

Examining the Root Causes of On-Street Parking Mismanagement in Central Bangkok

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ABSTRACT

Bangkok, a sprawling metropolis and capital of Thailand, has long-struggled with chronic on-street parking mismanagement despite repeated government attempts at regulation. This paper examines the root causes of ineffective on-street parking management in the city, elicited using root cause analysis (RCA), documentary research, field surveys, and in-depth interviews as data sources. In-depth semi-structured interviews were conducted with fifteen government officers, focusing on the mindsets, motivations and incentives of stakeholders, and tree diagrams were developed to visualize cause-and-effect relationships and identify root causes of mismanagement. Our analysis identified eight root causes of ineffective on-street parking management stemming from misalignment of government bodies, including a fragmented institutional framework, lack of interest and commitment from both national and local policymakers, the limited legislative authority of the local government, lack of on-street parking policy, lack of planning and review, ineffective law and regulation enforcement, lack of monitoring mechanisms, and low perceived seriousness of parking infringements. Based on these findings, several priority action steps are proposed to help policymakers in effectively managing on-street parking in Bangkok.

Keywords: central Bangkok, on-street parking, root cause analysis, illegal parking, institutional fragmentation

INTRODUCTION

Bangkok, a developing metropolis and the capital of Thailand, has long-struggled with chronic on-street parking mismanagement despite repeated government attempts at regulation. Bangkok has experienced rapid motorization over the past four decades, resulting in heavy dependence on automobiles and motorcycles, especially in areas where public transportation is underdeveloped (Chalermpong, 2019; Kenworthy, 1995). Indeed, traffic congestion indices consistently rank Bangkok among the world's ten worst cities (Ayaragarnchanakul & Creutzig, 2022a). While poorly managed on-street parking is generally viewed as a cause of congestion, the only widely used law in Bangkok is a parking ban on arterial streets (Chalermpong & Ratanawaraha, 2019). As a result, widespread illegal and obstructive parking on streets is common, reflecting ineffective on-street parking management, yet to date no studies have examined on-street parking mismanagement in Bangkok. Our paper aims to examine the root causes of management failures and provide a path forward for policymakers to effectively coordinate and implement an effective system.

The benefits of effective on-street parking management are clear; it helps in reducing traffic congestion, optimizing space utilization, and enhancing the city's mobility and overall livability (Arnott & Rowse, 2013; Sustainable Urban Transport Project, 2017; Shoup, 2005). In contrast, ineffective on-street parking management creates many problems. For example, Shoup (2006) argued that inefficient on-street parking pricing encourages wasteful driving in searching for free parking, causing unnecessary traffic congestion and accidents. Ineffective on-street parking may also encourage illegal parking on the street, which obstructs traffic, and illegal parking in places designated for other uses, such as bus stops, bicycle lanes, and crosswalks, at the expense of pedestrians and cyclists (Morillo & Campos, 2014; ParkingAustralia, 2019; Tsakalidis & Tsoleridis, 2015). Worse still, physical violence occasionally arises from parking-related conflicts in areas with ineffectively managed parking (Bliss, 2019; Sustainable Urban Transport Project, 2017).

In cities in developing countries, these parking-related problems are common and increasingly

severe due to rapid motorization, underdeveloped road and parking infrastructure, and limited regulatory capabilities (Wang & Yuan, 2013). There have been suggestions from scholars as to how to deal with on-street parking (Sustainable Urban Transport Project, 2017; Institute for Transportation and Development Policy, 2021; Kodransky & Hermann, 2011; Litman, 2021). However, these suggestions are mainly based on cities in developed countries, and there is limited research into on-street parking management in developing countries (Sustainable Urban Transport Project, 2017; Parmar et al., 2020; Rye, 2010; Thanh, 2017).

While the overarching goal of this paper is to provide empirical evidence to inform parking policy and provide lessons for other developing cities, this paper specifically aims to answer two research questions.

1. What are the root causes of ineffective on-street parking management in Bangkok?
2. Do stakeholders' mindsets, motivations, and incentives affect the outcome and effectiveness of on-street parking management? If so, how?

In the next section, we review the literature about on-street parking, followed by a review of historical efforts and problems related to Bangkok's parking policies. The research methodology is discussed in Section 3, followed by a discussion, in Section 4, of the symptoms of ineffective on-street parking management and a breakdown of root causes based on documentary research and in-depth interviews with key informants. In the final section, we conclude with policy suggestions to reform parking governance in Bangkok, and lessons for cities in other developing countries based on Bangkok's challenges.

LITERATURE REVIEW

Effectively managed on-street parking can improve the efficiency of use of limited urban space, increase pedestrian safety by lowering vehicle speed, support local businesses, and reduce driving time (Marshall, 2014). Parking researchers have long advocated on-street parking pricing and management as a policy tool that can enhance sustainable urban mobility and

economic vitality (Arnott & Rowse, 2013; Button, 2006; Gragera & Albalate, 2016). Effective on-street parking management can offer local authorities an alternative to requiring real estate developers to provide costly off-street parking, potentially boosting housing affordability (Lin & Guo, 2019; Shoup, 2013). Other researchers have considered on-street parking pricing as a viable Travel Demand Management (TDM) tool that can encourage a modal shift and reduce urban congestion (Litman, 2021; Mingardo et al., 2015), arguing that parking pricing is a more feasible and politically palatable alternative to congestion pricing (Ayaragarnchanakul & Creutzig, 2022b; Gragera & Albalate, 2016; Jakob & Menendez, 2021).

A Conceptual Framework for Effective On-Street Parking Management

The benefits of effective on-street parking management appear to be a foregone conclusion among researchers in developed countries. Thus, professionals and scholars have suggested that, for on-street parking management to be effective, it requires three components:

1) institutional and legislative frameworks that support all activities of effective on-street parking management (Sustainable Urban Transport Project, 2017; Manville & Pinski, 2021; Rye, 2010);

2) parking policies and programs that consist of the following parts: parking policy with a specific objective (Kodransky & Hermann, 2011; McShane & Meyer, 1982; Rye, 2010); parking strategy and planning that support achieving the policy objectives (Rye, 2010; Thanh, 2017);

3) implementation that consists of the following parts: parking regulation and fine structures (Litman, 2021; Washington State University, 2015); physical infrastructure, signage, and equipment for fee collection (DeBow & Drow, 2019; Rye, 2010); enforced compliance with parking regulations (Sustainable Urban Transport Project, 2017; San Francisco County Transportation Authority, 2009); monitoring operations (DeBow & Drow, 2019; Sustainable Urban Transport Project, 2017;

Institute for Transportation and Development Policy, 2021); regular evaluation of strategy to ensure that it fulfills defined objectives (DeBow & Drow, 2019); communication with the public (Institute for Transportation and Development Policy, 2021; Washington State University, 2015).

On-Street Parking Research in Developing Countries

Unfortunately, in developing countries where motorization has rapidly increased parking demand in central city areas, on-street parking has received relatively little attention from researchers and policymakers (My Thanh & Friedrich, 2017; Parmar et al., 2020). Since policymakers in many developing countries consider urban congestion a far more pressing problem, on-street parking is generally viewed as an obstruction to traffic flow that should be regulated with the primary goal of minimizing traffic congestion (Aderamo & Salau, 2013; Ajeng & Gim, 2018). Thus, the body of literature related to on-street parking in developing countries tends to focus on parking demand (Aderamo & Salau, 2013; Chen et al., 2016; Dave et al., 2019; Fillone & Paringit, 2010; Parmar et al., 2020) and its impact on congestion and safety (Biswas et al., 2017; Putra & Hidayah, 2019; Sugiarto & Limanoond, 2013; Yue, 2004). More recently, some researchers have started to recognize the potential benefits of on-street parking, and have called for better management in order to reap those benefits (My Thanh & Friedrich, 2017; Phuc et al., 2019; Weinberger & Jacobson, 2014; Yan-ling et al., 2016). However, the reality is that many cities in developing countries still lack a formal system of basic on-street parking regulations (Haider et al., 2021; My Thanh & Friedrich, 2017; Vasallo, 2015).

