

ASSESSING THE PHYSICAL CONDITIONS OF MOTORCYCLE TAXI STANDS AND COMFORT  
CONDITIONS OF THE DRIVERS IN THE CENTRAL BUSINESS DISTRICT OF BANGKOK



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This research explores the current physical conditions of motorcycle taxi stands located near the BTS stations in the central business district (CBD) and the comfort conditions experienced by motorcycle taxi drivers at those stands. Stand conditions were assessed using design and location standards for transit stops. A total of 25 stands were surveyed and compared with design standards, considering factors such as location, physical form, and features. Stands that share similar characteristics were classified into stand typologies. Based on the environmental comfort model, questionnaires and in-depth interviews were conducted to evaluate the comfort levels of drivers, encompassing physical, functional, and psychological aspects. The results indicate that there are a number of motorcycle taxi stands that are not up to standard and are not conducive to the work-related activities of drivers. However, the informal nature of the stands positively influenced the psychological comfort experienced by the drivers. Stands with diverse features were associated with increased psychological comfort and territorial awareness compared to stands without such features. This research contributes new knowledge and offers strategic recommendations aimed at integrating motorcycle taxis into government mass transit planning. Additionally, the study proposes design and management strategies for motorcycle taxi stands to enhance the quality of work life for motorcycle taxi drivers.

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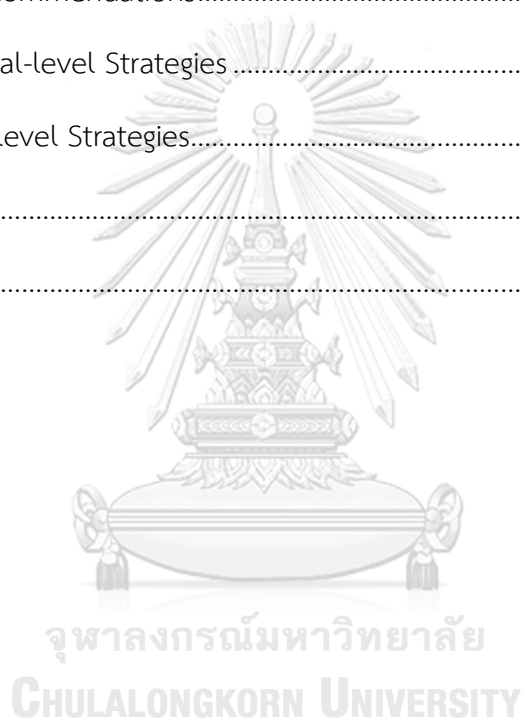
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# CHAPTER 1

## INTRODUCTION

### 1.1. Problem Statement and Research Significance

The importance of work-life quality has been recognized due to the significant role of human beings as valuable resources and social costs. With individuals spending a substantial portion of their lives at work, it is crucial to provide safe and healthy working conditions that promote the well-being, productivity, job satisfaction, and social relationships of employees (Walton, 1973). The recognition of the importance of supportive work environments is evident in various studies focusing on the effects of the physical work environment and features on the quality of work life. The growing body of knowledge has led to the development of building codes and standards, design guidelines, or contemporary science such as ergonomics applied to office furniture and equipment. One such development is the environmental comfort model by Vischer (2007), which provides a robust framework for assessing individual comfort conditions influenced by building design and elements. It provides a valuable approach to consider the well-being and morale of occupants, as well as their job performance in the workplace. The concept of environmental comfort is rooted in the recognition that individuals not only require safety and good health within the buildings they occupy but also functional and psychological support from a comfortable work environment to accomplish their tasks, reduce stress, and enhance job satisfaction. This concept can be extended beyond office spaces to evaluate work-life quality in different physical environments.

Motorcycle taxis are a crucial element in the public transportation system in Bangkok, bridging the accessibility gap resulting from inadequate integration between land use and transport planning. The rapid and uncoordinated land development in the inner city has led to a poor road hierarchy and traffic congestion, characterized by narrow alleys called "Soi" branching off main roads. Consequently, motorcycle taxis have become indispensable for providing on-demand and door-to-door mobility services to residents residing in densely populated neighborhoods far from main



roads. One key advantage of motorcycle taxis is their ability to navigate through congested traffic by finding alternative routes, enabling them to reach destinations promptly, especially during peak hours. These services primarily cater to short-to-medium-distance trips of 1-2 kilometers (Cervero & Golub, 2007; Poapongsakorn, 1994). Moreover, motorcycle taxi services extend beyond passenger transport. Drivers often provide additional on-demand services, such as transporting goods, acting as messengers, delivering food, or offering handyman assistance (Saechan, 2020; Sopranzetti, 2018). These services also provide income and employment opportunities for unskilled laborers, particularly rural migrants. The proliferation of motorcycle taxis and Wins (referring to both motorcycle taxi services and stands) reflects the high demand for this mode of transportation in Bangkok. The number of motorcycle taxi drivers increased from nearly 100 in 1986 to more than 16,000 in 1988, and reached to 37,500 in 1994 (Poapongsakorn, 1994). In 2020, there were 84,889 registered motorcycle taxi drivers and 5,564 Wins in Bangkok (Department of Land Transport, 2020).

With the development of a mass transit railway system in inner Bangkok, motorcycle taxis have gained popularity as feeder modes for commuters, particularly in the central business district (CBD) where the demand for first and last-mile transportation from rail transit stations to workplaces is high. This is evident from the presence of motorcycle taxi stands located near every BTS station. Although the motorcycle taxi service has been regulated under the Vehicle Act of 2004 (Department of Land Transport, 2004; Ryosuke et al., 2007), the establishment of stands remains complicated and unclear in terms of location determination, design, and responsible agencies. As a result, the design and formation of motorcycle taxi stands lack systematic planning. In general, stands are found strategically located where demand for short rides is high and occupy minimal areas of sidewalk space based on ridership levels and quotas of Win. Some stands consist of simple structures like shelters, sheds, plastic chairs, or outdoor umbrellas, while others are defined by nothing more than the habitual gathering of motorcycle taxi riders. A lack of standards for motorcycle taxi stands not only creates problems for pedestrians

and other traveling modes but also fails to provide suitable working and resting conditions for motorcycle taxi drivers.

From the literature reviews, a number of papers have examined the quality of work life for motorcycle taxi drivers, considering the overall aspects of the quality of life and specifically focusing on health-related aspect. Previous research on motorcycle taxis in Bangkok has mainly concentrated on their service operations and economic aspects. Some studies have also highlighted the social contributions of motorcycle taxi stands and drivers within urban areas. However, no previous studies have specifically investigated motorcycle taxi stands as transit stops or workspaces for drivers, nor have they examined the impact of these stands on the work-life quality of drivers.

Therefore, this study seeks to explore the current physical conditions and characteristics of motorcycle taxi stands located near BTS stations in the central business district of Bangkok. Furthermore, it seeks to evaluate the work-life quality of motorcycle taxi drivers by examining the comfort conditions they experience while waiting for passengers at these stands. The findings of this research will contribute to the existing knowledge base, providing valuable insights for policy development and effective management planning of motorcycle taxi services.

### **1.2. Research Questions**

- 1) What are the present physical conditions of motorcycle taxi stands located in the central business district of Bangkok?
- 2) What is the current state of comfort conditions experienced by motorcycle taxi drivers at these various stands?

### **1.3. Research Objectives**

- 1) To assess and compare the physical conditions of motorcycle taxi stands situated near BTS stations in Bangkok's central business district with the standards for the location and design of transit stops.
- 2) To investigate the comfort conditions experienced by motorcycle taxi drivers at these different stands.

- 3) To propose strategic solutions for enhancing the physical conditions of motorcycle taxi stands and improving the comfort conditions for motorcycle taxi drivers.

#### **1.4. Scope of Research**

This study focuses on the core central business district of Bangkok, specifically the Ratchathewi, Pathumwan, Bang Rak, and Sathorn districts. The research is limited to registered motorcycle taxi Wins located on the main roads near BTS stations within these districts. The content of the study pertains to the examination of the physical characteristics of motorcycle taxi stands, which can be observed visually. This includes investigating the unique features of the stands and the surrounding physical elements that shape their design. In terms of the work-life quality of motorcycle taxi drivers, the research specifically includes registered drivers who are members of these Wins. The study narrows its focus to the aspect of comfort, which refers to the state of physical, functional, and psychological ease influenced by the physical working conditions. This encompasses the exploration of drivers' experiences, emotions, satisfaction levels, and opinions regarding their workspace.

#### **1.5. Expected Benefits and Application**

The findings are expected to provide an understanding of the physical characteristics of motorcycle taxi stands and the current working conditions of and the use of space motorcycle taxi drivers. These will contribute to the existing body of knowledge in this field and can serve as a basis for future research endeavors. Furthermore, the insights gained from this study will inform policymaking and planning initiatives aimed at enhancing motorcycle taxi stands, thereby improving the work-life quality of motorcycle taxi drivers. These improvements will facilitate the integration of mass transit and feeder services, advance urban design, and promote the utilization of public transportation.

## CHAPTER 2

### LITERATURE REVIEWS

This chapter provides a comprehensive review of existing studies on motorcycle taxis and identifies relevant concepts and guidelines to formulate the research conceptual framework. The review highlights research gaps and limitations in previous research, as well as findings and methodologies applicable to this study. It covers definitions of quality of work life, the model of environmental comfort, and related standards and regulations for supportive workspaces. The related public transportation concepts are explored, along with standards and guidelines for on-street transit stops. The background, organization, and service management of motorcycle taxis, including stand establishment, are also discussed. The chapter concludes by presenting the conceptual framework based on the literature review.

#### 2.1. Review of Existing Literature on Motorcycle Taxis

##### 1) The quality of life of motorcycle taxi driver

The quality of work life for motorcycle taxi drivers has received attention in research. Lertchittsakul et al. (2019) explore the quality of work life and the factors influencing it among motorcycle taxi drivers in Bangkok. The sample consisted of 400 drivers selected from the districts of Thungkru, Rat Burana, Phasi Charoen, Bangkok Noi, and Bang Khae using purposive sampling. The variables were based on the eight criteria of Quality of Work Life (QWL) proposed by Walton (1973) (Walton, 1973). Data were collected through questionnaires and analyzed using independent sample t-tests and One-way ANOVA. The findings indicated that the overall quality of work life among the drivers was satisfactory, although the domains of "Safe and healthy working conditions" and "Social relevance of work life" received lower scores. Age and education level were identified as factors that affect the drivers' quality of life. Drivers aged 50 years and older had poorer quality of life due to decreased physical capacity and its impact on their earnings. Additionally, drivers with a high school education exhibited better quality of life compared to those with primary education,

as education level was associated with life attitude, contentment, and awareness of safety and health.

Yuyen & Saiyawong (2015) examine the development of quality of life of motorcycle taxis in Bangkok and vicinities. The sample consisted of 507 registered drivers, and data were collected using questionnaires. Data analysis involved cross-tab analysis, t-tests, and f-tests at a significance level of 0.05. The results indicated that the majority of participants expressed a high level of satisfaction with their overall quality of life. The safety aspect received the highest rating, followed by work life, spirit and soul, participation, family life, health, and communication. Income, environmental factors, housing, and education were rated at a moderate level. In terms of quality of life development, the drivers identified government agencies as the main entities responsible for regulating fares, services, and queuing systems for motorcycle taxis. They also expected government support in areas such as social security, low-interest investment loans, affordable housing, and child allowances for low-income workers.

Several studies have investigated the specific domain of the quality of life among motorcycle taxi drivers, with particular focus on aspects pertaining to health and health behaviors. De Conto et al. (2018) examine the hearing characteristics and risk of noise exposure among motorcycle taxi drivers in a southern Brazilian city. The sample group consisted of 17 drivers. The study followed a three-step process. Initially, the environmental noise levels were measured at the drivers' waiting area using a sound pressure meter. A dosimeter microphone was placed near the driver's ear inside the helmet to measure noise exposure in the traffic. Secondly, a questionnaire was conducted to collect demographic data, information about motorcycles and helmets, and drivers' perceptions of auditory and extra-auditory effects resulting from their daily noise exposure. Thirdly, tone threshold audiometry was performed to assess the drivers' hearing ability. The collected data were analyzed using statistical methods such as Friedman's ANOVA test and Wilcoxon test. The findings shows that all participants had noise exposure levels greater than 100%, with an average of 124%. Approximately 29% of the drivers exhibited hearing alterations suggestive of noise-induced hearing loss. Participants also reported

negative consequences such as fatigue, irritability, general health issues, and job accidents resulting from hearing impacts.

Arphorn et al. (2018) use a similar approach to study health conditions of motorcycle taxi drivers, specifically focusing on the association between PM10 exposure and lung function of the drivers in Bangkok. The research included 1,283 motorcycle taxis and 600 taxi drivers, who were tested for blood pressure and pulmonary function. The study compared the pulmonary functions of motorcycle taxi drivers and enclosed vehicle taxi drivers using the Mann-Whitney test. Multiple linear regression analysis was performed to assess the impact of PM10 exposure on the lung function of motorcycle taxi drivers. The findings revealed that motorcycle taxis, who spent significant time on roadsides, were exposed to high levels of airborne particulate matter, with potential exposure exceeding the World Health Organization standards of  $\geq 50 \mu\text{g}/\text{m}^3$  PM10, resulting in deteriorated lung function. However, it is important to note that the research methodology did not account for important confounding variables such as smoking behavior, past work experience, and medical history.

Chuenban et al. (2013) examine the factors associated with the health behaviors of motorcycle taxi drivers in Bangkok District, Bangkok. A total of 352 registered drivers participated in the study, providing data through questionnaires and surveys. Descriptive statistics were used to analyze population characteristics. Independent sample t-tests and one-way analysis of variance were conducted to explore the relationship between factors. The findings indicated that 63.4% of the motorcycle taxi drivers had abnormal hearing, 53.4% had below-standard visibility, and 22.4% had abnormal lung function. Personal factors such as age, marital status, driving experience, performance period, underlying health conditions, and perception of self-care benefits were identified as statistically significant factors influencing accident prevention behaviors and disease prevention behaviors.

## 2) Economic aspects of motorcycle taxis

Ratanawaraha and Chalermpong (2015) examine the market of Bangkok motorcycle taxi services, focusing on economic rent and its impact on fares. The study outlines three sources of monopoly rent: 1) locational rent; 2) quota rent; and

3) territorial rent. Locational rent was primarily determined by distance from the city center and accessibility of motorcycle taxi stands, while the other two rents were influenced by the operators' groups and their control over the number of drivers and service areas. Besides, the level of locational rent is based on accessibility. Stands strategically located in high-demand areas or those in outer areas with limited transportation options command higher fares. A field survey was conducted, and regression analysis provided the empirical evidence of the relationship between motorcycle taxi fares and locational and territorial rents. Fares decreased as stands moved away from BTS stations and stands with prime designated territories charged higher fares. The study highlighted the influence of the mass rail transit system, ridership of nearby stations, and distance from central business areas on fares.

