Mean Score and STD Deviation of Possible Way-2</b>							<b>3.61</b>	<b>1.31</b>

*Source: Survey Data (2024)*

According to Table (4.9), a maximum of 98 respondents (49 %) “strongly agree with statement 2” and the highest mean score in all three survey questions is 3.99. Because the total mean score of possible way-2 is higher than that of 3, it is found that the respondents are willing to park their own vehicles safely in street parking lots. Implementing street parking on municipal land (or public open space) not only reduces traffic congestion, but also saves time. The reliability for vehicle safety, according to survey question No.3, local authorities agreed to charge appropriate parking fees, which would save fuel costs for finding parking spaces, and the question “Should on-street parking fees be paid to local authorities?” scored (3.33), which is the lowest mean score in possible way-2.

### Possible Way-3 (Parking Lot Facilities)

Parking stations are designed to be convenient for parking users with a good security system. Table (4.10) shows the opinions of the respondents for parking spaces.

**Table (4.10) Perceptions Toward Possible Way-3 (Parking Lot Facilities)**

**SDA= Strongly Disagree = 1**

**DA = Disagree = 2**

**N = Neutral = 3**

**A = Agree = 4**

**SA = Strongly Agree = 5**

No	Description	Number of Respondent					Mean Score	STD Deviation
		SDA	DA	N	A	SA		
1	Parking facilities of private parking companies should be placed in our township.	30 15%	40 20%	64 32%	46 23%	20 10%	2.93	1.22
2	Parking should be assigned to save our time and cost.	4 2%	18 9%	48 24%	44 22%	86 43%	3.95	1.15
3	Parking lot management should prioritize parking quality and convenience and safety.	6 3%	30 15%	70 35%	46 23%	48 24%	3.50	1.11
<b>Overall Mean Score and STD Deviation of Possible Way-3</b>							<b>3.46</b>	<b>1.16</b>

*Source: Survey Data (2024)*

According to Table (4.10), the 86 respondents (43 %) “strongly agree with statement 2” and the highest average score of 3.95 in possible way-3. It can be said that the respondents prefer to assign a parking space to save time and cost. Possible ways-3, because the total average score of the parking spaces is higher than 3, it can be said that they want to park their vehicle conveniently only in the designated parking lot. The problem of parking can be solved by entering and parking in relevant parking facilities, but if it is done by private parking companies, the parking fee may be high. According to survey question No.1, the score for the question "Should parking facilities of private parking companies be placed in our township" is almost 2.93, which is the lowest average score among possible ways-3. This is because people do not want the private companies managing the parking

facilities as the only controller, but want these companies to collaborate with PPP/BOT.

#### **Possible Way-4 (Residential Parking Lot)**

In urban areas, residential buildings are required to have adequate parking spaces. Land intended for long-term parking needs to be set aside. The respondents' opinions on the available parking space in the residential area are shown in Table (4.11)

**Table (4.11) Perceptions Toward Possible Way-4 (Residential Parking)**

**SDA= Strongly Disagree = 1**  
**A = Agree = 4**

**DA = Disagree = 2**  
**SA = Strongly Agree = 5**

**N = Neutral = 3**

No	Description	Number of Respondent					Mean Score	STD Deviation
		SDA	DA	N	A	SA		
1	Neighborhood parking should be created to provide parking space for shopkeepers and commuters.	10 5%	22 11%	84 42%	44 22%	40 20%	3.41	1.14
2	They should share parking spaces at their residences.	8 4%	12 6%	50 25%	38 19%	92 46%	3.97	1.12
3	In South Okkalapa Township, encroachment buildings should be demolished and parking spaces should be created.	23 11%	62 31%	68 34%	40 20%	7 4%	2.73	1.17
<b>Overall Mean Score and STD Deviation of Possible Way(4)</b>							<b>3.37</b>	<b>1.14</b>

*Source: Survey Data (2024)*

According to Table (4.11), the 92 respondents (46%) “strongly agree with statement 2” and the highest mean score in all three survey questions is 3.97. It can be said that respondents and the house they live in agree to include parking around the yard (or apartment). In the possible way-4, the total average score of residential parking is higher than 3. They can also say that they only want to park their car in a

residential parking lot. Placing parking lots near residential areas can prevent unwanted problems. According to survey question No.3, the score for the question "Should the encroachment buildings be demolished and parking spaces should be created in South Okklapa Township" is almost 2.73, which is the lowest average score. This is because they are unwilling to hinder the street vendors making their livings on a daily basis.