Challenges to effective on-street parking management include, for example, rampant illegal parking (Haider et al., 2021; My Thanh & Friedrich, 2017; Shoup et al., 2016; Vu, 2017; Yan-ling et al., 2016), lack of proper marking and signage (Bulactial et al., 2013), lack of coordination among agencies (Vu, 2017), lack of political support (Barter, 2011; Shoup et al., 2016), institutional fragmentation (Wang & Yuan, 2013), asynchronous parking development

planning and urban transport planning (My Thanh & Friedrich, 2017; Phuc et al., 2019), corruption (Barter, 2011; Fisman & Miguel, 2007), and weak enforcement (Barter, 2011; Phuc et al., 2019).

On-Street Parking Research in Thailand

The literature related to on-street parking in Thailand is quite limited. Ayaragarnchanakul and Creutzig (2022b) examined the optimal Pigouvian vehicle taxation in Bangkok, and computed on-street parking costs in the inner city to prevent on-street parking cruising, yet this ignored the reality of issues with fee collection. Chalermpong and Ratanawaraha (2019) reported various issues with on-street parking in Bangkok, including informal and illegal governance of on-street parking spaces, similar to the findings of Barter (2011) on informal parking attendants in Jakarta and Palembang, as well as unauthorized reservation of on-street parking spaces by building owners in front of their properties. In a rare study of on-street parking enforcement problems by traffic police, Suksoi (2010) conducted a questionnaire survey of traffic police officials in central Bangkok to investigate the causes of parking violations and identify the difficulties faced in enforcing on-street parking regulations. While some police officials feel that resources for effective enforcement are insufficient, others believe the problems stem from the current parking regulations. For example, the structure of fines for illegal parking is unrealistically low, as Yan-ling et al. (2016) discovered in Beijing.

In some studies, off-street parking demand has been examined, but the interactions between off-street and on-street parking markets are usually not directly addressed. For example, Chalermpong and Ampansirirat (2011) surveyed the parking demand of a university campus located in central Bangkok and found a substantial number of drivers parked on-street despite the availability of off-street parking because on-street parking is free of charge. In addition, Hino et al. (2011) studied the situation of off-street parking development in Bangkok. Like Chalermpong and Ampansirirat (2011), they found that, despite many off-street parking spaces available in nearby buildings, drivers

would regularly park their cars on the street due to the cost of off-street parking spaces and the fact that on-street parking is free. Piriyalertsak (2012) surveyed parking demand in the Chinatown area of Bangkok, where on-street parking is banned, and found a significant shortage of off-street parking supply.

Given the limited research on parking in Thailand, there is a large gap in the literature with respect to on-street parking management, particularly regarding the causes of ineffective enforcement and management problems. Several researchers have studied parking demand characteristics, but none have examined the demand for paid on-street parking. Although a parking charge has recently been proposed to help alleviate traffic congestion, the existing research does not include research into how to solve the fee collection problem. In addition, there is no research on the mindsets, motivations, and incentives of stakeholders for on-street parking management in the existing literature.

METHODOLOGY

To examine the root causes of ineffective on-street parking management in Bangkok, we adopted a modified version of the Root Cause Analysis (RCA) framework, constructed by Wagner (2014) and Houngho et al. (2017). RCA is a structured approach for determining the real cause of a problem, and how to resolve it appropriately (Okes, 2019). It is particularly useful for identifying multiple root causes of complex problems (Doggett, 2005; Wagner, 2014), and has been chiefly adopted in studies of safety, quality assurance, production process, and healthcare problems (Abela, 2021; Mahto & Kumar, 2008; Wangen et al., 2017). The RCA framework was selected because on-street parking problems are complex, with multiple factors and many stakeholders involved.

We proposed a five-step modified RCA approach to identify the root causes of ineffective on-street parking management in Bangkok.

First, we conducted documentary research of the literature on parking management in Bangkok to understand the history of on-street parking policies and management, previous challenges,

and problems that contribute to the current ineffectiveness. Since the academic literature is limited, most information came from non-academic sources, including official records from the national archive, government documents, legislation, newspaper articles, and minutes of government agency meetings.

Second, we identified symptoms of ineffective on-street parking management by gathering information and evidence from an initial survey of all 65 designated on-street parking areas according to the BMA Ordinance via Google Street View in November 2020, and through a field survey undertaken from March to April 2021. Our study area for the field survey consisted of inner districts of Bangkok where most of the streets have been designated as paid on-street parking areas and managed by the Bangkok Metropolitan Administration (BMA) (the City Ordinance on Parking Management B.E.2564, 2021). They are known as areas with severe parking and traffic congestion problems. As seen in Figure 1, our study area consisted of four sub-areas chosen based on their distinctive land use characteristics (see more details in Appendix A). The field survey was conducted between 8 a.m. and 9 p.m. on weekdays and weekends.

Third, to identify the possible causes of ineffective on-street parking management, we conducted in-depth semi-structured interviews with key stakeholders using the *five whys* analysis approach. Five whys analysis is a powerful technique for performing RCA for cause identification by exploring cause-and-effect relationships (Gurley et al., 2021; Mahto & Kumar, 2008; Serrat, 2017). Based on the institutional structure of on-street parking management, as gathered from official documents and the website, potential stakeholders were identified; the stakeholders, listed in Appendix B, comprised 15 representatives of seven government agencies. Between May and June 2021, interviews with the fifteen stakeholders (see appendix B) were conducted (three via telephone and twelve via face-to-face meeting). The hierarchical structure of various government bodies and their respective duties regarding parking management can be seen in Figure 2.

The in-depth interviews were conducted in three stages. In the first stage, interviewees were

asked to confirm the symptoms that the authors had identified in our documentary research and field survey, as well as their mindset, motivation, and incentives for on-street parking

management. In the second stage, we used the *five whys* technique; we began with the identified symptoms and asked "why" to uncover systemic causes of the symptoms. All interviews lasted between 60 and 75 minutes and were audio-recorded and transcribed. Inductive thematic analysis by Braun and Clarke (2006) was used to examine the qualitative data extracted from the interview transcripts in order to present an analysis of possible causes.

Fourth, to determine the root cause of ineffective on-street parking management, we developed a cause-and-effect diagram (model) using the interview data. This diagram visualizes the symptoms and multiple levels of possible causes that contribute to the problem. As illustrated in Figure 4, this study employs a tree diagram (Compass, 2021; Okes, 2019) to visualize causal links. Root causes are identified by connecting symptoms to possible cause sequences until root cause of the problem is reached.

Finally, these trees were used as tools to help in identifying root causes that could be effectively addressed by implementing policy interventions. These identified policy interventions together with the findings from the RCA, were analyzed and discussed in order to ascertain how stakeholders' mindsets, motivations, and incentives affect the outcome and effectiveness of on-street parking management.

Ethical Considerations

This study was approved by the Research Ethics Review Committee for Research Involving Human Subjects at the Chulalongkorn University (COA No. 072/2564). All participants were informed about the purpose and procedures of the study before interviews were conducted. Surveyors ensured that individual privacy would always be protected in both written and published data resulting from this study. No potential risks were reported from the participants in this study.