Similarly, Kulpanich (2013) examines locational and management factors that influence fares of motorcycle taxis located along the BTS route. The findings identified five factors: location of the taxi stand, size of the stand, gas expenditure, commuting mode choices, and distance to the nearest bus stop. Stand locations at the entrances of alleys and in front of large buildings were found to have a monopoly due to high passenger demand, leading to significant fares and driver revenues. The size of the stand determined the number of rounds made by motorcycle taxis, with larger stands in prime areas having lower fares but potentially higher profits. It was crucial for stands to balance the number of drivers to avoid reducing revenues or disappointing customers with long waits.

### 3) Social aspects of motorcycle taxis

Some research suggests social contributions generated by the presence of motorcycle taxi stands and the drivers. Sirijintana (2016) examines the role of Bangkok motorcycle taxis in urban surveillance as "eyes on the street." The research focused on the Chatuchak district and analyzed the relationship between the locations of motorcycle taxi stands and recorded crime incidents in public spaces during 2016. The results showed that areas within a 100-meter radius of a motorcycle taxi stand had significantly lower crime rates compared to areas without a stand. The study identified three mechanisms that contribute to this surveillance: strategic location of stands, driver quotas, and service area scope. While waiting for

passengers, drivers have the opportunity to observe their surroundings and detect any suspicious activity. The limited membership of each stand fosters a sense of community and encourages mutual surveillance among the riders. Additionally, the service territory of each stand allows drivers to become familiar with their routes and enables them to provide immediate assistance, such as reporting suspicious individuals to the police.

Pannoi (2018) suggests that motorcycle taxis in Bangkok can serve as community reporters, contributing to the improvement of public spaces. The study found that motorcycle taxi drivers have a deep understanding of their neighborhoods and frequently observe various issues such as traffic problems, damaged infrastructure, crime incidents, and garbage. The drivers also commonly use smartphones for various purposes and express willingness to report problems through this technology. Based on discussions and workshops with volunteer drivers, the researcher developed an ICT system for community problem reporting. Prototypes of an application and online portals were tested in actual fieldwork, and the results demonstrated their practicality and effectiveness in utilizing motorcycle taxis as community reporters. The drivers who participated in the project acknowledged the benefits of reporting problems, including the prompt improvement of public spaces, an elevated social status, a sense of belonging to their communities, and a positive perception of motorcycle taxis. Their active engagement also helped prevent harassment from government officials, motivating them to continue their involvement in the care of their stands' areas.

Ibrahim and Bize (2018) discuss the social and institutional bonds formed among motorcycle taxi drivers in Nairobi through their collective waiting at designated motorcycle taxi stands called "Shimos." While the drivers consider themselves as independent entities, gathering at these spots is essential for their work. The presence at the Shimo allows operators to establish a market presence and offers security against theft, encroachments, and attempts by authorities to control or remove them. Waiting together also fosters social interactions, trust-building, and solidarity among the drivers, who are primarily rural migrants. These interactions involve discussing aspirations, politics, negotiating with street vendors,



exploring alternative economic opportunities, and mentoring new members. The Shimo serves three key purposes: as a guild, it safeguards membership benefits and sets entry requirements; as a savings cooperative, it facilitates collective investments and internal loans; and as a welfare association, it provides financial support during times of need. The drivers' contributions to the savings group demonstrate the strong bonds and intimacy developed through their collective waiting experience.

Similar findings have been mentioned in an ethnographic study by Sopranzetti (2018) that studies on motorcycle taxi drivers in Bangkok and examined their backgrounds, daily lives, and participation in the Red Shirts' protest in 2010. The study found that many drivers shared similar characteristics: they had a high school education or lower, migrated from other provinces to Bangkok for better job opportunities, chose motorcycle taxi driving due to relatively higher earnings, and aim to accumulate capital for future endeavors such as starting their own businesses. Their daily experiences navigating through traffic allow them to become familiar with the physical, social, and legal aspects of the city. Waiting at the stand allowed them to engage in the social life of the neighborhood, fostering relationships with regular clients, salaried workers, vendors, and other drivers. These interactions established them as trusted sources of local knowledge and occasionally led to unexpected opportunities for social and economic mobility, such as receiving food and drinks from neighbors in exchange for house watching and being hired by middle-class customers for errands and bill payments. These social connections were nurtured through prolonged interactions during their waiting time at the stands.

#### 4) Research Gaps and Applicable Methodology, Variables, and Findings

Existing studies have explored the overall quality of work life among motorcycle taxi drivers, considering general self-assessments of satisfaction. Further examination is needed to consider the specific aspects of quality of life and drivers with a comprehensive assessment. While previous studies have focused on the health aspects and work conditions of motorcycle taxi drivers on the roads, there is an opportunity to explore the physical conditions of motorcycle taxi stands. Since drivers spend a significant time waiting at the stands, studying the infrastructure, amenities, and overall comfort of these stands could provide valuable insights into

the drivers' well-being. Data collection methods such as survey questionnaires and statistical analysis, like t-tests, employed in the reviewed studies, can be applied in this research. Additionally, variables such as age, education level, years of experience, health conditions, working hours, and opinions on occupational health and safety issues, which may impact driver comfort, should be considered.

Previous studies in the motorcycle taxi market have primarily focused on identifying factors influencing fares. While some research has explored the social function and benefits of motorcycle taxi stands, limited attention has been given to investigating them as transit stops. This includes examining the physical structure, form, and amenities of the stands, as well as understanding drivers' perceptions and experiences of the stands. However, these studies also shed light on the decision-making process behind selecting stand locations and the work dynamics of motorcycle taxi drivers, which affect their utilization of public spaces. Considering these insights when setting variables will allow for a comprehensive examination of the physical conditions of motorcycle taxi stands and the comfort conditions of drivers. Potential variables to consider include stand position on the road, motorcycle taxi group size, waiting hours, activities during waiting, and frequency of observing crime incidents while at the stand. Methodologies utilized in social research can be applied, such as employing Google Maps or GPS for data collection to indicate stand locations, conducting in-depth interviews to gain insights into drivers' work-life experiences, and categorizing surveyed stands based on shared characteristics into typologies.

## **2.2. The Quality of Work Life**

### **2.2.1. Definition and Criteria**

The concept of quality of work life (QWL) has become increasingly significant in both the industrial and service sectors. QWL is an integral part of overall quality of life, influenced by work and work-related experiences. The notion is on the ground of recognizing employees as valuable resources rather than mere tools driven by financial incentives. How employees are treated and the fulfillment of their career goals significantly impact their performance and organizational productivity.

QWL refers to the degree to which a working organization contributes to the overall well-being of its members, both materially and psychologically (Harrison, 1985). It involves creating a positive relationship between employees and their work environment, fostering conditions that facilitate individual growth and development. Employees are granted autonomy and control over their tasks and methods, while being engaged in meaningful and rewarding work, leading to personal satisfaction and fulfillment. Furthermore, QWL takes a holistic approach, considering the interplay between people, work, and organizations. It emphasizes the importance of evaluating the impact of work on individuals and organizational effectiveness while promoting employee participation in decision-making and problem-solving processes (Davis, 1983; Nadler and Lawler, 1983).

Overall, QWL aims to create a work environment that enhances the lives of employees and contributes to the success of the organization. This is based on understanding human needs, from basic needs (physical and safety needs) to complex needs (social needs, esteem, and self-actualization).

### **2.2.2. The Link between the Quality of Work Life and Comfort**

Comfort is a fundamental for setting environmental standards. It arose from the awareness that individuals require more than a safe and healthy building to work in; they also need an environment that supports their activities. Comfort is also associated with the psychological aspect of users' environmental satisfaction and perception. When individuals experience comfort in the workplace, it aligns with the principles of QWL by contributing to their overall well-being, both materially and psychologically. Comfortable work environments, where employees have control over their tasks and methods and can perform their duties without physical or psychological discomfort, foster a sense of autonomy and empowerment, which are vital elements in QWL. Moreover, when employees are comfortable in their work environment, they are more likely to be motivated, engaged, and satisfied with their jobs, leading to increased job performance and organizational productivity.

In essence, comfort in the workplace complements the principles of QWL by providing the necessary environmental support for employees' activities, aligning with

the goal of creating a work environment that enhances employees' lives and contributes to organizational success.

### 2.2.3. The Concept of Environmental Comfort

Vischer (2007) introduced the concept of environmental comfort, which serves as a comprehensive theoretical framework for organizing growing knowledge about the influence of the physical work environment on workers. It provides a more robust outcome measure than individual self-reported satisfaction ratings to understand workplace performance.

Environmental comfort comprises three hierarchically related categories: physical, functional, and psychological comfort. While each level can be assessed independently, all three must be considered in the context. The diagram in Figure 1 illustrates the hierarchy, with physical comfort as a fundamental human need, followed by functional support for tasks and activities, and psychological comfort representing the optimum environmental quality achieved when resources are allocated to all three comfort categories.

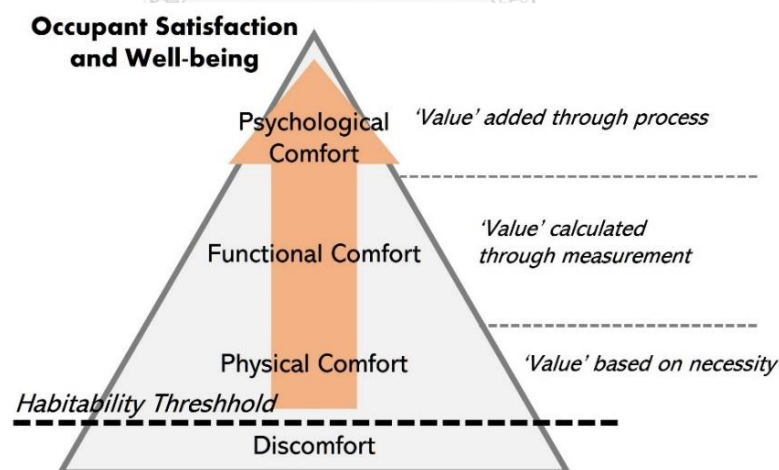


Figure 1 Environmental Comfort Model

#### 1) Physical comfort

Physical comfort is at the base of environmental comfort model which is a necessary condition for building habitability. This includes safety, hygiene, and

accessibility. The physically comfortable workplace ensures that workers are not placed under undue stress by being exposed to extreme environmental conditions such as too much heat or cold, loud noise, unpleasant odor, and poor air quality. If a building is inconvenient at the physical level, it is not likely to be acceptable at others.

Physical comfort can be provided through applying building codes, occupational safety, health, and environment act, and architectural design and construction standards which specify standards for building construction and design as well as determine basic buildings services, for example, elevators, bathrooms, parking, and cleaning and maintenance.

## 2) *Functional comfort*

At the mid-level, functional comfort focuses on the general human need of support to accomplish their specific tasks. This notion views the workspace as a tool facilitating work completion. The difference between a supportive and unsupportive work environment is the degree to which workers can conserve their energy and attention for their tasks. A task-supportive workspace enhances job performance and productivity, enabling workers to fully devote their time, energy, and focus to their works. Conversely, a functionally uncomfortable workspace drains effort and energy out of workers. When workers have to deal with chronic environmental obstacles that irritate them on a regular basis, they lose concentration and energy for work-related activities. For instance, a workspace with inadequate lighting impairs vision, an uncomfortable chair causes frequent movement to alleviate back pain, and an open plan layout leads to distractions from background noise. Sustained discomfort situations generate fatigue and stress, ultimately leading to health issues among workers. This in turn affects organizational productivity through employee lateness, absenteeism, burnout, and increased medical insurance costs.

User feedback is a key measuring tool for assessing whether workspace is functionally comfortable and to help design more supportive work environment. Workers can help identify physical features, such as lighting, color and surface of materials, workspace layout, and furniture, that provide or do not provide ergonomic

support for both individual work and teamwork. However, outcome may vary depending on respondents' type of work, job rank, and subjective perspective.

### 3) *Psychological comfort*

Psychological comfort, positioned at the top of the pyramid, is linked to environmental psychology through the concepts of territoriality, privacy, and control. The sense of territory, both individual and group, is a primary component of psychological comfort that is associated with feelings of ownership and belonging. Privacy and control, fundamental elements of territoriality, are significant criteria by which individuals perceive and evaluate their workspaces. Privacy involves being free from public attention or disruption and maintaining control over accessibility to others.

Within the workplace, environmental control takes on two forms: mechanical or instrumental control and empowerment. Instrumental control involves adjustable workspace features and equipment, while empowerment occurs through providing workers with opportunities to participate in decision-making regarding their workspace and the ability to define their own territory. Research indicates that increasing the degree of privacy and environmental control has positive psychological effects on workers. Feelings of privacy is linked to job satisfaction rating; people experiencing privacy in their workspace tend to make positive judgement on their work environment. Similarly, greater control offers several benefits, including the ability to manage environmental demands and the motivation to solve problems creatively, leading to increased learning and knowledge of their workplace. It also helps reduce strain from novelty, unpredictability, and uncontrollability of workspace change that undermine workers' sense of status and job satisfaction.

Vischer proposes methodologies for identifying and assessing psychological comfort. The awareness of territory and privacy expresses through personalization, wherein individuals use physical elements and personal belongings to establish territorial boundaries. Also, the presence of personal objects in one's workspace can signifies a sense of belonging, as individuals feel connected to and accepted by their peers, facilitating self-expression through personalization, marking, and decorating of

the space. However, the number and type of personal objects may vary based on job type, employee level, and tenure within the organization.

Subjective measures of psychological comfort can be derived from workspace users' opinions and feelings regarding territory, privacy, and control, obtained through satisfaction ratings and interviews. The level of involvement in the workspace design process—ranging from being informed about workspace-related decisions to having a say in design decisions and defining territory—reflects one's ability to control the work environment and thus predicts the degree of psychological comfort.

### 2.3. Relevant Regulations and Standards for Physical Workspaces

#### 2.3.1. Occupational Safety, Health, and Environment ACT B.E. 2554

- 1) **Section 6.** An employer is obligated to arrange and maintain the establishment and its employees in safe and hygienic working conditions and environment, and to support and promote the work operation of employees in order to prevent them from harm to life, physique, mentality, and health.
- 2) **Section 32.** For the purpose of control, regulation, and supervision of the operations on occupational safety, health and environment, an employer shall conduct hazard assessment and study on impacts of working conditions which have an effect on employee.

#### 2.3.2. Ministerial Regulations Concerning the Provision of Labour Welfare in Workplace B.E. 2548

- 1) At least one clean drinking water station for less than 40 employees, with the ratio increasing to one for every 40 employees.
- 2) Clean restrooms, built following the design and numbers prescribed in the Building Control Act and other pertinent laws, separating between gender and workers with disabilities, with regular cleaning to keep in sanitary conditions.
- 3) Sufficient medical supplies and first aid kit for a workplace with more than 10 employees.

### 2.3.3. Office space and ergonomic standards

Several standards have developed to encourage organizations to specify and invest in office furnishings to optimize space efficiency, improve employees' performance, and reduce workplace injury (Government of the District of Columbia Department of General Services, 2009; Government of the Northwest Territories, 2012; Government Property Management Centre of Expertise, 2014; O'Neill, 2011); UCL Estates Space & Feasibility, 2018). The selected workspace criteria and ergonomic standards in the research are summarized in Table 1 and 2 as follows.