**Possible Way-5 (CBA Parking Management)**

In the current situation, with a mix of commercial centers and residential areas, efficient parking management is very important. Table (4.12) shows the opinions of the respondents.

**Table (4.12) Perceptions Toward Possible Way-5 (CBA Parking Management)**

**SDA= Strongly Disagree = 1      DA = Disagree = 2      N = Neutral = 3**  
**A = Agree = 4                      SA = Strongly Agree = 5**

No	Description	Number of Respondent					Mean Score	STD Deviation
		SDA	DA	N	A	SA		
1	School shuttle service should be improved to avoid the use of individual vehicles.	10 5%	38 19%	70 35%	40 20%	42 21%	3.33	1.15
2	All street vendors should be removed from the encroachment of the street and relocated to a new location.	20 10%	32 16%	58 29%	51 25%	39 20%	3.29	1.24
3	The loading/unloading areas in City Mark should be organized in time order.	2 1%	15 7%	68 34%	56 28%	59 30%	3.78	0.98
4	Parking spaces should be clearly demarcated around City Mark and markets.	4 2%	10 5%	66 33%	48 24%	72 36%	3.87	1.03
<b>Overall Mean Score and STD Deviation of Possible Way(5)</b>							<b>3.57</b>	<b>1.10</b>

Source: Survey Data (2024)

According to Table (4.12), the 72 respondents (36 %) “strongly agree with the statement 4” and the highest average score of 3.87 in all four survey questions. They agree that taxis and private vehicles should be allocated space around City Mark and the market, so they can say that the parking problem can be solved by enforcing the rules. According to probability way-5, The overall mean score of the survey questions on parking management in the central business area is greater than 3. The presence of street vendors selling basic food items causes parking problems, and according to survey question No.2, the question “Should all street vendors be removed from street encroachment and moved to a new location” had the lowest mean score 3.29 out of possible way-5.

**Possible Way-6 (Parking Regulation & Policy)**

Local authorities should enforce established parking policies and regulations to meet the basic needs of urban residents. Table (4.13) shows the opinions of the respondents.

**Table (4.13) Perceptions Toward Possible Way-6 (Parking Regulation & Policy)**

**SDA= Strongly Disagree = 1      DA = Disagree = 2      N = Neutral = 3**  
**A = Agree = 4      SA = Strongly Agree = 5**

No	Description	Number of Respondent					Mean Score	STD Deviation
		SDA	DA	N	A	SA		
1	A parking regulation will effectively manage the parking problem.	8 4%	32 16%	18 9%	48 24%	94 47%	3.94	1.25
2	If the police could manage the parking scheme it would help the problem.	10 5%	26 13%	86 43%	40 20%	38 19%	3.40	1.08
3	If the government restricts the parking policy, it can reduce the parking demand problem.	12 6%	68 34%	72 36%	22 11%	26 13%	2.90	1.10



4	Strengthening public transport will have the effect of reducing the use of private cars and reducing the need for parking.	22 11%	28 14%	40 20%	83 41 %	27 14%	3.28	1.20
<b>Overall Mean Score and STD Deviation of Possible Way(6)</b>							<b>3.38</b>	<b>1.16</b>

Source: Survey Data (2024)

According to Table (4.13), the 94 respondents (47 %) are “strongly agree with statement-1”, and the highest mean score of 3.94 across all four survey questions. Most of the respondents said that the parking problem can be solved by effectively managing the parking regulations. Thus, the traffic control force should help control action against illegal vehicles, and act as a support organization for parking problems. According to survey question No.3 of possible way-6, "The government can control the demand for parking by restricting the car import policy and reducing the parking problem," the overall mean score for this state is almost 2.90, which is the lowest average score in the possible way-6. This is because the other transport vehicles could become in use due to the demands in transportation sector, consequently leading to the impossibility of reducing car parking problems.