Figure 1

Locations of The Selected Survey Areas in Bangkok are Designated by Red Boxes (Left), Map of Designated Streets Where Paid Parking is Allowed According to the City Ordinance on Parking Management B.E.2564 (2021) (Right)

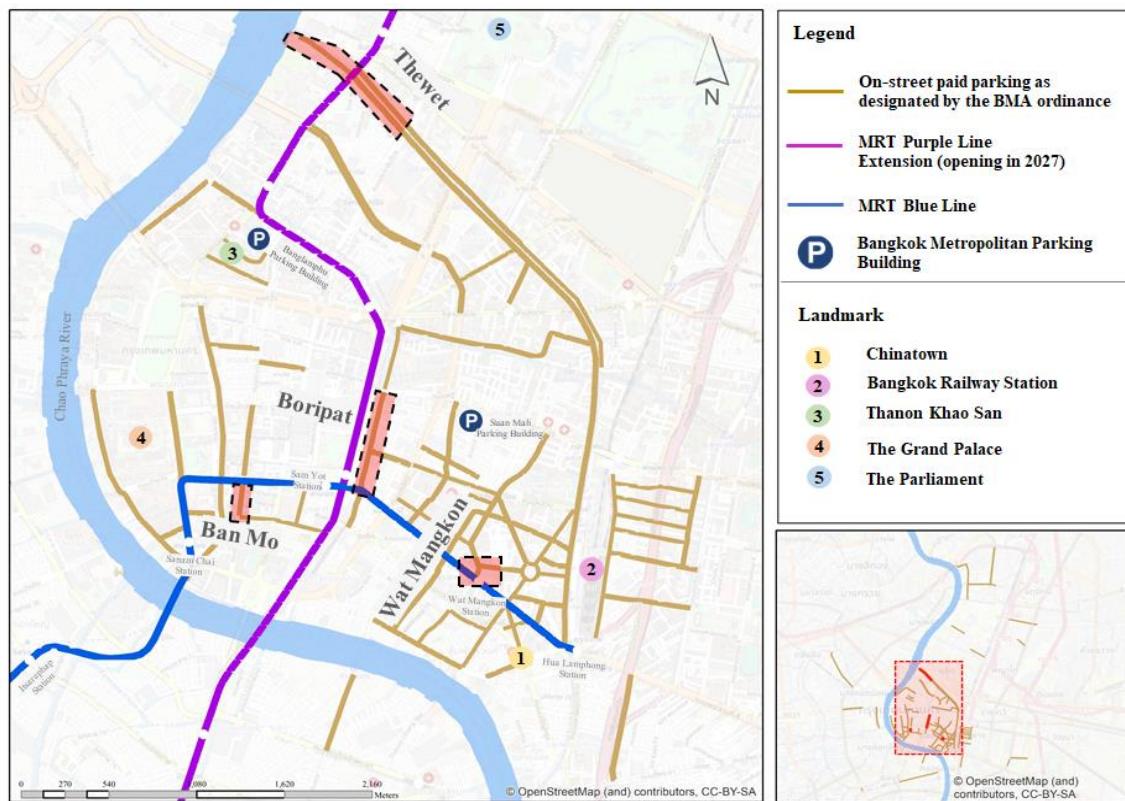
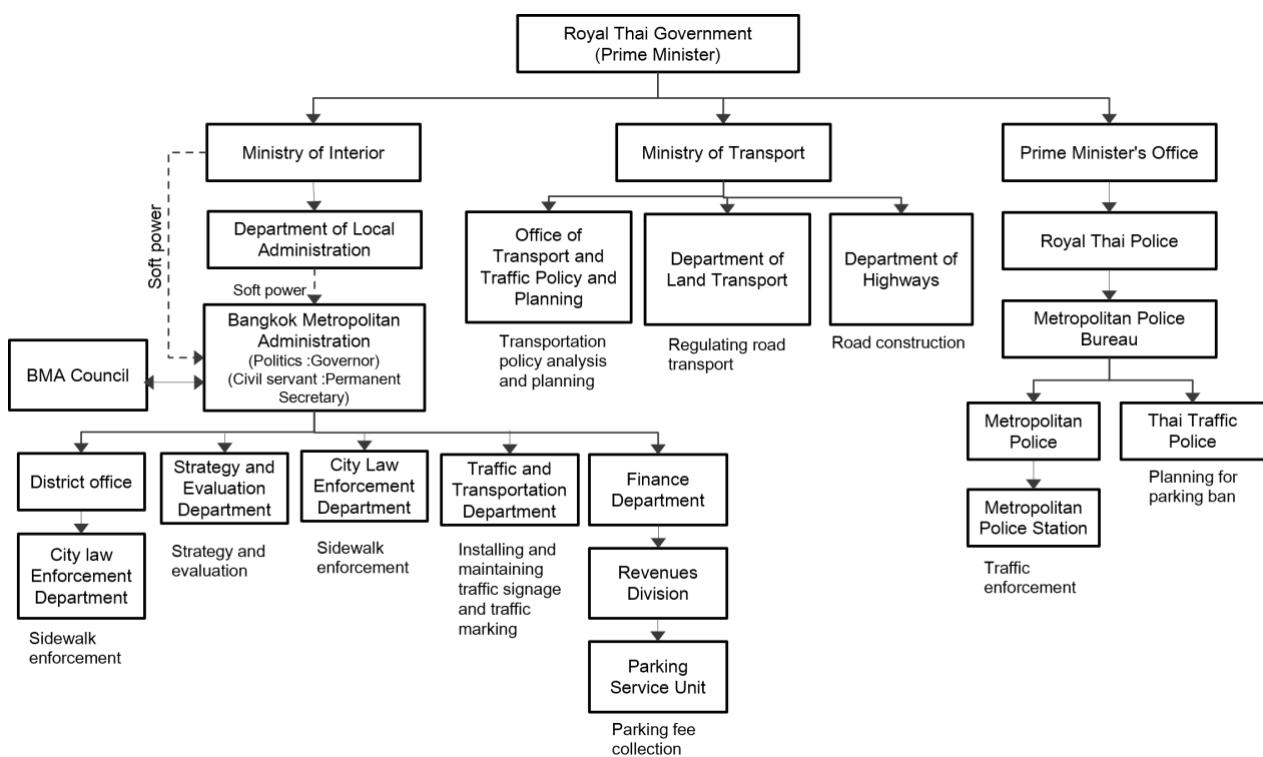


Figure 2

Hierarchy and Relationships of Government Bodies



FINDINGS

This section summarizes the findings from the RCA process, including the evolution and previous challenges of on-street parking policies and management discovered through documentary research, the symptoms of ineffective on-street parking management from Google Street View and field survey, and the root causes of ineffective on-street parking management as revealed from documentary research, in-depth interview data, and the tree diagram.

The Evolution and Previous Challenges of On-Street Parking Policies and Management

Before 1960, on-street parking in Thailand was regulated by the Road Traffic Act B.E. 2477 (1934), which banned parking or stopping on certain streets. The Parking Management within Municipalities Act B.E. 2503 (1960) was passed to allow municipalities, including the BMA, to designate street segments where parking is allowed and levy on-street parking fees in their jurisdictions. The rationale was that drivers who park on-street should contribute to the costs of construction, operation, and maintenance of streets via parking fees paid to the municipalities. The Ordinance (No.1) B.E. 2503 designated four streets in central Bangkok where parking was allowed, and, in 1971, that number grew to 23. With regard to implementation, the Committee of Municipal Parking Regulation, comprised of BMA officers and Metropolitan police officers, is responsible for setting up on-street parking spots and fees (National Archives of Thailand [NAT], 1960).

Poor compliance was a problem because the parking attendants, municipal employees in charge of collecting parking fees, had no legal authority to issue citations to violators. Only the Traffic Police could issue traffic citations, but their primary responsibility was general traffic control, and, with limited staffing, they focused their resources on that purpose rather than parking management. Moreover, corruption by parking attendants was allegedly rampant. For example,

it was reported that parking attendants did not collect fees at the specified rate, and negotiated off-record parking payments with drivers (NAT, 1960, 1967a).