#### 1) Typical components of work environment

Component	Description	Furniture and equipment
Workspace area		
Workstation	Either enclosed or open, space should serve a specific function.	Acoustic insulation wall or panel, task lighting, task chair, personal storage units or small lockable cabinets
Support area		
Collaborative space (meeting space)	Should be flexible enough to accommodate various activities and future equipment.	General lighting, whiteboard, easy-clean and stackable meeting chairs,
Kitchenette	Provide workers access to minimal light refreshments such as hot and cold beverages and simple meal preparation.	Counter, sink, dish washer, fridge, microwave, water tap, waste bin

Table 1 Typical Components of Workstation

#### 2) Ergonomic seat requirement

Seat element	guidelines
Seat height	Adjustable between 380 mm and 550 mm
Seat width	Minimum of 450 mm
Seat pan depth	If fixed, should be not more than 430 mm
Seat cushion	Should not too hard or too soft, with at least 25 mm thick
Backrest height	The minimum lower boundary is buttock height above the seat level
Backrest angle	Adjustable within the range of 90° and 120° from horizontal.

Table 2 Seat requirement guidelines

The regulations and standards for workspace design aim to ensure a safe, hygienic, and efficient work environment for workers. However, it is evident that the



responsibility for providing these benefits to employees primarily lies with employers. There are no specific regulations or measures in place to ensure safe working conditions for informal workers who operate independently in unique work settings. This regulatory gap leaves informal workers, including motorcycle taxi drivers, without adequate protection and support in terms of welfare provisions.

#### **2.4. Multimodal Transportation Concept**

Multimodal transport refers to the movement of people or goods within a transportation system using two or more different modes of transport, both motorized and non-motorized (Kumar et al., 2010; Tennessee Department of Health, 2016). It encompasses various elements in the urban transport system such as different modes of transport, a combination of public and private services, physical infrastructure, information exchange, and coordination.

The aim of multimodal transport is to enhance mobility, accessibility, and safety for urban travelers. By providing diverse connections and options for motorists, pedestrians, cyclists, transit riders, and people of all abilities, it promotes the use of public transport, ensures a balanced mix of transportation modes, and optimizes the capacity of the overall transportation network. The key components of a multimodal transport system are integration and interchange.

- 1) Integration of different modes of transport is essential for sustainable and demand-responsive public transportation. This is also required diverse mobility options at various levels, new means of public transport, and the construction of public transport-oriented infrastructure.
- 2) Interchange is one of the key element in the integrated transport system that enhances seamless travel across the modes. An interchange is a part of infrastructure involving with multimodal activities and serving as the origin, destination, or transfer point for a significant portion of trips.

Thus, transit stations serve as primary interfaces within the multimodal transportation system, facilitating seamless connections between various modes of transport and passengers. These stations play a crucial role in promoting the efficient use of public transport and managing urban mobility system.

## 2.5. Seamless Mobility Concept

Seamless travel is a key characteristic of multimodal transport system (Kumar et al., 2010; Permana & Petchsasithon, 2020). Seamless mobility is a process of intermodal transfer experienced by urban travelers to complete their trips from beginning to end without difficulties. The level of seamlessness can affect people's decisions about whether to take public transportation. If the entire trip is safe, convenient, and effective in cost and time, it will increase public transport ridership rates and hence reduce dependence on automobiles.

At a macro-scale, seamless mobility requires the integrated system for all transport modes, multimodal transit nodes, and payment systems and schedule information that make trip planning simple and comfortable for passengers, while at a micro-scale, the physical conditions of the transfer node and pathway, accessibility to each mode, and facilities within the premise of a transit hub are necessary. The four criteria to consider the seamless level at the micro-scale are as follows:

### 1) *Integration*

Integrated transit stations require careful planning and design to ensure smooth transfers between transport modes. Horizontal layouts are preferred, but as stations expand, longer transit distances and durations may arise. When employing vertical interchanges, accessibility for individuals with disabilities must be considered, making a combination of horizontal and vertical layouts necessary.

### 2) *Easiness and comfort*

The success of seamless transportation is assessed by an easy transfer pathway which provides users with a convenient transit experience for their journeys. The pathway should be able to protect travelers from sunlight, rainfall, or other climate conditions to ensure optimal comfort for them.

### 3) *Transit distance and time*

The distance between transport modes should be as brief as possible to ensure the easy and in-time intermodal alteration for all type of users. Shorter transit distance together with station map information will minimize the delay caused by route disorientation and uncontrolled crowd during peak hours.

#### 4) Convenient facilities

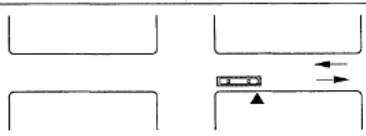
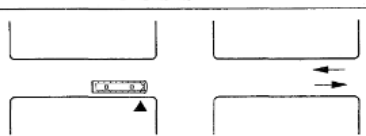
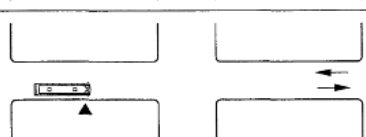
A transit trip is door-to-door rather than stop-to-stop. Various facilities both within the station and along the pathway can make the transit experience more pleasant and enjoyable. Station amenities such as information desks, ticket vending machines, and convenience stores, along with street components like benches, lighting, and landscaping, contribute to safety, navigation, and comfort during mode transfers. Surrounding land uses also play a role in providing shelter and amenities.

## 2.6. Guidelines for Location and Design of On-street Transit Stops

### 2.6.1. Design of On-street Transit Stops and Access by APTA

The American Public Transport Association (APTA) has developed guidelines for designing on-street transit stops to enhance accessibility and improve transportation options. These recommendations aim to support transit agencies and communities in creating a multimodal transportation system that increases ridership, revenue, safety, pedestrian opportunities, and overall transportation balance. The primary objective is to ensure a positive passenger experience by addressing connectivity, universal design, safety, comfort, legibility, and quality (APTA, 2012). The relevant guidance for the location and design of on-street transit stop are summarized in Table 3.

Component	Description and measurement
<b>Street design</b>	
Pedestrian clear zone	A clear zone should have a minimum width of 5 ft (1.5 m) to accommodate two people or wheelchairs. A width of 6 to 8 ft (1.8 m) is preferable. In high-pedestrian areas, such as CBDs, mixed-use areas or campuses, a width of 10 to 15 ft (3 to 4.5 m) is common. Width should be adjusted based on pedestrian activity and context.
Buffer zone	The buffer zone, situated between the clear zone and the street, consists of an edge zone and a street furnishing zone. The edge zone permits car door and mirror overhangs, while the furnishing zone accommodates light poles, transit stops, street furniture, trash receptacles, and landscaping. The minimum width for a buffer zone is 2 ft (0.6 m).
Frontage zone	The 2 ft in front of a building will not be used by pedestrians or considered part of the clear zone. Low obstacles are acceptable in the frontage zone.
<b>Surrounding land uses</b>	

Architectural elements	Add architectural elements of buildings adjacent to sidewalks such as canopies that provide additional shade and shelter from rain and wind. Avoid elements that increase the effect of weather conditions, for example, reflective façade that direct summer heat onto pedestrians.
<b>Types of stop location</b>	
Far-side bus stop	<p>Bus stops immediately after passing through an intersection.</p> 
Near-side bus stop	<p>Bus stops immediately prior to an intersection</p> 
Midblock bus stop	<p>Bus stops within the block</p> 
<b>Stop wayfinding</b>	
Design	<p>The transit stop signage should clearly indicate the presence of transit service. It should be distinctive from a distance of 300 ft to 500 ft (90 m to 150 m) in both direction and its shape, color, and reflectiveness should identify the area as transit stop to both motorists and pedestrians.</p>
Information	<p>Basic information on the transit service should be provided as follows:</p> <ul style="list-style-type: none"> <li>● Phone number and website of transit agency</li> <li>● Name or identification of stop</li> <li>● Service routes</li> <li>● Destination of routes</li> </ul> <p>The following is additional information to encourage casual and first-time riders:</p> <p>Fare information</p> <ul style="list-style-type: none"> <li>● Schedule or frequency of service (first and last service time of the day)</li> <li>● Real-time arrival information provided either via a display at the stop or mobile phone's application</li> <li>● Route map or system map</li> <li>● Contact information for the transit police</li> </ul>
Symbol	<p>Use standard (local) transit agency symbols and lettering for identification on signs. Design signages to respect or integrate with building scale, architectural</p>

	features, and the streetscape.
<b>Stop amenities</b>	
Shelter	<p><b>Location</b></p> <ul style="list-style-type: none"> <li>● Avoid locating shelters in the clear zone.</li> <li>● Shelters should be located at the end of transit stop zone making them visible to approaching buses.</li> </ul> <p><b>Setback</b></p> <p>A minimum 2 ft (0.6 m) set back should be maintained between the roof or panels of the shelter and the back-face of the curb.</p> <p><b>Height</b></p> <p>A minimum clearance of 7.5 ft (2.28 m) is required between the underside of roof and the sidewalk surface.</p> <p><b>Design features</b></p> <ul style="list-style-type: none"> <li>● Install lights in shelters when existing streetlights provide adequate lighting for the safety and security of passengers.</li> <li>● Shelters should be designed to protect waiting transit patrons from local climatic conditions such as wind, rain, and harsh sun.</li> <li>● Most shelters require a roof and side panels to be practical and attractive.</li> <li>● Adhere to Crime Prevention Through Environmental Design principles, prioritizing sightlines, and visibility. Shelter walls are constructed using transparent or semi-transparent materials to ensure waiting passengers can see their surroundings.</li> </ul>
Seating	Install benches at transit stops for comfortable seating, ensuring clear visibility of approaching vehicles and unobstructed clear zones.
Trash receptacle	<ul style="list-style-type: none"> <li>● Attach the trash receptacle to the ground to prevent illegal movement</li> <li>● Allow at least 3 ft (0.9 m) spacing of the trash can from other street furniture.</li> <li>● Locate the trash receptacle at least 2 ft (0.6 m) from the back of the curb.</li> <li>● Avoid using materials that permit fluids to leak out.</li> </ul>
Other features	Use pedestrian-scale landscaping, trees, pavement color and texture, street furniture components, and kiosks to create visual variety and attractiveness of the transit stops. Streetscape features should be placed in a buffer zone to separate the vehicular traffic and the pedestrian traffic.

Table 3 Related Design Guidelines of On-street Transit Stops and Access (APTA, 2012)

### 2.6.2. Multimodal Access Design Guidelines by BART

The San Francisco Bay Area Rapid Transit District (BART) has released the Multimodal Access Design Guidelines (MADG) to support Transit Oriented Development (TOD) policies and enhance sustainable communities. The MADG focuses on improving access for transit riders to and from stations, prioritizing active modes such as walking and cycling over high-occupancy and single-occupancy vehicle modes. It provides specific design requirements, including quantitative measurements and qualitative descriptions, for various components within multimodal transit station areas (BART, 2017). The guidelines aim to ensure safe, comfortable, affordable, and efficient access, and are accompanied by illustrations and detailed guidelines in the following section.

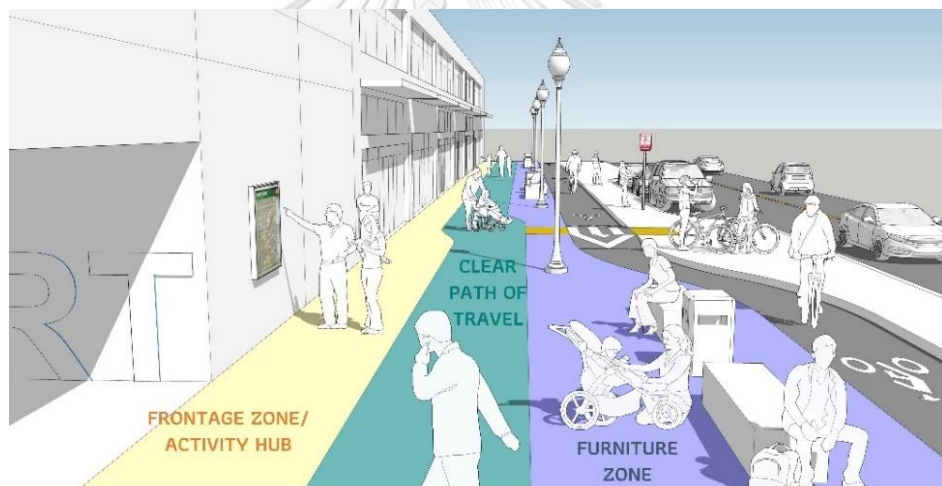


Figure 2 BART Sidewalk Zone

The sidewalk space can be divided into three sections: the frontage zone/activity hub, clear path of travel, and furniture zone (Figure 2). The frontage zone or activity hub serves as an extension of the building and encompasses the building structure, facade, and adjacent space. The clear path of travel is an unobstructed path for pedestrians ensuring accessibility. The furniture zone, located between the curb and the clear path of travel, accommodates street furniture and amenities like lighting, benches, trees, and bicycle parking. Table 4 shows relevant guidance for transit stop design to enhance safety and convenience mobility in a multimodal transport system.

Component	Description and measurement
<b>Passenger shelter</b>	
Distance from curb	Maintain a minimum 5 ft sidewalk clear zone around shelter structure. Bus shelters should be located parallel to the curbside.
Clear path behind or in front of shelter	Maintain a minimum 6 ft sidewalk clear path of travel zone around shelter structure. In commercial settings, an 8 ft to 12 ft wide pedestrian through-zone on the sidewalk adjacent to the shelter is preferable.
Height	Bus shelters should have the same clearance as sidewalk height clearances and canopy area should be maximized while maintaining the shelter structure footprint as compact as possible to offer coverage without impeding pedestrian traffic on the sidewalk.
Clearance from curb	Bus shelters can extend beyond the structure footprint but should maintain at least 2 ft of clearance from curbs to allow buses to pass.
<b>Bus stop features</b>	
	Provide passengers amenities such as shelters, wayfinding signage, benches, and trash cans, while ensuring that these elements do not obstruct the clear pedestrian path.
Signage	Coordinate signs with lighting by using low-glare materials and illuminate signs.
Paratransit loading	Curb loading space for paratransit vehicles should provide adequate space for the maximum vehicle length plus 10 ft of space between vehicles to accommodate pull in/pull out operations.