#### 4.3.6 Respondents' Opinions On Possible Ways

Table (4.14) shows the respondents' opinions on six ways to solve the parking problem.

**Table (4.14) Perceptions Toward All Possible Ways**

Possible Way	Description	Overall Mean Score	Overall STD Deviation
Possible Way-1	On-street parking	3.54	1.16
Possible Way-2	Off-street parking	3.61	1.31
Possible Way-3	Parking lot facilities	3.46	1.16
Possible Way-4	Residential Parking	3.37	1.14
Possible Way-5	CBA Parking Management	3.57	1.10
Possible Way-6	Parking Regulation and Policy	3.38	1.16
<b>Grand Total Mean Score and STD Deviation of All Possible Ways</b>		<b>3.49</b>	<b>1.17</b>

Source: Survey Data (2024)

The average score of the respondents' opinions for the six possible ways to reduce the parking problem was 3.49.

Among all possible ways, the highest score among them is 3.61, while the remaining ways are between 3.38 and 3.57. The lowest average score was 3.37. Therefore, the above-mentioned ways should be used in appropriate places, and mainly if public land (municipal land) is vacant, the parking problem in South Okkalapa Township can be solved by creating enough parking spaces on the side of the road.

## CHAPTER V

### CONCLUSION

#### 5.1 Findings

This study focused on the parking management situation of South Okkalapa Township, a suburban township of Yangon City. In the socio-economic life of the residents, the effort to get parking is also a burden. This study surveys the root causes and key issues of parking management in this township and the findings are presented below.

By studying the nature of the respondents, the gender ratio is almost equal, and the age range is between 20 and 65. Most of them are married people. Graduated and educated, government employees, company employees, and self-employed, 24 of the respondents are 60 years of age or older and run family businesses. Respondents have many experiences with urban parking problems.

According to the housing ownership and living conditions of the respondents, most of them live in high-rise apartments, and in terms of vehicle ownership, they are not able to park their vehicles near their apartments, causing parking problems. Most of the apartments are on the main roads. Shops have been opened on the ground floor as well. In the place where the apartments are located, it is difficult to park because the road is narrow and not in good condition.

As many families are economically comfortable, they mostly use private vehicles and taxis for daily travel and the township's basic buildings, such as roads and sidewalks. It can be said that the quality level of office buildings and shopping centers is fair, and they are usually emotionally satisfied with the local transportation facilities of South Okkalapa Township.

Households of the respondents own at least one vehicle, they mainly use on-street parking lots. Vehicles are usually parked during working hours during the day (1 to 4 p.m.), and during commuting/commuting times, they usually travel at the same time, so parking problems are reduced and traffic congestion problems occur. In the survey question, "I don't think the current parking regulations in the township are effective", a maximum of respondents, 90 (45%), answered that they strongly agreed, indicating that the current parking regulations are ineffective. According to the current

parking rules in the township, parking rules should be established exactly. The problem of parking can be alleviated only if the vehicle owners follow the regulations positively and strictly.

In the survey questions to solve the long-term parking problem, the 161 respondents (80.5 %) answered that the situation is fair. Parking is a problem during office hours, and at other times, it can be said that parking is convenient because the government has expanded the roadsides. The main problem with parking is in commercial areas, and the prices are also high due to taxi drivers unruly loading their vehicles into designated parking lots near busy offices. The number of parked cars and the parking space are not balanced, so it is not possible to park conveniently.

When asked about the factors that cause parking problems, the 102 respondents (52%) answered that there is not enough parking space, so more than other factors, the problem will be alleviated by creating multi-story parking lots. The majority said that more parking spaces in the township should be included in the planning of urban projects. Therefore, vacant land in the township, most agree that even municipal green spaces should be made into parking lots.

In addition, most of them accepted that the problem of parking could be improved by incorporating modern digital technology. The respondents also agreed to charge a service fee for vehicle security.