To improve the effectiveness of on-street parking management, in 1966 the Bangkok Parking Fee Collection Agency was formed as a BMA municipal enterprise, with officials from both the BMA and the traffic police as members of its executive board, which was tasked with monitoring parking management and fee collection. Despite the collaborative effort between the BMA and the police, noncompliance remained prevalent due to poor coordination in enforcement (NAT, 1967a, 1967b).

Problems with Parking Meters

In 1961, parking meters were first installed in Bangkok to reduce the need for parking attendants and prevent corruption tied to manual parking fee collection (NAT, 1961). However, between 1967 and 1971, many parking meters were intentionally damaged so that drivers of parked vehicles would not have to pay fees. It was suspected that the vandalizers were shop owners or residents who parked their cars for extended periods without paying (NAT, 1967c). Another problem associated with the use of parking meters was related to the effectiveness of traffic law enforcement and the inability to penalize violators due to legal obstacles. For example, in 1969, police statistics showed that only five percent of motorists who received parking citations in Bangkok actually paid the fines (NAT, 1970a). This caused difficulty in enforcing the parking rules, rendering parking meters an ineffective tool for parking management in Bangkok.

Returning to Manual Collection

The inability of the BMA to maintain a stock of working parking meters resulted in a call to remove all parking meters (NAT, 1970b). An experiment comparing meter versus manual collection was conducted in 1970; the result showed that the revenues from manual collection were four times higher than those from a parking meter collection. Based on this result, all meters were removed in 1971, except those installed along Rajadamri and Surawong Roads.

However, following the return to manual collection, old problems reemerged, such as corruption by parking wardens, who made agreements with drivers to make daily, weekly, or monthly payments, or not issuing tickets after collecting fees. In some areas, such as Phayathai District, unauthorized attendants also collected parking fees (NAT, 1971).

In 1992, the Parking Management within Municipalities Act (No.2) B.E. 2535 (1992) was passed by the Parliament, which set a higher fine for violations. Subsequently, BMA issued the Parking Area and Parking Fee Announcement B.E. 2537 (1994), which designated 123 streets as paid parking zones and set higher parking rates. However, the following year the number of streets where parking was allowed was reduced to 65. There were attempts by the BMA governor to expand the number of streets where on-street paid parking was allowed, but the city council blocked those efforts in 2005, claiming that residents' lives would be adversely affected (Bangkok Metropolitan Administration, 2005). Despite these developments, the on-street parking situation remained unchanged, particularly because the BMA still had no legal recourse against those who refused to pay their parking citation fines.

Empowering Local Government: Enforcement and Management

In line with the national government's policy to decentralize various public services and responsibilities, in 2020 the Parking Management within Municipalities Act was passed by the Parliament to empower local governments to better manage on-street parking, and to delegate parking fee collection to private entities. At the time of writing, the BMA had recently announced ordinances pursuant to the 2020 Act that designated 65 streets and one off-street parking area as paid parking zones.

Symptoms of Ineffective On-Street Parking Management in Bangkok

In this section, we review the common symptoms of ineffective on-street parking management

observed during the field survey and virtual survey via Google Street View.

Mismatch Between Regulation and Reality

In Bangkok, the BMA is required to publish an official announcement of any road or location where on-street parking fees are charged, but there is stark difference between the official policy and actual implementation. At the time of writing (January 2022), 65 streets, most of which are in the central city area, are designated as having on-street paid-parking by the current BMA Ordinance (City Ordinance on Parking Management, 2021). In reality, however, on-street parking is permitted and fees collected on only 53 of these streets, but not on the remaining 12, where parking has been banned outright by the traffic police since 2006. The main reason for the parking ban on those streets is heavy traffic congestion in these areas, especially near flyover bridges and rail transit stations (Bangkok Metropolitan Administration, 2020). Nevertheless, despite these bans by the police, the BMA has not updated its announcement of designated on-street paid parking locations since 2004.

Lack of Markings and Signs in On-Street Paid Parking Areas

According to a city ordinance, the BMA is responsible for installing signage and pavement markings for on-street parking spaces in the places specified in the ordinance. However, according to our survey of all designated on-street parking spaces via Google Street View, of the 65 designated parking areas, 13 areas lacked any parking signage. Furthermore, our field survey, which was conducted in four study areas, revealed that the ratio of on-street parking spaces with appropriate street markings to the total available on-street parking spaces ranged from 0% to 58%.

Problems Related to Fee Collection

Our field survey also revealed that parking wardens did not collect fees according to BMA regulations. Due to legal and technical problems associated with parking meters, the parking fee collection can only be done manually by parking

wardens, who are outsourced employees of the BMA Department of Finance's Division of Commerce. The parking fee schedule is uniform for all on-street paid parking streets under the BMA announcement, with no parking duration limit. We found that the wardens did not collect the parking fee according to the specified rate, but negotiated with drivers and often collected a flat fee that was far less than the rate established by the BMA Ordinance. Additionally, we discovered that on several streets, wardens made agreements with residents of nearby properties to charge a fixed amount on a daily or monthly basis that allowed them to park their vehicles for an unlimited duration.

Lack of Parking Wardens for Fee Collection

Due to the limited number of parking wardens on the BMA's payroll, some on-street paid parking areas lacked parking wardens during the prescribed hours. Since on-street parking fees must be collected manually, parking wardens must always remain in the assigned paid-parking area, primarily from 9.00 a.m. to 4:00 p.m., except on Sundays. However, our survey revealed that several paid parking locations did not have any wardens on duty during these periods.

Weak and Irregular Law Enforcement

When vehicles are parked illegally on the street, the responsibility for enforcing on-street parking regulations rests with the traffic police, according to the Road Traffic Act B.E. 2522. Under the Act, only the police, and not BMA officials, can issue parking ban rules on streets as necessary, issue traffic citation tickets, or apply wheel clamps. However, the police generally refuse to get involved in cases of drivers not paying or overstaying a paid parking period, claiming these are violations of municipal laws, which the police have no legal power to enforce. The police may choose to intervene, but only in cases where a

car is parked in a banned zone and affecting traffic.

According to our survey, violations of on-street parking rules, such as parking in no-parking zones and parking during banned periods, are common. The rates of on-street parking violations in our study areas ranged from 38% to 100% of all parked vehicles. However, the traffic police enforce the parking rules for violators only on a selective basis. For instance, we observed that while traffic police strictly enforced on-street parking during rush hour on main roads, parking rules on secondary roads, or on main roads at night, were mostly unenforced.

Unauthorized Parking Reservation

Our field survey also showed that on side streets, particularly those in commercial areas, owners of shophouses often claimed de facto ownership and usage rights over the parking spaces in front of their properties, as shown in Figure 3. They staked their claims by placing objects such as chairs, tires, wooden barricades, or traffic cones to reserve the space. According to our survey results, an average of 21% of total parking spaces in the study area were blocked by barricades throughout the day, resulting in the street parking not being used at full capacity.

Informal and Illegal Governance of On-Street Parking Space

Most information regarding informal parking governance was collected from media reports, which frequently revealed incidents connected with on-street parking. In locations where on-street parking is currently free, particularly where demand for parking is high near public parks or commercial districts, on-street parking is frequently controlled by unauthorized individuals who collect unsanctioned parking fees. If drivers refuse to pay, these individuals may cause damage to the drivers' vehicles (News Directory 3, 2021; Thairath, 2016).