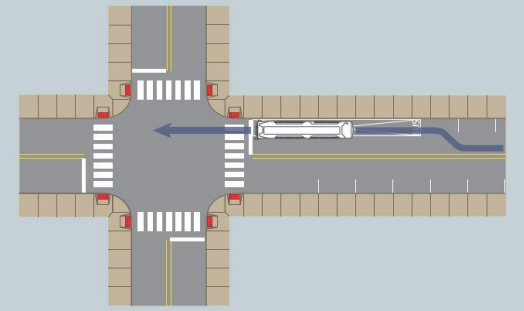
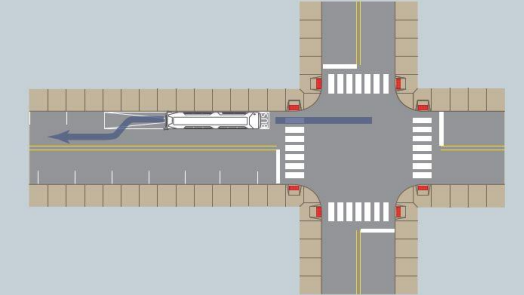
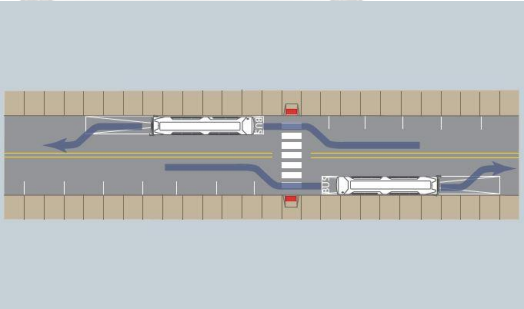
Table 4 Related Design Guidelines for Multimodal Access (BART, 2017)

### 2.6.3. Bus Stop Design Guidelines by DVRPC

The Delaware Valley Regional Planning Commission (DVRPC) is a designated metropolitan planning organization responsible for a nine-county region spanning Pennsylvania and New Jersey. In line with their commitment to an equitable, innovative, and sustainable region, the DVRPC has developed transit planning principles and design guidelines that prioritize multimodal transportation and land use integration. This includes a report on SEPTA bus stop design guidelines (DVRPC, 2019).

The comprehensive report aims to provide guidance to municipal officials, urban planners, traffic consultants, designers, and land developers for designing surface transit stops. It covers four key components: stop placement, in-street design, curbside design, and stop elements, which collectively improve the connection between transit stops and their neighborhoods while enhancing the waiting

experience for passengers. Table 5 presents a summary of the criteria applicable for this study.

Component	Description and measurement
<b>Types of stop location</b>	
Near-Side Bus Stop	<p>Bus stops are placed before the intersection</p> 
Far-Side Bus Stop	<p>Bus stops are placed after proceeding through the intersection (preferred)</p> 
Mid-Block Bus Stop	<p>Bus stops in the middle of the block. (Undesirable and should only be considered in limited applications)</p> 
<b>Stop elements</b>	
Transit shelters	<ul style="list-style-type: none"> <li>● Use durable and architecturally sound materials for shelter construction.</li> <li>● Shelters should have a roof and be enclosed on at least two sides.</li> <li>● Consider site-specific design for protective sides or solar shading based on local weather conditions.</li> <li>● Should be oriented towards the pedestrian path leading to the loading area.</li> <li>● Use tempered glass panels or clear-view materials to provide visibility of approaching buses.</li> </ul>



Stop area seating	<ul style="list-style-type: none"> <li>• Benches should be made of a long-lasting material that is resistant to vandalism and weather exposure.</li> <li>• A minimum length is 6.5 ft (2 m), or the equivalent of three seats.</li> <li>• A leaning rail, a large-diameter tube, a low masonry wall, or other forms of seating can also be used as an alternative to benches.</li> </ul>
Trash receptacle	<ul style="list-style-type: none"> <li>• Trash receptacles should be placed at stops with high ridership or places that have a potential for accumulating garbage.</li> <li>• Placement of trash receptacles should not be in a loading area, pedestrian pathway, and direct access between a waiting area and a loading pad.</li> </ul>
Lighting	<ul style="list-style-type: none"> <li>• Adding lighting within bus stops provides a sense of security and helps define the waiting area. An average level of 1.3 to 2.6 horizontal foot candles or 13 to 26 lux is recommended for bus stop lighting.</li> <li>• A neighboring streetlight can also be utilized to illuminate the stop area.</li> <li>• The bus stop signs should be lighted and shelter fixtures, if available, can provide additional light levels; LED lighting is recommended.</li> </ul>
Signage	<ul style="list-style-type: none"> <li>• A bus stop should be clearly identified with a two-sided sign on its pole.</li> <li>• Clear and distinct signage assures transit riders that they are at the right location and waiting for boarding the right bus.</li> <li>• Specify a standard sign size, with lettering displaying the bus route number, unique stop identifier number, and route destination locations.</li> <li>• provide basic information such as fares, maps, wayfinding, and customer service contact numbers. Electronic signs can also offer real-time information on arrival and departure times, weather, schedules, and advertisements.</li> </ul>
Public art	Collaborate with the local community to design and create murals and street art which help create a sense of place and positive health benefits.

Table 5 Related Guidelines for Transit Stop Location and Design (DVRPC, 2019)

#### 2.6.4. Transit Design Guidelines by WeGo Public Transit

WeGo Public Transit is the main transportation authority serving the Nashville metropolitan area. They offer a range of services including fixed-route buses, paratransit for people with disabilities, and downtown circulators. WeGo is committed to providing excellent transportation and accessibility for all passengers. To ensure consistent and accessible transit facilities, WeGo has developed a manual with guidelines for designing and placing transit facilities. These guidelines comply

with the Americans with Disabilities Act and aim to create well-designed transit facilities that can be applied in different locations and contexts (WeGo, 2019). The following are selected guidelines for transit stop design as well as the various amenities that can be incorporated to make trips more comfortable and efficient for transit riders (Table 6).

Component	Description and measurement
<b>Bust stop amenities</b>	
Bus stop sign	<ul style="list-style-type: none"> <li>● Bus stop signs should be located at the end of bus stop or on the far side of the accessible landing area.</li> <li>● Contain information for stop identification, the destination or direction that the stop is serving, bus numbers, schedules, and timetables.</li> <li>● Color, style, character size, and spacing of signs should be consistent, visible, and legible. Sign vandalism prevention, easy maintenance, and replacement should all be considered prior to installing a bus stop sign.</li> </ul>
Shelter	<ul style="list-style-type: none"> <li>● Add shelters to bus stops with over 25 daily riders</li> <li>● Maintain a 5 ft buffer behind shelters if space allows</li> <li>● Use transparent panels or steel mesh for visibility and vandal resistance</li> <li>● Choose shelter locations to utilize existing facilities and enhance visibility.</li> <li>● Keep a 2 ft clearance between shelters and curbs to prevent bus collisions.</li> <li>● A two-pole support system for canopies is recommended to minimize space and solve site restrictions such as right-of-way and accessibility.</li> </ul>
Lighting	<ul style="list-style-type: none"> <li>● Consider context and existing lighting before adding lighting to bus stops for security and visibility. Options include nearby streetlights, light from adjacent businesses, or stand-alone poles.</li> <li>● Ensure a smooth transition from darkness to light and orient light fixtures downward to reduce light pollution.</li> <li>● Avoid excessive or spotlighting, as it can impair visibility.</li> </ul>
Benches	<ul style="list-style-type: none"> <li>● Benches located in shelters should be supported by the back of the shelter.</li> <li>● Use durable yet comfortable materials to encourage their use.</li> <li>● Benches placed at stops with high boarding numbers and maintain a 5 ft clearance from the curb.</li> <li>● Benches outside shelters should be positioned near natural cover for comfort and protection from the elements.</li> <li>● Consider ambient lighting when placing benches for safety and visibility.</li> </ul>



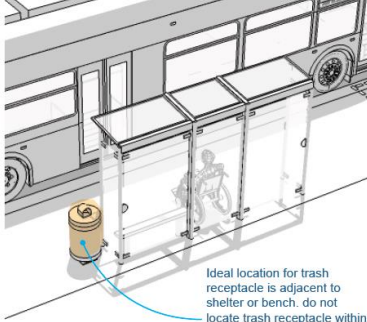

	<ul style="list-style-type: none"> <li>• Benches within shelters should be supported by the shelter's back.</li> <li>• Choose durable and comfortable materials to encourage use.</li> </ul> <div style="display: flex; justify-content: space-around;">   </div> <div style="display: flex; justify-content: space-around; font-size: small;"> <p><i>WeGo bench with advertisement</i></p> <p><i>WeGo shelter bench</i></p> </div>
<p>Trash receptacle</p>	<ul style="list-style-type: none"> <li>• Prioritize installing trash receptacles at bus stops with high rider traffic.</li> <li>• Place trash can next to benches or shelters and secure them to the ground.</li> <li>• Ensure trash cans have lids for security and to prevent litter from escaping.</li> <li>• Use durable materials: stainless steel, painted galvanized steel, or aluminum.</li> </ul> <div style="display: flex; justify-content: space-around;">   </div> <div style="display: flex; justify-content: space-around; font-size: small;"> <p><i>Trash receptacle placement at bus shelter</i></p> <p><i>Current WeGo trash receptacle</i></p> </div>
<p>Public art and placemaking</p>	<ul style="list-style-type: none"> <li>• Incorporate public art installation to enhances placemaking, help build civic pride, and make the stops unique.</li> <li>• Priority is given to local artists for art installation. Art should avoid offensive and sensitive subject matter and be focused on building community.</li> <li>• Art installations should consider site context, durability, and maintenance.</li> </ul>
<p>Integrated advertisement</p>	<ul style="list-style-type: none"> <li>• Adheres to state and local requirements</li> <li>• Incorporate with the shelters and blend with the surrounding environment</li> </ul>

Table 6 Related Guidelines for Transit Stop Design and Amenities (WeGo, 2019)

## 2.7. Review of Motorcycle taxis in Bangkok

### 2.7.1. Background of motorcycle taxi service in Bangkok

According to Poapongsakorn (1994), the first motorcycle taxi service in Bangkok emerged in the 1980s in Ngam Du Phli alley and suburban areas of Don Muang and Bang Kapi Districts. The service catered to high-density communities located within the alleys approximately 1.2 kilometers away from the main road. Public buses were infrequent in the area, posing difficulties for low-income residents who were unable to afford taxi or tuk-tuk fares for their daily commute. To assist their neighbors, residents with motorcycles provided transportation free of charge, with shared gasoline costs. In June 1981, the navy group and community members who owned motorcycles established a motorcycle taxi group, charging fares of 2-3 THB per person per trip. As the service gained popularity, more drivers joined, seeking additional income or full-time employment. To maintain service quality and safety, the group implemented rules on fare rates, parking, queue management, and prohibited racing, gambling, and drinking while transporting passengers. The success of the Ngam Du Phli motorcycle taxi service led to the establishment of similar services in other areas of Bangkok.

Udomrat (2007) identifies three key factors contributing to the proliferation of motorcycle taxi groups throughout various districts of Bangkok.

#### 1) Physical factor

Bangkok's urban fabric characterizes by superblocks and narrow alleys known as "Soi." Poor urban planning has resulted in a lack of sufficient arterial and collector roads, making large areas inaccessible. Additionally, the rising property prices and urban density in the inner city have pushed housing development to expand to outer areas, leading to the emergence of numerous narrow and dead-end Sois, posing challenges for accommodating two-way traffic.

#### 2) Economic factor

This factor arises from the government's limited fiscal and institutional capacity to provide adequate public transport services, exacerbating traffic congestion during rush hours. Motorcycle taxis offer a preferred mode of transport due to their speed,

flexibility in routes, and ability to navigate congested roads and narrow alleys, circumventing traffic.

### 3) Social factor

The growing population in Bangkok has led to increased demand for both transportation services and employment opportunities. Motorcycle taxis serve as an affordable transportation option for urban dwellers and provide income and employment for unskilled laborers, particularly migrants from rural provinces seeking work in the service sector. The ease of entry into the motorcycle taxi industry, higher wages, and self-employment opportunities attract individuals with no specific skills, experience, or educational qualifications.

#### 2.7.2. Organization and operation of motorcycle taxi groups

Motorcycle taxi services organized in Bangkok are usually known as a “Win”. a term derived from horse racing that symbolizes the first motorcycle taxi driver to reach a passenger. Presently, “Win” can refer to both the motorcycle taxi organizations and stands. Each win operates within its own service area, determined by street or district, to avoid overlapping services and competition among different wins. These services are typically organized and managed by groups of members.

Ratanawaraha and Chalermpong (2014) outline a typical organizational structure of a motorcycle taxi group, consisting of four main groups with specific roles:

##### 1) *The Win owner*

Win owners or founders are often non-commissioned police or military officers or influential individuals. Before regulations were enforced, founders played significant roles in selecting suitable locations, requesting permission from local police officers, and ensuring no competing groups existed. They had the authority to manage the group, collect fees, enforce rules, and resolve conflicts among members. Some founders benefited from connections to local government officials. However, after the enforcement of regulations in 2005, the role of owners decreased significantly. Many motorcycle taxi groups now operate without specific owners and are managed by leaders and members within the groups.

### *2) The head of Win*

Win leaders, or “Hua-na Win,” are selected by members and serve as the chair of the committee. They perform several roles including submitting permission requests to establish a motorcycle win, supervising the service, ensuring members comply with rules, and representing the group in external matters. If win members violate traffic rules, the leaders must negotiate with the police for leniency in fines or penalties.

### *3) The Win committee members*

The Win committee members, or Gam-ma-gaan Win, are selected by win members to support the leader in making decisions on internal matters. They oversee accepting new members, establishing rules, and disciplining rule violators. Some groups offer financial support, such as low-interest loans or common funds for member assistance during sickness. The provision of financial aid varies depending on the management and relationships within each win.

### *4) The Win members*

Win members, or operators, are motorcycle taxi drivers officially registered with the District Office of the BMA. While various types of drivers may be present within a win, only registered members with numbered vests have voting rights and participate in decision-making on important matters. Drivers who rent or borrow vests solely have the right to operate the service. Due to similar economic status and backgrounds, the relationships among members are relatively horizontal, and decision-making within the group tends to be democratic.

To become a motorcycle taxi driver, new entries are required to possess a registered motorcycle for public transportation, a vehicle ownership certificate, and a valid public driving license. Approval from the Win leader, committee, and members is necessary for joining a group. Typically, new drivers are introduced by existing members, often relatives, friends, or acquaintances, to maintain a harmonious work environment and build trust among members. New drivers are required to pay an administration fee, which goes into a common savings fund. The fee amount varies between wins, ranging from 400 to 6,000 THB, with an average of approximately 4,000 THB. The group leader provides the driver with a distinctive, orange-colored

vest, costing around 250 THB, which displays the Win's information, queuing number, and the driver's public driving license. (Kulpanich, 2013).

Currently, there are no specific regulations in Bangkok regarding the quota of motorcycle taxis for each group. The number of operators varies based on factors such as ridership demand, management convenience, and the decisions of Win leaders. Udomrat (2007) categorizes motorcycle taxi groups into three sizes: the small-sized group (less than 30 drivers), the medium-sized group (31-70 drivers), and the large-sized group (more than 70 drivers).

Queuing system is widely used in motorcycle taxi services to efficiency and consistency in the service. Kulpanich (2013) identifies two common queuing patterns:

1) Key tag system

This is prevalent among small and medium-sized groups. The head of the motorcycle taxi group assigns numbered key tags to indicate the service order of members. The driver whose vest number matches the tag's number hanging at the top of the board will be the next to pick up a passenger. After completing a trip, drivers return to hang their key tags in order and wait for their turn at the stands. In cases where the next driver is unavailable, the following driver will be able to operate.

2) Turnover system

This is typically used by large groups or when parking spaces are limited. Drivers form queues on their motorcycles, parked in a single line along the street. They remember the order and remind each other to avoid confusion. After dropping off passengers, drivers ride back to their stands and join the last queue.