Another way to solve the parking problem is if passengers on the same route gather together and use collective taxis such as public buses. They can reduce the use of vehicles to reach their destination quickly and save fuel. Most people think that it causes nature conservation. Therefore, the use of bicycles as substitutes provides penalties for traffic laws by municipal laws; according to the survey, most of the respondents wanted to prioritize funding for the parking problem and better public awareness activities.

In solving the parking problem, the possible ways of the respondents can be selected and solved.

Among the four questions of the possible way-1, the highest mean score of 3.99 was obtained for the question "Traffic light area and bus stop area should be restricted to parking?"

Among the three questions of the possible way-2, the question "If public land (Municipal land) is vacant, street parking should be created." has the highest average score, with a score of 3.99.

Among the three questions of the possible way-3, the assertion that "Parking should be assigned to save our time and cost" received the highest mean score of 3.95.

Among the three possible ways-4, the question "They should share parking spaces at their residences." received the highest mean score of 3.97.

Among the four questions of the possible way-5, "Parking spaces should be clearly demarcated around City Mark and markets" received the highest mean score of 3.87.

Among the four questions of the possible way-6, the statement "A parking regulation will effectively manage the parking problem" received the highest mean score of 3.94.

The overall mean score for all possible ways was 3.49. Among the possible ways to reduce the parking problem, according to the possible way-2, if there is public land (municipal land), there should be enough street parking; the respondents answered "strongly agree" with a score of 3.99. All probabilistic ways have mean scores above 3, and the remaining probabilistic ways among them are between 3.37 and 3.57.

Given the fact that the average mean score of all possible ways described in this study exceeds 3, it can be concluded that these solutions should be implemented depending on the locations and situations. According to research data, the problem of parking is the high demand for parking. It is necessary to strictly follow the traffic rules and regulations, and by taking specific measures in accordance with the law, the incidence of parking problems can be reduced.

Mainly, Yangon, being the commercial hub, sees a rise in population and, subsequently, an increase in vehicle usage. In response, the government is focusing on enhancing infrastructure. South Okkalapa township apparently faces these challenges due to limited city space, leading to persisting issues with car parking and traffic congestion. Therefore, the analysis suggests that implementing high-rise car parking systems equipped with advanced technologies favored by the public and compatible with urban infrastructure can effectively address these current challenges.

## 5.2 Suggestions

Based on the research findings from South Okkalapa Township, several key suggestions emerge to improve parking management and alleviate related issues. Firstly, addressing the pressing need for parking space is paramount. Most respondents highlighted insufficient parking as the primary concern, advocating strongly (51%) for developing multi-story parking structures. These facilities can optimize vertical space, easing congestion on narrow streets and providing convenient access near commercial and residential areas.

Moreover, converting vacant municipal land into street parking received notable support (3.99 mean scores), suggesting a practical solution to expand available parking spaces. Public-private partnership PPP/BOT systems should be implemented in constructing roadside parking lots, and the government should grant land use rights. Municipal authorities should prioritize these conversions to meet the growing demand effectively and enhance urban mobility.

Effective parking regulations are crucial to maintaining order and fairness in parking allocation. With a high mean score of 3.94 supporting robust regulations (Possible Way-6), enforcement efforts should be strengthened through clearer signage, stricter penalties, and enhanced monitoring. This approach aims to curb illegal parking practices and mitigate traffic congestion, particularly in busy commercial zones where disorderly parking prevails.

Integrating digital parking solutions can streamline operations and enhance user experience in tandem with regulatory measures. Implementing technologies such as app-based parking reservations and real-time availability updates not only improves efficiency but also enhances security and reduces parking search times.

Promoting alternative transportation options, such as shared taxis and public buses during peak hours, offers another avenue to reduce reliance on individual vehicles. This strategy alleviates parking demands and contributes to environmental sustainability by minimizing carbon emissions.

Public awareness campaigns are vital in fostering responsible parking behavior and garnering community support for sustainable solutions. Educating

residents about parking regulations and encouraging compliance can significantly enhance the effectiveness of regulatory efforts.