Figure 3

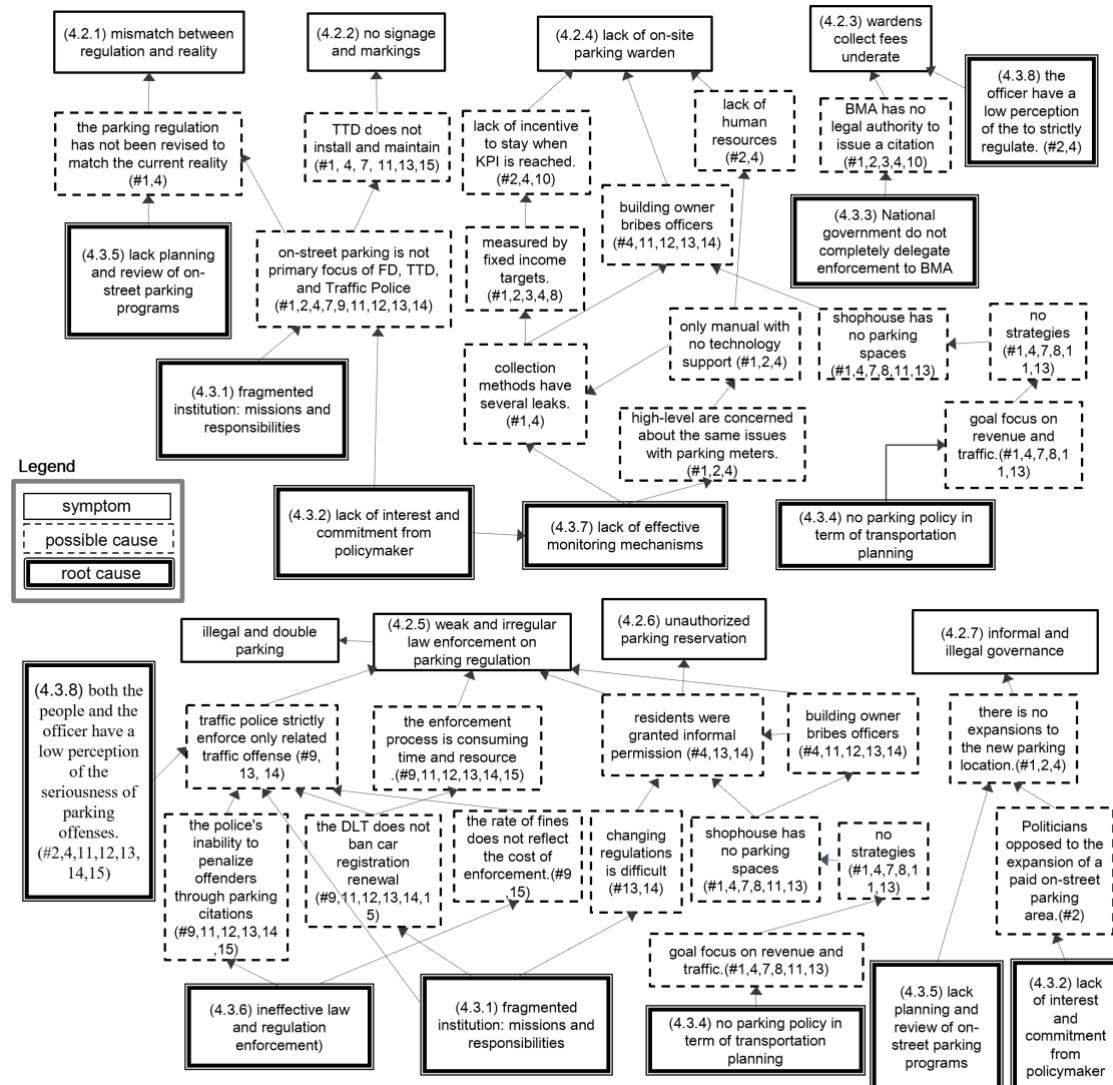
Problems of On-Street Parking Management in Bangkok



Note. (a) Parking fee schedule sign in green and faded marking in paid parking area (b) Parking warden and no-parking barricades put up by shophouse owners (c) Motorcycle barricades by shophouse owners (d) Double-parking and unauthorized reservation in front of the Ministry of Transport

Figure 4

Tree Diagram of the Causes and Symptoms of Ineffective On-Street Parking Management in Bangkok



Note. The number (#) corresponds to the interview number shown in Appendix 2.

The Root Causes of Ineffective On-Street Parking Management

The documentary research and in-depth interviews with stakeholders revealed various obstacles to effective on-street parking management, as visualized in Figure 4. This section discusses the root causes of ineffective on-street parking management as revealed by the RCA approach in combination with the *five whys* method. Eight possible root causes were identified and are discussed in this section:

Institutional Fragmentation

Our in-depth interviews confirmed our initial findings from documentary research that the institutional framework for managing on-street parking in Bangkok is highly fragmented. Each agency has independent responsibilities and missions, and there is no centralized authority to plan and manage on-street parking (#1,2,4,7,9,11,12,13,14). As summarized in Table 1, at least 14 national and local government agencies are involved directly or indirectly in on-street parking management in Bangkok. On-street parking management responsibilities are shared among the departments under three ministries of the

national government: the Ministry of the Interior (MoI), the Royal Thai Police (RTP), and the Ministry of Transport (MoT). The BMA, as a local government, reports to the MoI. In principle, the BMA should be entirely accountable for planning and executing on-street parking management; however, the BMA is only responsible for the planning, signage, road marking, and fee collection of on-street parking. Traffic police under the Metropolitan Police Bureau of the RTP are responsible for designation of on-street parking prohibition zones and parking enforcement. In addition, two department-level agencies indirectly support on-street parking management. The first is the Office of Transport Planning and Policy (OTP) under the MoT, which is responsible for developing traffic management policies. The other supporting agency is the Department of Land Transport (DLT) of the MoT, which oversees motor vehicle registration, and whose cooperation is indispensable for parking enforcement. This illustrates the fragmented structure of on-street parking governance, and at the same time, the dominance of central government agencies over the BMA.

Interagency coordination with respect to parking management in Bangkok has been difficult due to this institutional fragmentation, despite the establishment of the now-inactive joint committee of the BMA and the police for parking management. Because each agency reports to a different ministry of the national government and has separate and independent responsibilities and missions, they lack incentives to collaborate (#1,2,4,7,9,11,12,13,14). For instance, the Parking Services Unit (PSU) is a subdivision of the BMA's Finance Department that is responsible for the daily operation of formal on-street parking spaces. The primary responsibility of traffic police officers is traffic management; however, because of limited human resources, they do not prioritize enforcement of on-street parking regulations in line with BMA's PSU, which reports to a different ministry (#9, 13, 14). In another example, despite owners of vehicles failing to pay fines after being cited by police for traffic offenses, the DLT continues to renew the vehicle registration for those vehicle owners, citing the department's legal duty to renew registration regardless of outstanding fines (#9,11,12,13,14,15). According to the Office of the Council of State (2015), the DLT could be sued for not carrying out its legal duty, as

stipulated by the Motor Vehicles Act B.E. 2522, if it refused to renew the registration of vehicles whose owners have been cited for violation of the Road Traffic Act B.E. 2522 by the police. As a compromise, the DLT has agreed to accept payment of fines on behalf of the RTP when drivers pay their annual taxes, although drivers can still renew their vehicle registration even if the fines remain unpaid. As one interviewee said, "The legal process for suing for failure to pay the fine is problematic, including the court process and limited staff. In addition, traffic violations are minor offenses with a one-year prescription; thus, most cases expire before the litigation ends." For these reasons, the police have little recourse to methods of compelling drivers to pay fines, and voluntary compliance is low; in fact, only 18% of reported traffic violators paid fines in 2020 (Thairath, 2021).

At both the national and local government levels there is a lack of intra-agency coordination resulting from fragmented institutions. According to interviewees, collaboration across departments of the BMA is difficult due to their disparate responsibilities and missions, even within the same organization (#1,2,4,7,11). For example, the Finance Department of the BMA is the primary agency responsible for on-street parking management, including developing an on-street parking policy and collecting daily fees at paid parking locations. They, however, require assistance from the BMA Department of Traffic and Transportation to install and repair signage and paint the markings in on-street paid parking areas. Yet because the Traffic and Transportation Department is already overburdened with their core responsibilities of installing and maintaining traffic signs and markings across Bangkok, requests for the installation or repair of signage and markings for on-street parking regulations are frequently delayed or denied (#1, 4, 7, 11,13,15).