Under both systems, drivers are not permitted to pick up new passengers during their return to the motorcycle taxi stands.

### **2.7.3. Regulations and Relevant Agencies of Motorcycle Taxis**

Motorcycle taxis have been subject to several endeavors to formalize and regulate by various state agencies (Ratanawaraha & Chalermpong, 2014; Ryosuke et al.,2007). In the early stage, the formation of motorcycle taxi groups was informal and led by ordinary individuals or local influential figures. The increasing number of

operators resulted in conflicts over group establishment and debates on the legality of motorcycle taxi services. In response, the Council of the State revised the Motor Vehicle Act in 1979, categorizing motorcycles as either for private or public use. The director general of the Department of Land Transport (DLT) also affirmed that motorcycle taxi services did not violate vehicle laws, thus legitimizing them in 1982. At that time, motorcycle taxis fell under the authority of the National Police Agency, and the police station superintendent had discretion in granting permissions and enforcing traffic laws for motorcycle taxi drivers.

In 1988, the responsibility for regulating motorcycle taxis was transferred from the National Police Agency to the DLT. Subsequently, the Motor Vehicle Act of 1979 underwent further revisions to address issues such as vehicle registration for public transport and the use of private driving licenses. These revisions resulted in regulations that mandated only drivers with a public driving license and a public vehicle license plate (yellow plate) were permitted to operate motorcycle taxis. Additionally, regulations were implemented to gather data on the number and routes of motorcycle taxi services in Bangkok. However, the National Police Agency retained the authority to grant permission for establishing motorcycle taxi wins.

The most comprehensive effort to regulate motorcycle taxi services reflected in current enforcement of the Motor Vehicle Act of 2004 (Vol.13). The regulations were revised and enforced on 11 May 2005 to resolve problems of illegal administration, arbitrary fare charges, and extortion, and align with the government policy to eradicate influential people. The regulation covers formalization of motorcycle taxi services, the provision of safety measures, and the control of driver behavior.

In terms of formalizing the services, these regulations pertain to the establishment of fare rates, which stipulate that the initial 2-kilometer charge must not exceed THB 25, while subsequent kilometers should not surpass THB 5 per kilometer. If the distance exceeds 5 kilometers, the fare rate may be determined through negotiation between the driver and the passenger. Additionally, specific license plate requirements are outlined along with a directive for drivers to wear designated Win jackets. With regard to ensuring safety, the regulations dictate the



obligatory provision of safety equipment for passengers, such as installing handles and providing helmets. To maintain control over motorcycle taxi drivers, the regulations mandate registration procedures, which entail an annual tax payment of THB 100 and a fare for obtaining a driving license amounting to THB 150 for a three-year validity period. The regulations also include provisions for the banning or cancelation of driving licenses, as well as penalties for violations of traffic rules and the provision of inappropriate services.

Under this regulation, there is more coordination between related agencies, of which roles and responsibilities were defined, as follows:

*1) The Department of Land Transport (DLT)*

The DTL is responsible for issuing a public driving license and a yellow plate for drivers, who have already registered with the District Office of the BMA. The DLT also issues a set of measures for motorcycle taxi services under the 2004 Motor Vehicle Act regarding fare-setting, safety service, and control of driver behavior.

*2) The District Offices of the BMA*

The District Offices of the BMA serve as a registration site to certify status of motorcycle taxi drivers whose stands are located in their jurisdictions as well as a coordinator between relevant state agencies and drivers. Each District Office has the authority to work on behalf of The Committee of Bangkok Metropolitan Council to consider and give permission to operators to establish new motorcycle taxi wins.

*3) The Metropolitan Police Bureau*

The Metropolitan Police Bureau is responsible for enforcing traffic laws and punishing drivers who violate the regulations according to the Land Traffic Act of 1979.

*4) The City Law Enforcement Department*

The City Law Enforcement officers have authority and responsibilities concerning the enforcement of ordinances within Bangkok Metropolis and other laws that mandate Bangkok Metropolis to exercise power and uphold orderliness. They are authorized to patrol and impose fines of comparable amounts on motorcycle taxi drivers who inappropriately use public space according to the Act on the Maintenance of the Cleanliness and Orderliness of the Country B.E. 2535 (1992).

#### 2.7.4. Establishment of Motorcycle Taxi Stands

As previously mentioned, the word “Win” also refers to a physical site at which motorcycle taxi drivers gather to rest and await passengers. Another term widely used to mention to motorcycle taxi stands is “Sûm-win” which “Sûm” in Thai means a small temporary booth or shelter. Some Sûm-Wins are formed by temporary structures, while others are devoid of physical infrastructure, consisting merely of a group of drivers sitting together with their motorcycles parked in order.

Unlike conventional transit stops, motorcycle taxi stands are characterized by a unique waiting practices and complex procedures involved in their establishment. Instead of picking passengers up at specific spots along the service routes, motorcycle taxi drivers have to wait to offer services at designated stands. Moreover, the location of stands is initially determined by the operators themselves, in contrast to other transport stations that are typically designated by government agencies or private investors. The process of setting up a motorcycle taxi stand involves multiple steps and interactions with various sectors. The following section will outline the process of establishing a motorcycle taxi stand.

According to the announcement of the BMA Committee Subject: Determination of Win Location and Criteria for Issuing a Certificate of the Use of Public Motorcycle in Bangkok (2020), operators are required to choose a minimum of three representatives or at least half of the members to apply for certification and a public motorcycle use certificate. These applications should be submitted to the BMA sub-committee in the district where the new motorcycle taxi stand is situated. Typically, the representatives chosen are the win leader, committee members, or highly respected members. The necessary documents for the application process are outlined below.

- 1) Map showing the Win location and layout of the parking space
- 2) Photos of the win location and the parking space
- 3) Consent letter to use property for establishing a motorcycle taxi Win
- 4) Copy of the land title or property ownership confirmation letter
- 5) List of drivers in the group with a copy of the valid public motorcycle driving license of each driver

- 6) Copy of the vehicle registration showing the driver as the owner, or evidence of the vehicle acquisition showing the driver as the buyer or hire-purchaser
- 7) Clarification of routes or the service area and fares

The secretary of the BMA sub-committee verifies the submitted documents for establishing a motorcycle taxi Win before presenting them to the sub-committee board. In addition to the announced criteria, the sub-committee considers relevant laws and regulations, location suitability, distance from other stands, and pedestrian safety when approving a new Win. Once approved, a notice with the list of drivers is displayed at the BMA district office and the responsible transport office within 7 days. If no objections are raised during this period, the sub-committee issues a certification of win establishment and a certificate for each driver.

Although the stands are certified and registered, the representatives hold responsibility for overseeing their motorcycle taxi groups. This includes creating signage with details specified by the DLT (such as the Win's name, service area, and fares), refraining from renting, trading, or duplicating the win vests provided by the BMA district office, and ensuring that members adhere to various regulations.

In 2019, Bangkok had approximately 5,493 motorcycle taxi stands, distributed across different locations, including 2,339 on roads, 1,779 on private land, and 1,375 on street pavements (City Hall to introduce proper motorcycle taxi stops on street pavements, 2019). The establishment of motorcycle taxi stands on private property requires the consent of property owners, while those on public property, particularly sidewalks, involve multiple agencies. In general, The BMA is responsible for the construction and maintenance of sidewalks throughout the city. On main roads, the BMA shares duties with the Bureau of Public Works, while the district office takes charge of sidewalks in smaller roads or alleys. However, some roads and pedestrian footpaths fall under the jurisdiction of the Ministry of Transport, which delegates duties to the Department of Highways, Department of Rural Roads, and the State Railway of Thailand (The Enigma of the Bangkok Heart: Repeatedly Collapsing Sidewalks, 2015). The fact that Bangkok's sidewalks are under the supervision of multi-agencies results in a difference in the standards of sidewalks and motorcycle parking permission. Legally, operating motorcycle taxi services on sidewalks violates

several regulations outlined in the Act on the Maintenance of the Cleanliness and Orderliness of the Country B.E. 2535 (1992), including:

***Chapter 1: The Maintenance of the Cleanliness in Public Place and Public Establishment***

**Section 12.** No one shall scrape, chip, scratch, write, spray paint or make it appear by any means of any message, image, or photo on the wall adjacent to the road, on the road, on the tree or any part of the building adjacent to the road or in the public place, unless such actions are carried out by authorized local administrations, other government entities, or state agencies with the appropriate authority.

**Section 17.** No one shall:

- (1) take any action to impair the pavement.
- (2) park or drive or ride a car, motorbike, or wheeled vehicle on the pavement except for parking or driving to enter the building or there is an announcement of the traffic officer to allow such parking or driving.

***Chapter 4: The Maintenance of the Orderliness***

**Section 36.** No one shall climb, sit, or climb over a fence, wall, tree, or the supports of a tree in the public place.

**Section 39.** No one shall install, dry, place or hang anything in the public place except a letter of permission is acquired from the local official or the competent official or such action is an action of the local administration, other administrations or State enterprise or agency with the power to do so or such placing is temporary.

***Chapter 6: Penalties***

**Section 52.** Any person violating section 9, section 14, section 36, section 37, or section 38 or violating or failing to comply with the announcement of the local official made under section 47 shall be liable to a fine not exceeding five hundred baht.

**Section 54.** Any person violating or failing to comply with section 8, paragraph one, section 15, section 20, section 22, section 26, section 27, section 29, section 31, section 32, section 35, section 39, section

40, or section 41 shall be liable to a fine not exceeding two thousand baht.

**Section 56.** Any person violating or failing to comply with section 10, paragraph one, section 12, section16, paragraph one, section 17 or section 18 shall be liable to a fine not exceeding five thousand baht.

Despite the legal violation, certain motorcycle taxi operators are allowed to park on the sidewalks based on considerations by a committee comprising 4 parties: the Department of Land Transport, Metropolitan Police Headquarters, Military (11th Military Circle), and the City Law Enforcement Office of the area. These designated parking areas are marked with yellow lines. The lack of clarity regarding responsible agencies for sidewalks at some stands leads to confusion among operators seeking permission and fosters corrupt practices, including illegal payments and bribery by officials. Thairath (2023) some officers may overlook arbitrary parking if a payment, known as a tribute, is made. In some areas, operators face a monthly penalty charge. For instance, if 20 to 30 vehicles are parked in a particular location, officials may agree to accept a fine from the Win committee and issue a receipt, though it is not acknowledged as a tribute but rather a regular monthly fee. On the other hand, police officers may discreetly collect charges without providing receipts, directly approaching the head of Win for payment.

The current regulations of motorcycle taxis, enforced by multiple agencies, primarily aim to control Win services and management, as well as driver behaviors, to ensure safety, efficiency, and transparency. However, a critical gap exists in the absence of regulations or criteria concerning the quality of work life for drivers who spend extended periods working on the roads. This omission neglects an essential aspect of their occupation as transport workers. Furthermore, while there are regulations pertaining to the establishment procedures of motorcycle taxi stands, there is a lack of specific regulations or standards regarding their location and design. The establishment of these stands is left to the discretion of the BMA committee, without clear criteria accessible to all stakeholders. Operators are required to select locations and submit documents to obtain permission for stand establishment.

However, in practice, drivers encounter difficulties in identifying the property owner or responsible agencies for the selected space, particularly when it comes to sidewalks. This poses challenges in obtaining copies of land titles or property ownership confirmation letters, which are required during the document submission process.

## 2.8. Conceptual Framework

Through an examination of the existing literature, certain crucial aspects pertaining to motorcycle taxi stands remain unexplored. Specifically, the physical conditions of these stands, which function as transit stops for commuters and workstations for motorcycle taxi drivers, have not received adequate attention. Additionally, there is a notable gap in research concerning the effects of the physical work environment on the quality of work life experienced by motorcycle taxi drivers. Addressing these gaps is essential to gain a deeper understanding of the motorcycle taxi operation and to implement measures that enhance both the working conditions for drivers and the commuting experience for passengers.

The model of environmental comfort is applied as a framework and criteria for assessing the comfort conditions of drivers, which includes the three hierarchical comfort levels: physical, functional, and psychological. To evaluate physical and functional comfort, variables derived from literature reviews on motorcycle taxis, relevant regulations, and workspace design standards are employed. These variables include opinions on safety and hygiene, levels of fatigue experienced while sitting at the stand, user feedback on space utilization and supportive or unsupportive physical features. Psychological comfort is assessed through variables derived from the concepts of territoriality, privacy, and control. These variables encompass the number of personalized objects within the space, territorial definition, level of participation in workspace improvement, and drivers' perceptions of the stands.

To evaluate the physical conditions of the stands, guidelines for the location and design of transit stops in multimodal transport systems are employed, considering factors such as location, physical form, and features. Additionally,

variables are tailored to accommodate the unique characteristics of motorcycle taxi services and stand establishment. Figure 3 illustrates the conceptual framework formulated for to study the physical conditions of motorcycle taxi stands and comfort conditions of drivers.