Integrating comprehensive parking solutions into long-term urban planning initiatives is crucial. Future residential and commercial developments should include provisions for integrated parking structures to effectively anticipate and accommodate future parking demands.

At present, there is not enough car parking in South Okkalapa Township. Depending on the availability of funds, the Yangon City Development Committee undertakes road widening every year. The widening of the roadside area is mainly for the convenience of traffic and should only be used for temporary parking. Parking vehicles on roads can create unwanted problems, causing traffic congestion and road hazards. The on-street parking provided by the expansion of the roadsides is weak in terms of security, but people are currently able to park their vehicles conveniently.

Depending on the availability of financing and technological development, if the street parking system is completed properly, illegal street parking problems and traffic congestion problems can be dealt with according to municipal laws, and there is a balance between policy and law enforcement to prevent traffic accidents. It should be achieved by imposing heavy fines. In addition, it is recommended that by applying appropriate solutions for city development based on the nature of the city, comprehensive efforts should be made to make the city a clean and advanced Smart City.

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# MAP OF SOUTH OKKALAPA TOWNSHIP



## **APPENDIX**

### **Survey Questionnaire**

Hello, my name is Ye Marn Hlaine, 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 on urban car parking system in yangon city (Case study; South Okkalapa Township.)" All persons will remain anonymous, and the responses will be used specifically for my Thesis only.

### **Survey Questionnaire of Urban Car Parking System in Yangon City (South Okkalapa Township)**

#### **Part (A) Respondent's information**

**Please tick ()only your answer.**

#### **1. Age Group:**

- 20-40  40-60  above 60

#### **2. Place:**

- 4 Ward  5 Ward  7 Ward  
 10 Ward  14 Ward

#### **3. Gender:**

- Male  Female  
 Other (-----)

#### **4. Occupation:**

- Own Business  Government Staff  
 Private Staff  Unemployed  
 Retired  Other (-----)

#### **5. Educational Background:**

- Primary School  Middle School  
 High school  Diploma  
 Bachelor's degree  Master / PhD;

#### **6. Marital Status:**

- Single  Married  
 Divorce  Widow



**7. Household size:**

- 1-3                                       3-6                                       above 6

**Part (B) Housing ownership and living conditions of the respondent**

**1. What type of housing do you currently live in?**

- Own House                                       Own Apartment  
 Rental(Condo/Apartment)                       Other (-----)

**2. How long have you been living in South Okkalapa Township?**

- Less than 1 year                               1-5 years  
 More than 5 years

**3. Where does your apartment / house in South Okkalapa Township?**

- On main road                                       On second street

**4. What is your family's estimated monthly income?**

- Under 500,000 MMK                               Between 500,000 - 1,000,000 MMK  
 Above 1,000,000 MMK

**5. What type of vehicle do you use for daily commuting?**

- Private vehicle                                       Taxi                                       Bus  
 Other (-----)

**6. How would you rate the quality of infrastructure (roads, sidewalks, public facilities) in South Okkalapa Township?**

- Excellent                                       Average                                       Poor

**7. Satisfied with local transportation facilities in South Okkalapa Township? (Parks, shopping areas, schools, etc.)**

- Satisfied                                       Neutral  
 Dissatisfied

**Part (C) Cause of Car Parking Problem in South Okkalapa Township**

**1. How many vehicles does your household own?**

- One                                       Two  
 Three or more

**2. In what type of parking lot are cars parked at home?**

- Private garage or driveway
- Shared parking facility
- Street parking
- Other (-----)

**3. How long do you typically park your vehicle during the day?**

- Less than 1 hour
- 1-4 hours
- More than 4 hours

**4. Where do you usually park your vehicle in the township?**

- On-street
- Designated parking lots
- Private property
- Other (-----)

**5. Respondent’s Opinion on Cause of Car Parking Problem in South Okkalapa Township**

**1 = Strongly disagree      2 = Disagree      3 = Neutral      4 = Agree**  
**5 = Strongly agree**

Cause of Car Parking Problem		1	2	3	4	5
1	It's easy to find parking in the frequent stops.					
2	I think the parking management situation in the township is good.					
3	I think the current parking regulations in the township are effective.					
4	There is ample parking at your residence.					
5	I see the parking situation as an important issue for parking in the township.					
6	The township needs more parking spaces.					