Moreover, interviewees stated that no authority or lead agency oversees on-street parking management; rather, everyone focuses on their primary responsibilities and day-to-day jobs (#1,2,4,9,11,12,13,14). As a result, no one acts as a leader with the power necessary to completely plan and manage on-street parking, making it more difficult to implement policies and to push for improved on-street parking management.

Table 1*Agencies Responsible for Bangkok's On-Street Parking Management*

Agency	Under	Responsibilities
Department of Local Administration (DLA)	Ministry of Interior (MoI)	The department leads the development of the Parking Management within Municipalities Act B.E. 2562 and ministerial regulations in collaboration with the MoI and other relevant agencies.
Bangkok Metropolitan Administration (BMA) BMA Council City Law Enforcement Department (CLED) Traffic and Transportation Department (TTD) The Finance Department (FD) Parking Services Unit (PSU)	MoI	BMA Council is responsible for regulating, inspecting, and monitoring the Bangkok Executive Committee's Political and Civil Servants. CLED is responsible for sidewalk enforcement to ensure compliance with applicable laws, such as the Cleanliness Control Act. TTD is responsible for installing and maintaining traffic signage and traffic marking, and designs and implements traffic engineering schemes and minor road improvements in the BMA area. The FD collects taxes and works with the BMA council to determine on-street parking locations and rates. The PSU, under the FD is responsible for operating formal on-street parking areas daily and collecting parking fees for parked vehicles on the street.
City law Enforcement Department, District office	District office, BMA	Control and regulate under the district's authority and responsibilities, including cooperating with the Department of Law, BMA.
Thai Traffic Police	Metropolitan Police Bureau, Prime Minister's Office	Plans and approves the implementation of the on-street parking restrictions. Responsible for traffic control and enforcement in support of the Metropolitan Police Station's Traffic Police.
Traffic Police, Metropolitan Police Station	Metropolitan Police Bureau, Prime Minister's Office	Controls and regulates the safety of road users, and the traffic flow. Examples include enforcement of illegal parking on streets where no parking is allowed, issuing traffic citations, clamping wheels, or towing away vehicles.
Office of Transport and Traffic Policy and Planning (OTP)	Ministry of Transport (MoT)	A transportation "think tank" engaged in developing transportation policy, infrastructure planning, transportation and traffic analyses, and traffic management schemes for Thailand's cities.
Department of Land Transport (DLT)	MoT	Responsible for motor vehicle registration, regulations related to vehicles, formal and informal transport operations.

Lack of Interest and Commitment from Both National and Local Policymakers

In Bangkok, policymakers, both at the national and local levels, who govern on-street parking policy and management demonstrate a lack of interest in and commitment to on-street parking management. Tension between the government agencies and local government contributes to this disinterest, especially because governance of on-street parking in Bangkok is only partially decentralized. The role of the BMA and local government in on-street parking management is severely limited by the central government because regulations for on-street parking rely heavily on the Traffic Police, who report to the Prime Minister's Office, and who are primarily responsible for traffic management. This constrains the BMA's capacity to control on-street parking effectively when policymakers at the national level are inactive. BMA also lacks local political support, as was made clear in 2005, when the Deputy Governor of Bangkok proposed expanding on-street parking management in Bangkok extensively, only to have the proposal rejected due to intervention by a Member of Parliament who was a representative from Bangkok (#2). Further, several interviewees said that BMA leaders, such as the governor and heads of the department responsible for on-street parking management tasks, are generally uninterested in the issue (#1,2,4,5,6,7). They noted, for example, that on-street parking was not emphasized in the BMA's mission, and that there are no key performance indicators related to on-street parking management in the Bangkok Development Plan's 20-year outlook (#1,4,7). Even though the Bangkok Metropolitan Council established a committee to study curbside parking management and submitted reports and recommendations to the relevant agencies, no action has been taken (#1,4). As a result, little systematic effort has been made by national and local policymakers to improve the effectiveness of on-street parking management.

Limited Legislative Authority of the Local Government

As a local government, the BMA lacks the legislative authority to implement effective on-street parking management as the national government has not delegated the necessary

legislative powers to the BMA. According to the Parking Management within Municipalities Act B.E. 2562, the national government has authorized the BMA and other local governments to enact municipal laws establishing paid-parking locations, parking regulations, fee collection methods, and maximum parking fee rates. Further, the Act empowers both Traffic Police and BMA officials to enforce on-street parking laws, but in practice, only the Traffic Police enforce traffic-related parking rules. If a driver fails to pay a fee for parking on designated streets, BMA employees have no legal authority to issue a parking citation (#1,2,3,4,10). Additionally, the Traffic Police have the authority to determine the rate of traffic fines, and to ban on-street parking on BMA streets, including the time period of the ban. With only limited legislative authority, the BMA cannot manage paid on-street parking effectively.

Lack of On-Street Parking Policy

Currently, Bangkok lacks a coherent on-street parking policy, and there is no direct parking policy objective. The current, unwritten objective of on-street parking management is solely for the purpose of mitigating traffic congestion. The existing on-street parking regulations, including on-street parking bans and fee collection on certain streets, do not constitute an overarching parking policy designed to optimize curbside parking utilization or link effectively to urban transportation policy (#1,4,7,8,11,13). The absence of an on-street parking policy in Bangkok is due to the lack of a main authority to promote and integrate on-street parking policies with other urban transportation plans, as well as a lack of commitment from political and local leaders (#1,4,7).

Lack of Planning and Review of On-Street Parking Programs

Bangkok has no integrated planning that incorporates on-street parking management as a part of the city's transportation plan. This is partly due to the BMA Department of Finance's technical capacity constraints. The Department of Finance's primary responsibility is focused on revenue collection, including local income and tax, rather than transportation management

pertaining to parking planning and strategy (#1,2,4,7). It is not surprising, therefore, that this organizational setup has led to the neglect of planning and reviewing on-street parking plans, resulting in on-street parking locations that do not comply with the BMA announcement, unenforced on-street paid-parking areas, and no assessment and almost no updates on parking areas.

Ineffective Law and Regulation Enforcement

As discussed earlier, the Traffic Police have no power to coerce or punish a vehicle owner if the owner does not pay fines for traffic rule violations. Due to the police's inability to penalize offenders, Bangkok's on-street parking management has suffered various negative consequences. For instance, the police must immobilize vehicles with wheel clamps to guarantee that drivers who park illegally pay fines; this procedure consumes significantly more time and human resources than issuing a ticket (#9,11,12,13,14,15). In addition, the BMA has been forced to maintain a parking warden on duty in paid-parking areas to ensure drivers pay parking fees, which is labor intensive. This hinders the BMA from implementing more efficient parking collection technologies such as parking meters or electronic payments (#1,2,4).

Another difficulty with existing legislation and regulation enforcement is that fines do not fully cover the cost of effective enforcement. For instance, the fines for towing illegally parked vehicles do not reflect the actual cost of towing and storage, creating no motivation for police to tow away vehicles unless necessary (#9, 15). According to one key informant, "There is a practical problem with towing the car; the lack of storage and the low fines discourage the private sector from participating since they believe the income is not worth the risk. Furthermore, we have no idea when the vehicle's owner will return to get the vehicle. Additionally, the fee is set at a fixed amount that does not grow as the number of storage days increases."