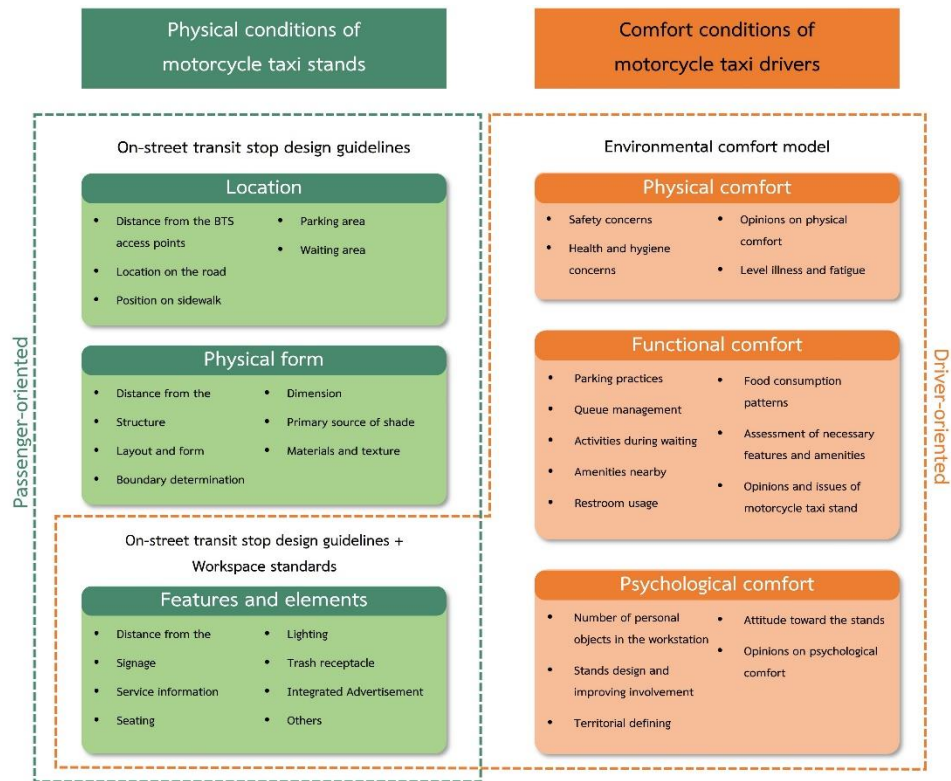


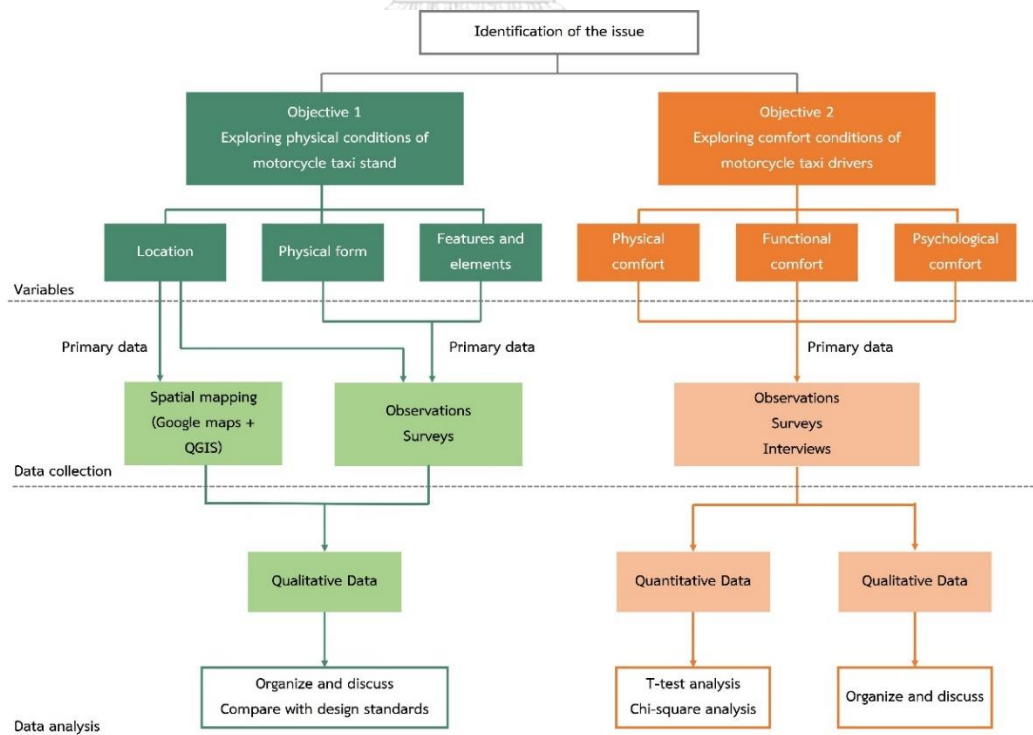
Figure 3 Research Conceptual Framework

## CHAPTER 3

### RESEARCH METHODOLOGY

This exploratory research aims to assess the physical conditions of motorcycle taxi stands and the comfort conditions experienced by the drivers. The study employed a survey research method, utilizing observations and questionnaires as the primary data collection methods. To ensure a systematic approach to the study, a research methodological framework was established to provide guidelines for conducting the research. The research process encompassed several sequential steps, which involved scoping the study area, defining the target population and sampling procedures, collecting data, and conducting an analysis of the gathered information. The subsequent sections will provide detailed explanations of each step.

#### 3.1. Research Framework



*Figure 4 Methodological Framework*



### 3.2. Definition of study area

The scope of the study area was the core central business district (CBD) of Bangkok, a geographically concentrated zone encompassing significant economic hubs, shopping centers, corporate establishments, and renowned landmarks. As a pivotal hub for business activities, this district benefits from extensive mass transit connectivity, particularly the Bangkok Mass Transit System (BTS). The study area encompassed four distinct administrative districts, namely Ratchathewi, Pathumwan, Bang Rak, and Sathorn (Figure 5), which collectively constitute the core of the CBD.

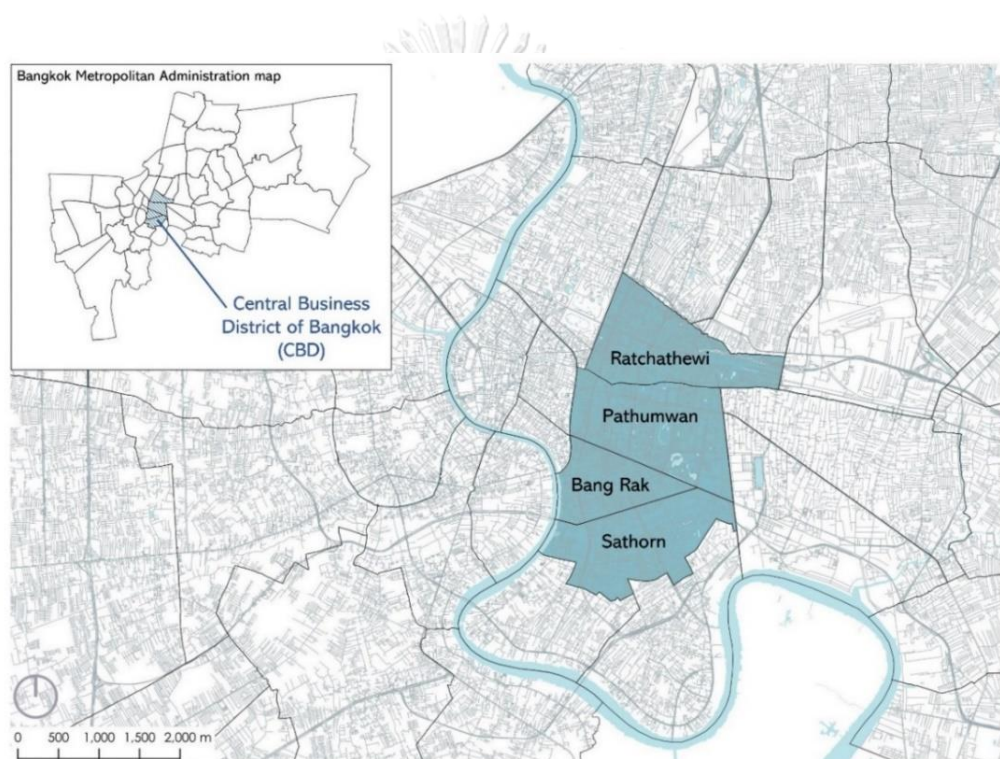


Figure 5 The Core Central Business District (CBD) of Bangkok

The BTS serves as the primary mass transit network in Bangkok, connecting various areas within the city and its metropolitan region. The BTS Skytrain operates on an elevated track system, supported by concrete plinths positioned 12 meters above arterial roads with sidewalk support pillars. Stations typically consist of two levels: the concourse level for ticketing and the platform level for boarding trains. Access to the concourse level is available from the street level via stairs, escalators, or elevators located on major road sidewalks.

The current BTS network comprises two lines, covering a total distance of approximately 68.5 kilometers and serving a combined total of 61 stations. The Sukhumvit Line runs northwards from Siam station to Kheha Samutprakan station, covering a distance of 54.25 kilometers and encompassing 47 stations. This line offers interchanges with the MRT system at Ha Yaek Lat Phrao, Mo Chit, and Asok stations, as well as an interchange with the Airport Rail Link at Phaya Thai station. The Silom Line starts from National Stadium station and terminates at Bang Wa station, spanning approximately 14 kilometers with 14 stations. Notable interchanges along this line include Sala Daeng and Bang Wa stations with the MRT line.

The study area encompassed 13 BTS stations along the Silom line and the Sukhumvit line, including 5 stations in the Bang Rak and Sathorn districts, 5 stations in the Pathumwan district, and 3 stations in the Ratchathewi district. Figure 6 presents a graphical representation indicating the precise location and name of each station within the study area.

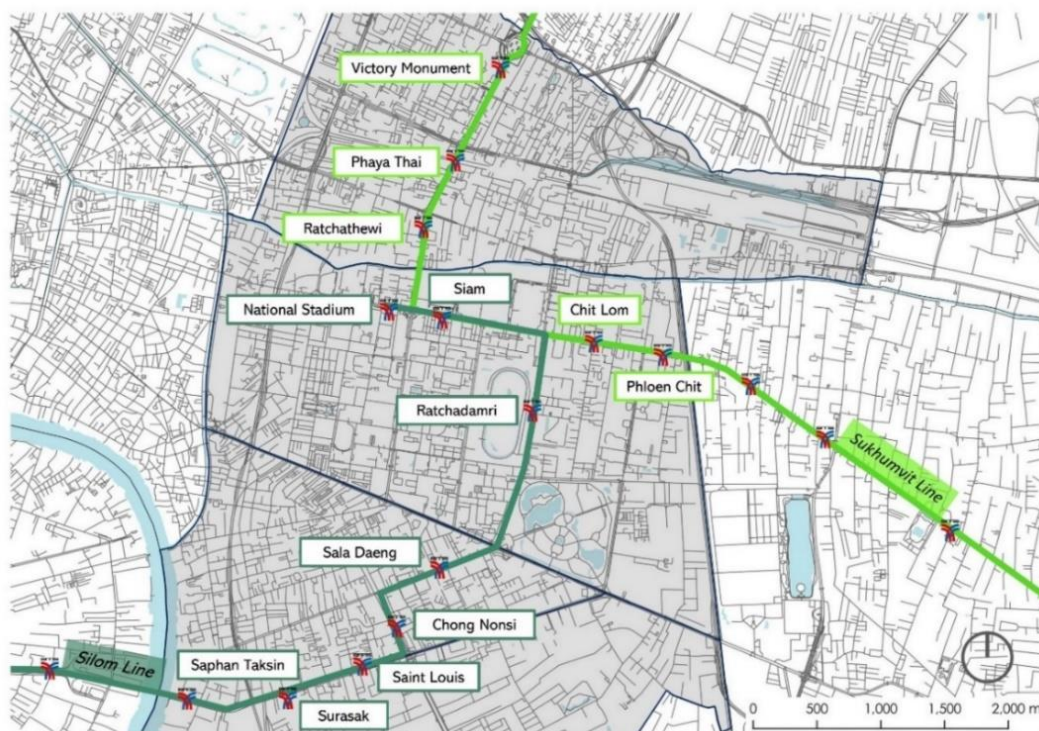


Figure 6 The Location and Name of BTS Stations within the CBD of Bangkok

### 3.3. Target Population and Samplings

#### 1) Motorcycle taxi stands

The research conducted a sampling of registered motorcycle taxi stands located in close proximity to 13 BTS stations within the study area. Specifically, stands were selected if they were situated within a maximum distance of 200 meters from the BTS access points. This criterion was determined based on the commonly acceptable walking distance to a pick-up point or transit stop, typically falling within the range of 150 to 240 meters, with an upper limit of 400 meters. During the preliminary site survey, it was observed that the number of motorcycle taxi stands varied based on the physical characteristics of the location. Certain stations exhibited more than four nearby stands, while others had a minimal presence. To ensure comprehensive representation, at least one sample was selected from each station.

#### 2) Motorcycle taxi drivers

Given that data collection regarding the comfort conditions and opinions on motorcycle taxi stands relied on the availability and consent of participants, convenience sampling was employed. This approach involved selecting samples from motorcycle taxi drivers who willingly participated in survey questionnaires and in-depth interviews. Samples are not limited by age, sex, education level, and years of working experience to have answers from various perspectives. At least two members are selected from each stand to represent stand users.

### 3.4. Variables

Based on a review of literature on design guidelines for on-street transit stops, specific criteria for examining the physical conditions of motorcycle taxi stands were identified. These criteria encompassed general information, location, physical form, as well as features and elements. To facilitate systematic data collection, a list of variables along with their corresponding levels of measurement was established, as presented in Table 7.

Criteria	Variable	Levels of measurement
General information	Size of <i>Win</i>	Ratio
	Queue system	Nominal
	Years of operation	Ratio
Location	Distance from the BTS access	Ratio
	Location on the road	Nominal
	Position on sidewalk	Nominal
	Parking area	Nominal
	Waiting area	Nominal
Physical form	Structure	Nominal
	Layout and form	Nominal
	Boundary determination	Nominal
	Dimension	Ratio
	Primary source of shade	Nominal
	Materials and texture	Nominal
Features and elements	Signage	Signage
	Service information	Service information
	Seating	Seating
	Lighting	Lighting
	Trash receptacle	Trash receptacle
	Integrated Advertisement	Integrated Advertisement
	Others	Nominal

Table 7 Variables of Motorcycle Taxi Stands

Similarly, the criteria employed to assess the comfort conditions experienced by motorcycle taxi drivers were derived from the model of environmental comfort. The established criteria primarily focused on physical comfort, functional comfort, and psychological comfort. Additionally, demographic and career-related data were collected to gain insights into the drivers' overall working conditions. The variables and levels of measurement pertaining to these criteria were presented in Table 8.

Criteria	Variable	Levels of measurement
Demographic and career information	Ages	Ratio
	Education level	Nominal
	Years of experience	Ratio
	Average daily wages	Ratio
	Average working day	Ratio
	Average working hour	Ratio
	Average waiting duration	Ratio
Physical comfort	Safety concerns	Nominal, Ordinal
	Health and hygiene concerns	Nominal, Ordinal
	Opinions on physical comfort	Ordinal
	Level illness and fatigue	Nominal, Ratio
Functional comfort	Parking practices	Nominal
	Queue management	Nominal
	Activities during waiting	Nominal, Ratio
	Amenities nearby	Nominal
	Restroom usage	Nominal
	Food consumption patterns	Nominal
	Assessment of necessary features and amenities	Ordinal
	Opinions and issues of motorcycle taxi stand	Nominal
Psychological comfort	Number of personal objects in the workstation	Ratio
	Stands design and improving involvement	Nominal
	Territorial defining	Nominal, Ration
	Attitude toward the stands	Nominal
	Opinions on psychological comfort	Ordinal

Table 8 Variables of Motorcycle Taxi Drivers

### 3.5. Data Collection

The primary data collection for assessing the physical conditions of motorcycle taxi stands and the comfort conditions of the drivers took place from August 16, 2022, to September 6, 2022. The methods and tools employed for data collection are outlined as follows:

#### 3.5.1. Data on the Physical Conditions Motorcycle Taxi Stands

Three methods were utilized to gather data on the physical characteristics of motorcycle taxi stands.

##### 1) *Spatial mapping*

Google Maps was utilized to mark the locations of motorcycle taxi stands during the on-site survey. Subsequently, these location points were indicated and attributed as point data in QGIS software to generate maps illustrating the distribution of motorcycle taxi stands in proximity to each BTS station.

##### 2) *Observations*

Field observations were conducted from 10:00 am to 18:00 pm, employing two perspectives: close-range and distance observations. Close-range observations involved a proximity of 1 to 6 meters from the motorcycle taxi stands to capture detailed physical characteristics, while distance observations were made from BTS station corridors or across the street to gain a visual understanding of the shape, proportion, and spatial relationship of the stands with respect to the surrounding context. The observations relied on the researcher's visual assessments, supplemented by note-taking, sketching, and the recording of photos and videos.

##### 3) *Surveys*

Various tools were employed to conduct surveys. Survey checklist forms were utilized as a practical means of collecting on-site data. Cameras were used to document videos and photographs of the motorcycle taxi stands, while a Laser Distance Meter was employed to measure the dimensions of areas, sidewalk width, and approximate shade height. It was necessary to perform the surveys between 11:00 am and 15:00 pm to avoid rush hours when the services were in high demand, making it inconvenient to record photos or measure area dimensions.