**Part (D) Respondents' opinions on potential ways to examine and propose sustainable car parking solutions in South Okkalapa:**

**1. How would you rate the current severity of the car parking problem in South Okkalapa?**

- Severe
- Moderate
- Not a problem

**2. Which factor do you believe most contributes to the parking problem?**

- Increase in number of cars
- Inadequate parking spaces
- Poor urban planning
- Insufficient public transportation
- Other (-----)

**3. What type of parking solutions would you prefer?**

- Multi-level parking structures
- Expanded street parking
- Improved public transportation
- Other (-----)

**4. How can urban planning solve the parking problem?**

- Better public transportation
- More parking areas
- Stricter regulations
- Other (-----)

**5. By building more parking spaces, the parking problem will be reduced.**

- Effective
- Somewhat effective
- Not effective

**6. Do you think that if some of the green areas in the township are used as parking spaces, the problem will be alleviated?**

- Yes
- No
- Maybe

**7. Do you think the use of technology (e.g., parking apps, digital payment systems) should be used to manage the township's parking system?**

- Yes
- No
- Maybe

**8. If you are responsible for security by keeping your own vehicle, should you charge a service fee?**

- Yes
- No
- Depends on the price

**9. Do you think that if private taxis run on the same route as public buses, the parking problem can be reduced?**

- Yes
- No
- Maybe

**10. Should we promote the alternative use of bicycles as a solution to ease public transportation?**

- Yes
- No
- Maybe

**11. Strict municipal laws against illegal parking to alleviate the problem of parking on the streets. Should laws support punishments?**

- Yes
- No

**12. Should local government prioritize funding for parking solutions over other infrastructure projects?**

- Yes
- No
- Depends on the situation budget

**13. Do you think we need better public awareness campaigns about parking regulations?**

- Yes  No

**14. Respondent’s Opinion on Possible Ways to Reduce the Car Parking Problem**

**1= Strongly disagree      2 = Disagree      3 = Neutral      4 = Agree  
5 = Strongly agree**

<b>(i) Possible Way-1 (on-street parking)</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1	Proper on-street parking will reduce the need for parking spaces.					
2	On-street parking should be temporary for guest cars and passengers.					
3	Charging should have a positive effect on the congestion caused by double parking.					
4	Traffic light area and bus stop area should be restricted for parking.					
<b>(ii) Possible Way-2 (Off-street Parking)</b>						
1	Especially in front of shopping malls and markets, street parking signs should be installed to reduce road congestion.					
2	If public land (Municipal Land) is vacant, off-street parking should be created.					
3	Street parking charges should be paid to local authorities.					
<b>(iii) Possible Way-3 (Parking lot facilities)</b>						
1	Parking facilities of private parking companies should be placed in our township.					
2	Parking should be assigned to save our time and cost.					
3	Parking lot management should prioritize parking quality and convenience and safety.					
<b>(iv) Possible Way-4 (Residential parking)</b>						
1	Neighborhood parking should be created to provide parking space for shopkeepers and commuters.					
2	They should share parking spaces at their residences.					
3	In South Okkalapa Township, encroachment buildings should be demolished and parking spaces should be created.					

<b>(v) Possible Way-5 (CBA Parking management)</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1	School shuttle service should be improved to avoid the use of individual vehicles.					
2	All street vendors should be removed from the encroachment of the street and relocated to a new location.					
3	The loading/unloading areas in City Mark should be organized in time order.					
4	Parking spaces should be clearly demarcated around City Mark and markets.					
<b>(vi) Possible Way-6 (Parking Regulation &amp; Policy)</b>						
1	A parking regulation will effectively manage the parking problem.					
2	If the police could manage the parking scheme it would help the problem.					
3	If the government restricts the parking policy, it can reduce the parking demand problem.					
4	Strengthening public transport will have the effect of reducing the use of private cars and reducing the need for parking.					

Thank you so much for your participation in this survey.