Lack of Monitoring Mechanisms

Effective monitoring mechanisms that track operational performance to ensure proper operation, such as car movement in and out, are

missing from the manual fee collection, management, and enforcement processes governing on-street parking. Several interviewees admitted that their operating processes lacked effective monitoring mechanisms (#1,2,4,7,11,12,13,14,15). This is partly due to a lack of equipment and technologies that can be used to monitor processes, such as CCTV, and reliance on mostly human and paper-based methods (#1,2,4,7,11). Due to a lack of adequate monitoring mechanisms, corruption is commonplace. For example, parking wardens have a fixed daily income target; they can collect fees from other sources such as bribes from homeowners, and have little motivation to collect extra fees once the target is reached, resulting in some locations where parking wardens should be present during the operational time, but are not (#2,4,10). Another example is in areas with limited on-street parking, such as older parts of the city; government officials are bribed to avoid penalizing homeowners who violate on-street parking regulations. As one interviewee explained, "If the traffic police strictly enforce the regulations against all illegal parking, it may affect the lives of the residents and business owners. Therefore, a compromise has to be made to allow them to park their vehicles." This allows property owners to unofficially reserve spaces in front of their property, or park in the no-parking zone during the ban period (#4,11,12,13,14).

Perceived Seriousness of Infringements by Drivers and Public Officers

Our in-depth interview results revealed that parking infringements were perceived as minor offenses in the eyes of the public and officers in Bangkok. Interviewees stated that on-street parking infringements, such as failure to pay for parking and illegal parking, were not major offenses, and that the public officials had no intention of strictly regulating and enforcing them as doing so could result in a backlash (#2,4,11,12,13,14,15). As noted by one subject, "The fee collection by BMA officers is not particularly effective since they fear looking bad if they act harshly against the people, and, hence, do not enforce payments as much as they should. Besides, it is a minor issue." For example, wheel clamping a car owned by a

politician, a high-ranking government official, or someone with close ties to a high-ranking government official could have adverse impacts on a police officer's job security (#4,13,14).

DISCUSSION

The documentary research and field survey findings of this study confirm that the majority of the problems seen today, such as fee collection and evasion problems, poor coordination between the BMA and police, legal impediments, lax law enforcement, and unauthorized attendants, are identical to those detailed in official government documents from the National Archive since 1971, and in Chalermpong and Ratanawaraha's study (Chalermpong & Ratanawaraha, 2019). In addition, many issues mirror those in other developing countries in Southeast Asia, such as the Philippines (Bulactial et al., 2013) and Indonesia (Barter, 2011).

The eight root causes discovered through application of the RCA framework can be classified into three components of effective on-street parking management, i.e., institutional and legislative frameworks, parking policies and programs, and implementation, as described in Section 2.1. To illustrate the scale of the problems, we classified root causes into two categories, *structure* and *stakeholder*, based on whether the problem was occurring at the institutional structure level or the stakeholder level. As shown in Table 2, it is clear that each of the three components has underlying causes that must be addressed in order for on-street parking to be managed effectively.

The root causes in the *Structure* category present significant challenges for developing countries. For example, institutional fragmentation in many Chinese cities hinders effective enforcement (Wang & Yuan, 2013), and many cities in India lack a concrete parking policy (Diyora & Dhameliya, 2020). However, there is one action that India has taken ahead of Thailand; the Indian city of Varadero completed a parking policy study in 2019 to solve parking problems and reduce the dependence on private vehicles (Vadodara Municipal Corporation, 2019).

A few of the root causes in the *stakeholder* category, as can be seen in Table 2, are uncommon in literature from developing countries (Section 2.2) and reflect aspects of Bangkok's social and political context. For one, there is a lack of interest and commitment from national and local policymakers. They have neither awareness of on-street parking issues as a critical problem, nor commitment to managing it effectively. Vu, 2017 argues that effective enforcement requires well-coordinated behavior among agencies. In our study, we discovered that stakeholders' mindsets, motivations, and incentives are not aligned, resulting in behavior that contributes to ineffective on-street parking management, as summarized and highlighted in Table 3. As one interviewee explained, "Currently, there is no adequate internal control mechanism for parking management, and performance is not monitored or evaluated." Additionally, several stakeholders are opposed to managing on-street parking and have no incentive to do so.

Of course, the primary enforcers of regulations are the municipal police and traffic police officers. Municipal police manage illegal parking on walkways, while traffic police officers cover on-street parking violations. Both fear public complaints which may negatively affect their promotion to management levels, similar to the research of Johnson (2006), who found that traffic enforcement is tied to management expectations. Moreover, traffic police and parking wardens can benefit from unregulated on-street parking regulations through bribes as there is a little incentive for the public to report corruption. In fact, the public is largely willing to bribe public officials when the incentive aligns with their motivation and mindset; when bribery occurs, traffic police abstain from penalizing infringements, such as parking during a prohibited period.

Limitations and future research

There were two key limitations to our study that may impact the interpretation of the study's findings. First, we could not interview high-level political and local leaders because of their limited availability, potentially leading to a gap in

understanding how politicians view parking management. Second, this study focuses mainly on on-street parking; the issue of off-street parking was not addressed.

Certain questions deserve further examination in future research. Even if agencies were well-coordinated, it remains unclear what kinds of on-street parking programs will meet the expectations of stakeholders when off-street

parking regulations are taken into consideration. In addition, it is worth investigating how the dawn of Mobility-as-a-Service (MaaS) and autonomous vehicles will affect on-street parking policy and management. Critically, research should consider how the public can inform on-street parking management, recognizing residents as key stakeholders, and seeking greater understanding of what will motivate behavior change and compliance.

Table 2

Mapping Identified Root Causes Under the Conceptual Framework and The Problem's Scale

Problem level	Institutional and legislative frameworks	Parking policies and programs	Implementation
Structure	(4.3.1) Institutional fragmentation	(4.3.4) Lack of on-street parking policy	(4.3.7) Lack of monitoring mechanisms
Stakeholder	(4.3.2) Lack of interest and commitment from both national and local (4.3.3) Limited legislative authority of the local government	(4.3.5) Lack planning and review of on-street parking programs	(4.3.6) Ineffective law and regulation enforcement (4.3.8) Perceived seriousness of infringements by driver and public officer

Table 3

The Stakeholders' Mindset, Motivation, Incentive, and Behavior

	Mindset	Motivation	Incentive		Behavior
			Non-monetary	Monetary	
Policymakers					
OTP, MoT	The local government is the primary host for on-street parking management, while OTP is a think-tank for the MoT.	To ensure that people access convenient, safe, on-time, and affordable transportation options.	None (Because it is not to be the primary focus of the MoT)	None (Because it is not to be the primary focus of the MoT)	OTP acts as a supporter. The on-street parking policy is not part of the transportation policy and planning.

Table 3 (Continue)

	Mindset	Motivation	Incentive		Behavior
			Non-monetary	Monetary	
Policymakers					
FD, BMA	Managing on-street parking is a minor task that demands a huge amount of effort.	To maximize Bangkok's revenue and tax collection.	None (Because it is not emphasized in the BMA's plan)	None (Because profits are breaking even)	A lack of interest since they operate just to the extent necessary to comply with the law.
Thai Traffic Police	To support the Metropolitan Police Station regarding traffic management.	Smooth traffic, no traffic congestion, and no public complaints.	Recognition from the management level, career development, and promotion	None (Because it is a policymaker level)	They lack regular updates on parking regulations and avoid enforcing policies that harm influential people, politicians, and individuals with connections to powerful people.
Policy implementers					
PSU, BMA	For civil servants to act harshly against people for on-street parking violations would be perceived as being unreasonably strict. People are not afraid of BMA employees because they do not have the same powers as police officers.	To organize on-street parking as per the law, and provide parking that is more accessible to people.	Career development and promotion	None (Because profits are negligible and all revenue must be remitted to the municipality)	They operate just to the extent necessary to comply with the law and only coordinate with the traffic police when a problem arises.