### 3.5.2. Data on the Comfort Conditions of Motorcycle Taxi Drivers

Data collection regarding the comfort level experienced by motorcycle taxi drivers was carried out using three methods as outlined below.

#### 1) *Observations*

Field observations encompassed close-range and distance perspectives. The use of space, working behavior, activities, and social interactions of drivers were observed during both peak and off-peak hours from 10:00 am to 18:00 pm. Close-range observations required permission from the drivers to record photos or videos, as some drivers may feel uncomfortable with such documentation.

#### 2) *Survey questionnaires*

The questionnaire form contained close-end questions (multiple-choice questions and completion questions) and open-end questions. The questions covered general information about the stands, occupational details, challenges encountered, space utilization, activities, and perceptions of the stands. Participants were asked to assess environmental comfort using a series of 5-point Likert scales with assistance in clarifying objectives and some queries. of environmental comfort. The surveys were conducted during off-peak hours, between 11:00 am and 15:00 pm, to allow drivers to respond without the pressure of offering services.

#### 3) *In-depth Interviews*

Interviews were conducted alongside the survey using a semi-structured questions. It aimed to gain insights into motorcycle taxi stands and the work-life of drivers. Topics covered included the establishment, relocation, and improvement of stands, issues related to current physical conditions, feelings, opinions, and suggestions regarding the stands, and other experiences from daily stationing. Interviews primarily focused on group leaders, with additional input from other group members. The conversations were recorded by taking notes, as interviewees expressed a preference for written documentation over audio recordings.

### **3.6. Data Analysis**

#### **3.6.1. Analysis of the Physical Condition of Motorcycle Taxi Stands**


The qualitative data collected in this study were systematically organized and analyzed according to predetermined criteria and variables. The surveyed stands, exhibiting similar physical characteristics and features, were categorized into typologies to facilitate further analysis. To assess the current physical conditions of these stands, the collected data were compared with established design standards for transit stops. This comparative analysis provided valuable insights into the extent to which the existing stands align with recognized design guidelines.

#### **3.6.2. Analysis of the Comfort Conditions of Motorcycle Taxi Drivers**

The qualitative data were organized and analyzed based on the conceptual framework of environmental comfort to examine the level of comfort experienced by drivers. Scores for physical and psychological comfort, assessed by respondents using a 5-point scale, were calculated to determine the average score for each stand. Subsequently, cross-tabulation analysis, including T-tests and Chi-square tests, was employed to explore significant differences in scores among stand types and associations between the characteristics of motorcycle taxi stands and driver psychological comfort.

The survey forms, along with their contents, used for gathering data on the physical characteristics of motorcycle taxi stands and the comfort conditions experienced by the drivers, are provided in the subsequent section.





**แบบสำรวจประเมินสภาพทางกายภาพของจุดให้บริการรถจักรยานยนต์รับจ้าง**

หัวข้อวิจัย การประเมินสภาพทางกายภาพของจุดให้บริการรถจักรยานยนต์รับจ้างกับสภาวะสบายของผู้ประกอบอาชีพขับ  
รถจักรยานยนต์รับจ้างในย่านศูนย์กลางทางธุรกิจของกรุงเทพมหานคร

วันที่เก็บข้อมูล ..... ช่วงเวลา .....

**ส่วนที่ 1 ข้อมูลทั่วไปของซุ้มจักรยานยนต์รับจ้าง (General information)**

- 1 ชื่อวิน/ซุ้มจักรยานยนต์รับจ้าง .....
- 2 สถานี BTS .....
- 3 ช่วงเวลาการให้บริการในหนึ่งวัน .....
- 4 ลักษณะการบริหารวิน
  - หัวหน้าวินและสมาชิกวิน
  - เป็นหุ้นส่วนกัน
  - อื่นๆ .....
- 5 ขนาดของซุ้มจักรยานยนต์รับจ้าง
  - วินขนาดเล็ก (มีรถจำนวนไม่เกิน 30 คัน) มีจำนวนผู้ขับขี่ภายในวิน .....
  - วินขนาดกลาง (มีรถจำนวนระหว่าง 31-70 คัน) มีจำนวนผู้ขับขี่ภายในวิน .....
  - วินขนาดใหญ่ (มีรถจำนวนมากกว่า 70 คันต่อวิน) มีจำนวนผู้ขับขี่ภายในวิน .....
- 6 การจัดลำดับคิว
  - แบบลำดับตามป้ายแขวน
  - แบบจอดเรียงลำดับคิว
  - ไม่มีคิว มาก่อนได้ออกก่อน

**ส่วนที่ 2 สภาพทางกายภาพของซุ้มจักรยานยนต์รับจ้าง (Physical condition)**

1. **ลักษณะที่ตั้งของซุ้ม (Location)**
  - 1.1. ตำแหน่งของซุ้มวิน .....
  - 1.2. ระยะห่างจากทางขึ้นสถานี BTS .....
  - 1.3. ความกว้างของทางเท้า (Sidewalk width) .....
  - 1.4. ตำแหน่งที่ตั้งของซุ้มจักรยานยนต์รับจ้าง
    - บนถนนสาธารณะ ข้างขอบทางเท้า (Curbside)
    - บนทางเท้า ริมขอบทางเท้า (Furniture zone)
    - บนทางเท้า ติดกับรั้ว กำแพง ผนัง หรือส่วนด้านหน้าของอาคาร (Frontage zone)

Figure 7 Outline of Questions in the Survey on the Physical Condition of the Motorcycle Taxi Stand -page 1

1.5. สถานที่หรือสิ่งอำนวยความสะดวกใกล้เคียง

ห้องน้ำ ..... ระยะทางโดยประมาณ .....

แหล่งอาหาร ..... ระยะทางโดยประมาณ .....

แหล่งซื้อสินค้า ..... ระยะทางโดยประมาณ .....

สถานพยาบาล/คลินิก ..... ระยะทางโดยประมาณ .....

อื่นๆ ..... ระยะทางโดยประมาณ .....

2. ลักษณะทางกายภาพของซุ้ม (Physical form)

2.1. รูปร่างของโครงสร้างซุ้ม (Form)

มีโครงสร้างที่ชัดเจน  ไม่มีโครงสร้างชัดเจน

2.2. รูปแบบเค้าโครงของซุ้ม (Layout type)

แบบตามแนวยาว (Linear)  แบบเป็นกลุ่มก้อน (Cluster)  อื่นๆ

2.3. การกำหนดขอบเขตของซุ้มจักรยานยนต์รับจ้าง (Boundary defining)

กำหนดโดย .....

2.4. ขนาดของพื้นที่ซุ้มโดยประมาณ (Dimension)

กว้าง ..... ยาว .....

2.5. วัสดุโครงสร้างของตัวซุ้ม (หากมี) .....

2.6. วัสดุ ผิวล้อมผืน และลักษณะวัสดุของตัวซุ้ม (หากมี) .....

2.7. ร่มเงาและสิ่งปกคลุม (Shade covering)

ไม่มีร่มเงา  มีร่มเงา จาก ระบุ .....

2.8. วัสดุของร่มเงาและสิ่งปกคลุม (หากมี) .....

2.9. ภาพสเก็ตแผ่นผืนซุ้มจักรยานยนต์รับจ้าง

Figure 8 Outline of Questions in the Survey on the Physical Condition of the Motorcycle Taxi

3. ส่วนประกอบภายในซุ้ม (Components: features/furniture/equipment)

3.1. พื้นที่จอดรถจักรยานยนต์ (Parking area)

จอดบนถนน โดยเรียงแบบขนานกับถนน       จอดบนถนน โดยจอดเรียงแบบทำมุมกับถนน

จอดบนทางเท้า โดยเรียงแบบขนานกับถนน       จอดบนทางเท้า โดยจอดเรียงแบบทำมุมกับถนน

รูปแบบอื่นๆ .....

3.2. พื้นที่พักคอยผู้โดยสาร (Waiting area)

3.2.1. ที่นั่งรอ (Seating)       มีที่นั่ง       ไม่มีที่นั่ง

ลักษณะของที่นั่งพัก .....

วัสดุของที่นั่ง .....

จำนวนจุดนั่งพัก ..... จุด (กรณีเป็นชั้น มีจำนวน..... ตัว ..... ที่นั่ง)

ลักษณะการนั่งฟัง .....

3.3. ป้าย (Stop signage)

3.3.1. การมีอยู่ของป้าย       มีป้าย       ไม่มีป้าย

3.3.2. สภาพของป้าย       สภาพสมบูรณ์       ชำรุดทรุดโทรม

3.3.3. วัสดุป้าย (หากมี) .....

3.3.4. ข้อมูลของป้าย (หากมี)

ชื่อระบุวิน (Name of stop)       มี       ไม่มี

ข้อมูลอัตราค่าโดยสาร (Fare)       มี       ไม่มี

เส้นทางหรือท้องที่ในการรับจ้างบรรทุกคนโดยสาร (Route map)       มี       ไม่มี

เบอร์โทรหรือเว็บไซต์ติดต่อหน่วยงานขนส่ง (transit agency contact)       มี       ไม่มี

ตารางและความถี่รอบบริการ (Service schedule and frequency)       มี       ไม่มี

ข้อมูลการมาถึงตามเวลาจริง (Real-time arrival information)       มี       ไม่มี

3.4. ระบบแสงสว่าง (Lighting)

มีแสงสว่างที่ซุ้ม       ไม่มีแสงสว่างที่ซุ้ม      แหล่งกำเนิดแสงสว่าง.....

3.5. สิ่งประกอบและสิ่งอำนวยความสะดวกอื่น (Stop furniture and amenities)


ป้ายแขวนกุญแจลำดับ       น้ำสะอาดสำหรับดื่ม       ที่เก็บวางอาหาร/เตรียมอาหาร

พื้นที่เก็บเสื้อวิน/หมวก       อุปกรณ์ปฐมพยาบาล       โต๊ะ/ที่วางของส่วนตัว

ถังขยะ       สื่อโสตทัศนอุปกรณ์       เกมกระดาน

อื่นๆ ระบุ .....

Figure 9 Outline of Questions in the Survey on the Physical Condition of the Motorcycle Taxi



**แบบสำรวจความคิดเห็นและประเมินระดับสภาวะสบายของผู้ขับขี่รถจักรยานยนต์รับจ้าง**

หัวข้อวิจัย การประเมินสภาพทางกายภาพของจุดให้บริการรถจักรยานยนต์รับจ้างกับสภาวะสบายของผู้ประกอบอาชีพขี่รถจักรยานยนต์รับจ้างในย่านศูนย์กลางธุรกิจของกรุงเทพมหานคร

วันที่เก็บข้อมูล ..... ช่วงเวลา .....

**ส่วนที่ 1 ข้อมูลทั่วไปของผู้ขับขี่รถจักรยานยนต์รับจ้าง (Demographic information)**

1. เพศ  ชาย  หญิง
2. อายุ ..... ปี
3. การศึกษา  ต่ำกว่าระดับประถมศึกษา  ระดับประถมศึกษา  ระดับมัธยมศึกษา  
 อาชีวศึกษา  อนุปริญญา (ปวส.)  ปริญญาตรี
4. โรคประจำตัว  ไม่มี  มี ระบุ .....
5. อาการบาดเจ็บเรื้อรัง  ไม่มี  มี ระบุ .....

**ส่วนที่ 2 ข้อมูลด้านอาชีพการทำงาน**

1. ชื่อวิน/ซุ้มจักรยานยนต์รับจ้าง .....
2. สถานี BTS .....
3. วินของท่านตั้งมานานเท่าไร .....
4. วินของท่านมีสมาชิก ..... คน
5. กลุ่มลูกค้าหลักของท่าน คือ .....
6. อายุการทำงาน ..... ปี
7. ลักษณะการทำงาน  ทำงานกะเช้า  ทำงานกะเย็น  ทำงานตลอดทั้งวัน
8. จำนวนวันที่ทำงานต่อสัปดาห์ ..... วัน
9. จำนวนชั่วโมงที่ทำงานต่อวัน ..... ชั่วโมง (เวลา ..... น.)
10. รายได้เฉลี่ยต่อวัน ..... บาท
11. อาชีพเสริม/อื่นๆ .....
12. โดยส่วนใหญ่ ท่านไปส่งผู้โดยสารที่ใดบ้าง .....
13. จุดหมายปลายทางที่ท่านไปส่งผู้โดยสารไกลที่สุด คือ .....

**ส่วนที่ 3 สภาวะสบายของผู้ขับขี่รถจักรยานยนต์รับจ้าง (Environmental comfort conditions)**

1. สภาวะสบายทางกาย (Physical comfort conditions)
  - 1.1. ในช่วงเวลาที่ **เร่งด่วน** ท่านใช้เวลาในการนั่งรอผู้โดยสารนานเท่าไร?
  น้อยกว่า 5 นาที  5 -10 นาที  10 -15 นาที  15 - 30 นาที  มากกว่า 30 นาที
  - 1.2. ในช่วงเวลาที่ **ไม่เร่งด่วน** ท่านใช้เวลาในการนั่งพักคอยในบริเวณซุ้มวินนานเท่าไร?
  น้อยกว่า 5 นาที  5 -10 นาที  10 -15 นาที  15 - 30 นาที  มากกว่า 30 นาที

Figure 10 Outline of Questions in the Survey on the Comfort Condition of Motorcycle Taxi

- 1.3. ในช่วง 3 เดือนที่ผ่านมา ท่านพบเห็น หรือ ประสบอุบัติเหตุขณะนั่งอยู่ในขุมวินบ่อยแค่ไหน?  
 ไม่เคย       แทบจะไม่       บางครั้ง       บ่อยๆ       เป็นประจำ  
 ระบุเหตุการณ์ .....
- 1.4. ในช่วง 3 เดือนที่ผ่านมา ท่านพบเห็น หรือ ประสบอาชญากรรมขณะนั่งอยู่ในขุมวินบ่อยแค่ไหน?  
 ไม่เคย       แทบจะไม่       บางครั้ง       บ่อยๆ       เป็นประจำ  
 ระบุเหตุการณ์ .....
- 1.5. ท่านเผชิญปัญหาจากสภาพอากาศรุนแรง (เช่น แดดร้อนจัด ฝนตกหนัก น้ำท่วม) ขณะนั่งอยู่ในขุมวินบ่อยแค่ไหน?  
 ไม่เคย       แทบจะไม่       บางครั้ง       บ่อยๆ       เป็นประจำ  
 ระบุเหตุการณ์ .....
- 1.6. ภายใน 3 เดือนที่ผ่านมา ขุมวินของท่านเคยมีการปรับปรุงซ่อมแซมโครงสร้างหรือพื้นผิวหรือไม่?  
 ไม่เคย       เคย      ผู้ที่ทำการปรับปรุง ระบุ .....
- 1.7. ภายใน 1 เดือนที่ผ่านมา ภายในพื้นที่ขุมวินของท่านมีการทำความสะอาดและจัดระเบียบบ่อยแค่ไหน?  
 0 ครั้ง       1 - 2 ครั้ง       3 - 5 ครั้ง       5 ครั้งขึ้นไป
- 1.8. ความคิดเห็นเกี่ยวกับความปลอดภัย สุขอนามัย และความสะดวกสบายขณะนั่งประจำที่ขุมวิน

กรณำทำเครื่องหมาย / ในช่องสี่เหลี่ยม	1 - น้อยที่สุด	2 - น้อย	3 - ปานกลาง	4 - มาก	5 - มากที่สุด	
		1	2	3	4	5
1.8.1. ความรู้สึกปลอดภัยจากมลภาวะทางเสียง		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8.2. ความรู้สึกปลอดภัยจากมลภาวะทางฝุ่นควัน		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8.3. ความรู้สึกปลอดภัยจากความร้อนและแสงแดด		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8.4. ความรู้สึกปลอดภัยจากลมฝน		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8.5. ความรู้สึกปลอดภัยจากน้ำท่วม		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8.6. ความรู้สึกปลอดภัยจากอุบัติเหตุ (เช่น จราจร การก่อสร้าง)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8.7. ความรู้สึกปลอดภัยจากการสัญจรชนิดอื่นๆ		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8.8. ความรู้สึกปลอดภัยจากอาชญากรรม		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8.9. ความสะอาด ถูกสุขลักษณะ		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8.10. ความเป็นระเบียบเรียบร้อย		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8.11. ความสวยงาม สบายตา น่าใช้งาน		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8.12. ความเหมาะสมของขนาดพื้นที่ขุมวิน		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8.13. ความเหมาะสมของลักษณะโครงสร้างขุมวิน		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8.14. ความเหมาะสมของตำแหน่งที่ตั้งขุมวิน		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8.15. ความรู้สึกปวดเมื่อย เหนื่อยล้าขณะนั่งพักคอย		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 11 Outline of Questions in the Survey on the Comfort Condition of Motorcycle Taxi

## 2. สภาพะสบายทางการทำงาน (Functional comfort conditions)

2.1. โดยปกติแล้ว ท่านจอร์รถักจักรยานยนต์ของท่านบริเวณซุ้มวินในลักษณะใด?