Table 3 (Continue)

	Mindset	Motivation	Incentive		Behavior
			Non-monetary	Monetary	
Policy implementers					
Parking warden	People are not afraid of BMA employees because they do not have the same powers as police officers.	To work as fast as possible to achieve KPIs.	None (They are personal outsourcing)	Bribes or other goods from local residents or business owners.	They collect the parking fee in whatever way possible. For example, they may negotiate deals with residents to provide unlimited parking for a monthly charge.
Enforcers					
Traffic police	Traffic enforcement is a minor task. Some officers oppose on-street parking because it impedes traffic.	Smooth traffic, no traffic congestion, and no public complaints.	Recognition from the management level, career development, and promotion	50% share of traffic fines and bribes for avoiding penalties for car owners for violating the on-street parking regulation.	They enforce parking regulations intermittently and selectively, only when a parked car is causing or worsening traffic congestion.
Municipal police	Municipal police are responsible for the walkways, and the traffic police are responsible for the roads.	To keep the city well-organized, minimize public complaints, and ensure that the law is followed.	Recognition from the management level, career development, and promotion	50% share of fines	They occasionally ticket cars and motorcycles parked on the sidewalk, especially when people complain.
Public					
Residents	They have de facto use of space right in front of residential property.	To have convenient parking.	To secure vehicle parking, avoid obstruction by a parked vehicle, and receive superior treatment from the officers.	Not to pay fines when parking illegally	They block the on-street parking space with objects and are willing to bribe an officer to allow parking during the prohibited period.

Table 3 (Continue)

	Mindset	Motivation	Incentive		Behavior
			Non-monetary	Monetary	
Public					
Shop-owners	They have de facto use of space right in front of property for commercial and personal purposes.	To have convenient parking for clients and employees, as well as loading and unloading goods.	To secure vehicle parking, avoid obstruction by a parked vehicle, and receive superior treatment from the officers.	Not to pay fines when parking illegally	They block the on-street parking space with objects and are willing to bribe an officer to allow parking during the prohibited period.

CONCLUSION

While the effort to manage on-street parking in Bangkok began over six decades ago, the streets of Bangkok remain plagued by parking issues stemming from mismanagement, such as widespread illegal parking and unauthorized reservation of on-street parking space. In order to understand the root causes of this mismanagement, we used a five-step modified RCA technique: 1) documentary research to explain past on-street parking management problems and lessons learned, 2) identifying symptoms observed during the field survey as well as a virtual survey using Google Street View, 3) identifying possible causes through in-depth semi-structured interviews, 4) creating a tree diagram to visualize cause-and-effect relationships in order to identify root causes, and finally, 5) analyzing the policy recommendation to improve effectiveness. In addition, the mindsets, motivations, and incentives of stakeholders on the effectiveness of on-street parking management were examined.

Our study found that the misalignment of stakeholders' mindsets, motivations, and incentives has resulted in ineffective management of Bangkok's on-street parking. Some motivations and incentives, such as bribes paid by residents to park illegally, hinder effective on-street parking management. The RCA

approach also identified eight root cause of ineffective on-street parking management, which are: 1) fragmented institutions and organizations, 2) lack of interest and commitment from both political and local leaders, 3) limited legislative authority of the local government, 4) absence of on-street parking policy, 5) insufficiency in planning and review of on-street parking programs, 6) ineffective law and regulation enforcement, 7) lack of monitoring mechanisms, and 8) perceived triviality of parking infringements by drivers and public officers.

Based on these findings, we propose priority action steps for improving the effectiveness of on-street parking management in Bangkok.

(i) The strategic approach we advocate, firstly, requires the BMA, as a local government and primary host, to take a genuine interest in on-street parking management, and to set organizational targets for current operations. These targets may be included in the agency's annual development plans in an effort to align the agents' mindsets and motivations. Additionally, the FD and CLED should speed up negotiations regarding sharing responsibility with the police for enforcing parking regulations, as per the new Act.

(ii) The BMA should develop an on-street parking policy with a specific objective. This may consider the supply and utilization of off-street parking, as

in Shenzhen (Lin & Guo, 2019), and be integrated into urban and transport policy.

(iii) It should be a priority to improve the street infrastructure for on-street parking to ensure that all road markings, curb markings, and signs are complete and communicate effectively.

(iv) The BMA's incentive structure for policymakers, implementers, and enforcers should be redesigned to promote effective on-street parking management. For instance, a parking warden may earn a bonus for collecting more parking fees than a threshold identified in the relevant KPI.

(v) The BMA and police management should emphasize public relations channels for anonymous complaints and reporting of offenses by the public; the public can use that system to report illegal parking and improper behavior by attendants. In addition, the executives of each agency should focus on monitoring the officers' responses to reports.

(vi) The BMA should begin collecting parking demand data, such as curb inventories and user behavior data, to understand the current situation and make decisions that improve operational performance, and for planning and strategic purposes.

(vii) The BMA and other agencies, with public participation, should develop a parking strategy for specific locations in order to address parking problems. For instance, to address the issue of unauthorized parking reservations, residents and business owners may be supportive of a residential parking permit program.

(viii) Incorporating the private sector may be an efficient way to improve on-street parking, as has been the case in Japan, Singapore, and China (Barter, 2011; Institute for Transportation and Development Policy China, 2015). In areas where the BMA cannot effectively govern, it should enable competitive bidding separated into districts or service areas. A monitoring system, data sharing, and payment technology such as pay-by-phone should also be included in the contract.

(ix) The national government should prioritize enacting legislation that will enable the BMA to manage all parking management activities effectively. Additionally, the BMA and police should revise laws and regulations to facilitate

on-street parking management, including the penalty structure, fee collection technologies (e.g., curbside electronic payment), and enforcement technologies.

(x) The BMA may consider setting up a central parking agency. This agency's duties may include planning, controlling, monitoring, and evaluating on-street parking regulation and management. In the Philippines, the Makati Parking Authority, a non-profit public-private partnership, is authorized to manage and implement all policies, rules, and regulations governing on-street pay parking initiatives (Makati Central Estate Association, 2021; Parking Reform Atlas, 2021).

(xi) Governments should educate the public on the importance of respecting traffic regulations and reporting corruption through the primary education system and government public awareness campaigns.

(xii) Finally, national and local governments may consider shifting on-street parking policies from 'control' to 'demand management' as part of TDM strategies. To enhance the effectiveness of on-street parking management, all stakeholders must take ownership of the project and work collaboratively toward a shared goal.

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Appendix A

Table A

Introduction of the Survey Areas

Survey area	Land-use Type	Features
Wat Mangkon	Commercial and retail	Wat Mangkon area consists of small-size restaurants, Chinese funeral products and other variety of retail shops which are closed in the evening to allow for street food vendors.
Thewet	Market and public utilities	This area is located near Thewet market which sells fresh produce and garden supplies, small-size restaurants, government offices, and pier access to Chao Phraya River which is Bangkok's main water transit system.
Boripat	Office and business	This area mostly consists of offices, auto repair shops, car parts and general retail shops.
Ban Mo	IT Commercial	Ban Mo has an IT gadget and house appliance market, restaurants, gold shops, Buddhist talisman shops, and other retail shops.

Appendix B**Table B***Interview Information*

Interview Number	Identity
#1	Bangkok Metropolitan Council Member#1
#2	Senior BMA officer #1
#3	Parking attendant
#4	Senior BMA officer #2
#5	BMA district officer #1
#6	BMA district officer #2
#7	BMA Strategy and Evaluation Department officer
#8	OTP Senior officer
#9	Sub - Inspector (Traffic)
#10	BMA Lawyer who worked on the regulation of on-street parking
#11	Traffic Police Deputy Superintendent
#12	Traffic Police Inspector
#13	Inspector (Traffic)
#14	Police official (Traffic) #1
#15	Police official (Traffic) #2