- จอดบนถนน แบบเรียงขนานกับถนน       จอดบนถนน แบบเรียงทำมุมหรือตั้งฉากกับถนน
- จอดบนทางเท้า แบบเรียงขนานกับถนน       จอดบนทางเท้า แบบเรียงทำมุมหรือตั้งฉากกับถนน
- รูปแบบอื่นๆ .....

2.2. ท่านประสบปัญหาในด้านการจอร์รถักจักรยานยนต์บ่อยแค่ไหน?

- ไม่เคย       แทบจะไม่       บางครั้ง       บ่อยๆ       เป็นประจำ

2.3. ท่านประสบปัญหาใดในการจอร์รถักจักรยานยนต์? (ตอบได้มากกว่า 1 ข้อ)

- พื้นที่จอดรถไม่เพียงพอ       ความไม่สะดวกในการนำรถเข้า-ออก       พื้นที่จอดขวางทางสัญจรผู้อื่น
- พื้นที่ไม่มีการแบ่งแ่งเขตจอด       พื้นที่จอดไม่สะอาดหรืออยู่ในสภาพไม่ดี       อื่นๆ ระบุ .....

2.4. ท่านเคยประสบความขัดแย้งกับคู่กรณีจากการจอร์รถักจักรยานยนต์หรือไม่?

- ไม่เคย       แทบจะไม่       บางครั้ง       บ่อยๆ       เป็นประจำ

โดยคู่กรณีของท่าน คือ (ตอบได้มากกว่า 1 ข้อ)

- คนสัญจรทางเท้า       ผู้ค้าหาบเร่แผงลอย       รถสาธารณะอื่นๆ       วินอื่น       รถทั่วไป
- เจ้าหน้าที่รัฐ       เจ้าของพื้นที่/อาคาร       อื่นๆ ระบุ .....

2.5. ท่านประสบความขัดแย้งกับสมาชิกวินท่านอื่นในเรื่องการจัดคิวบ่อยแค่ไหน?

- ไม่เคย       แทบจะไม่       บางครั้ง       บ่อยๆ       เป็นประจำ

ระบุปัญหา .....

2.6. ท่านประสบปัญหาในการทำงานจากการไม่มีป้ายราคาค่าโดยสารหรือป้ายบอกอาณาเขต เส้นทางบริการบ่อยแค่ไหน?

- ไม่เคย       แทบจะไม่       บางครั้ง       บ่อยๆ       เป็นประจำ

ระบุปัญหา .....

2.7. ในช่วงเวลาที่ไม่มียูกค้า ท่านทำกิจกรรมใดขณะอยู่ในซุ้มวิน? (ตอบได้มากกว่า 1 ข้อ)

- นอนงีบ       นั่งพักเฉยๆ       ดูโทรทัศน์       ฟังวิทยุ
- ทานอาหาร/เครื่องดื่ม       เล่นหมากรุก       พูดคุยกับสมาชิกวินและคนอื่นๆ
- ใช้งาน Smartphone       สูบบุหรี่       อื่นๆ ระบุ .....

2.8. หากท่านใช้งาน Smartphone เป็นประจำ ท่านใช้งานเพื่อจุดประสงค์ใดบ้าง? (ตอบได้มากกว่า 1 ข้อ)

- ท่องดูโซเชียลมีเดีย       พูดคุย/แชท ผ่านแอป (Apps)       ชมวิดีโอ/ภาพยนตร์/รายการบันเทิง
- ฟังเพลง       อ่านข้อมูลข่าวสาร       ขายของออนไลน์
- ซื้อของออนไลน์       ให้บริการรับ-ส่งผ่านแอป (Apps)       บริการส่งอาหารผ่านแอป (Apps)
- อื่นๆ ระบุ .....

2.9. จากซุ้มวินที่ท่านประจำอยู่ ท่านเดินทางไปห้องน้ำที่ใกล้ที่สุดที่ไหน? ด้วยวิธีการใด?

สถานที่ .....

- เดินทางโดยวิธีการ       เดินไป       ขับรถจักรยานยนต์ไป

Figure 12 Outline of Questions in the Survey on the Comfort Condition of Motorcycle Taxi

2.10. ท่านรับประทานอาหารกลางวันที่ซุ้มของท่านบ่อยแค่ไหน?

ไม่เคย       แทบจะไม่       บางครั้ง       บ่อยๆ       เป็นประจำ

2.11. ท่านมักจะเลือกซื้ออาหารกลางวันและเครื่องดื่มจากแหล่งใด? (ตอบได้มากกว่า 1 ข้อ)

นำมาจากบ้าน       ซื้อวัตถุดิบมาทำกินเองที่ซุ้มวิน       ซื้อจากร้านค้าแผงลอยริมทาง

ซื้อจากร้านค้าใกล้เคียง       ซื้อจากห้างสรรพสินค้า       สั่งจากรับบริการรับ-ส่งอาหาร

อื่นๆ ระบุ .....

2.12. โดยปกติแล้ว ท่านมักจะเดินทางไปเลือกซื้ออาหารกลางวันและเครื่องดื่มอย่างไร? (ตอบได้มากกว่า 1 ข้อ)

เดินไปซื้อ       ขับรถจักรยานยนต์ไปซื้อ       สั่งซื้อและรับอาหารจากที่ซุ้ม

ผ่ากรีนท่านอื่นซื้อ       อื่นๆ ระบุ .....

2.13. บุคคลหรือหน่วยงานใดเป็นผู้จัดหาข้าวของเครื่องใช้ส่วนรวมภายในซุ้มวิน?

เจ้าของซุ้มวิน       คณะกรรมการวิน       สมาชิกวิน       อื่นๆ ระบุ .....

2.14. ในเวลากลางคืน ซุ้มวินของท่านมีแสงสว่างจากแหล่งใด?

ไฟถนน       ไฟจากร้านค้า/อาคาร       ไฟภายในซุ้ม

2.15. ในเวลากลางคืน แสงสว่างดังกล่าวเพียงพอต่อการปฏิบัติงานหรือกิจกรรมอื่นๆของท่านขณะประจำอยู่ที่ซุ้มหรือไม่?

เพียงพอ       ไม่เพียงพอ      เนื่องจาก ระบุ .....

2.16. ความคิดเห็นเกี่ยวกับความจำเป็นของสิ่งประกอบและอุปกรณ์อำนวยความสะดวกในซุ้มวินต่อการปฏิบัติงาน

กรุณาทำเครื่องหมาย / ในช่องสี่เหลี่ยม	1 - ไม่จำเป็น	2 - เฉยๆ	3 - จำเป็น	4 - จำเป็นมาก	
		1	2	3	4
2.16.1. ปลั๊กไฟ		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16.2. น้ำสะอาดสำหรับดื่ม		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16.3. ที่นั่งพักคอย		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16.4. ร่มเงา		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16.5. ป้ายแขวนกฎแฉล่าดับ		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16.6. ป้ายระบุชื่อวิน		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16.7. ป้ายบอกราคา		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16.8. ป้ายบอกอาณาเขตและเส้นทางบริการ		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16.9. โต๊ะ/ที่วางของใช้ส่วนตัว		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16.10. อุปกรณ์ปฐมพยาบาล		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16.11. พื้นที่เก็บหรือแขวนเสื้อวิน/หมวก		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16.12. ที่เก็บวางอาหาร/เตรียมอาหาร		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16.13. พื้นที่รับประทานอาหาร		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16.14. ถังขยะ		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 13 Outline of Questions in the Survey on the Comfort Condition of Motorcycle Taxi

กรุณาทำเครื่องหมาย/ในช่องสี่เหลี่ยม	1 - ไม่จำเป็น	2 - เล็กๆ	3 - จำเป็น	4 - จำเป็นมาก	
		1	2	3	4
2.16.15. สื่อโสตทัศนูปกรณ์ (โทรทัศน์ วิทยุ)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16.16. เกมกระดาน		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.17. อุปกรณ์หรือสิ่งอำนวยความสะดวกอื่นๆที่ท่านต้องการให้มีภายในชุมชน	.....				
	.....				
2.18. ปัญหาที่พบเห็น หรือ อุปสรรคในการทำงานภายในชุมชน (ตัวอย่างเช่น ที่จอดรถไม่เพียงพอ ร่มเงาไม่เพียงพอ)	.....				
	.....				
	.....				
<b>3. สภาพาสบายทางจิตใจ (Psychological comfort conditions)</b>					
3.1. ท่านมีอุปกรณ์การทำงาน เครื่องมือ หรือของใช้ส่วนตัวนำมาเก็บไว้ภายในชุมชนหรือไม่?					
<input type="checkbox"/> ไม่มี	<input type="checkbox"/> มี	จำนวน ..... ชิ้น			
		ได้แก่ .....			
3.2. ระบุอาณาเขตพื้นที่ชุมชนตามความคิดเห็นของท่าน (ตัวอย่างเช่น ตั้งแต่หัวมุมถนนจนถึงเสาไฟฟ้าและขอบทางเดินเท้า)					
.....					
.....					
.....					
(พื้นที่ว่าสภาพประกอบคำอธิบายตามใจชอบ)					
3.3. ท่านมีส่วนร่วมในการออกแบบและจัดหาสิ่งประกอบและอุปกรณ์อำนวยความสะดวกภายในชุมชนหรือไม่?					
<input type="checkbox"/> ไม่มีส่วนร่วม	<input type="checkbox"/> มีส่วนร่วม	ระบุ .....			
3.4. ท่านคิดว่าคำว่า “ชุมชน” มีความหมายอย่างไรสำหรับท่าน? (ตอบได้มากกว่า 1 ข้อ)					
<input type="checkbox"/> เป็นที่รอลูกค้า	<input type="checkbox"/> เป็นที่ทำงาน	<input type="checkbox"/> เป็นที่พบปะพูดคุยกับผู้คน			
<input type="checkbox"/> เป็นที่กินข้าว	<input type="checkbox"/> เป็นที่พักกาย	<input type="checkbox"/> เป็นที่พักใจ			
<input type="checkbox"/> เป็นที่นัดหมายทำกิจกรรม	<input type="checkbox"/> เป็นที่รวมกลุ่มคนที่เหมือนกับเรา	<input type="checkbox"/> เป็นที่ให้ความช่วยเหลือ ให้คำปรึกษา			
อื่นๆ ระบุ .....					

Figure 14 Outline of Questions in the Survey on the Comfort Condition of Motorcycle Taxi



3.5. ความคิดเห็นและทัศนคติที่มีต่อชุมชน

กรุณาทำเครื่องหมาย / ในช่องสี่เหลี่ยม	1 - น้อยที่สุด	2 - น้อย	3 - ปานกลาง	4 - มาก	5 - มากที่สุด
	1	2	3	4	5
3.5.1. ความรู้สึกเป็นส่วนตัวขณะนั่งอยู่ในชุมชน	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5.2. ความรู้สึกสบายใจขณะนั่งอยู่ในชุมชน	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5.3. ความรู้สึกรำคาญใจเมื่อมีคนสัญจรผ่านไปมาขณะนั่งอยู่ในชุมชน	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5.4. ความรู้สึกสนิทใจขณะนั่งอยู่ร่วมกับสมาชิกคนอื่นในชุมชน	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5.5. ความสนิทกับผู้คนในบริเวณเดียวกัน (เช่น พ่อค้า แม่ค้า ยาม)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5.6. ความช่วยเหลือที่ได้รับจากสมาชิกภายในวัน	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5.7. ความร่วมมือและสามัคคีของสมาชิกภายในวันในการทำงาน	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5.8. ความรู้สึกเป็นพวกพ้องของวันที่ท่านสังกัดอยู่	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5.9. ความรู้สึกเป็นเจ้าของพื้นที่ชุมชน	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5.10. ความรู้สึกหวงแหนพื้นที่ชุมชน	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5.11. อำนาจในการควบคุม จัดระเบียบพื้นที่ชุมชน	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5.12. ความมีส่วนร่วมในการตัดสินใจเรื่องต่างๆภายในวัน	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5.13. ความรู้สึกภาคภูมิใจในอาชีพที่รับผิดชอบที่ได้รับจ้าง	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5.14. ความรู้สึกเสมอภาคในเชิงพื้นที่ (เทียบกับบรรดาสถาณะอื่นๆ)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ส่วนที่ 4 ความคิดเห็นและข้อเสนอแนะอื่นๆเกี่ยวกับชุมชน (ตัวอย่างเช่น ด้านการจัดตั้งชุมชน, ด้านการจัดระเบียบวัน, ด้านจุดที่ตั้งชุมชน, ด้านการออกแบบของชุมชน, ด้านหน่วยงานที่รับผิดชอบ, ฯลฯ)

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Figure 15 Outline of Questions in the Survey on the Comfort Condition of Motorcycle Taxi Drivers-page 6

## CHAPTER 4

### RESEARCH FINDINGS

This chapter presents the results of data collection on the physical conditions of motorcycle taxi stands and the comfort conditions experienced by drivers. The first section provides a detailed account of the surveyed motorcycle taxi stands, including their location, physical characteristics, and features. These stands are then evaluated in comparison to standards and design guidelines for transit stops. The following section presents data on the quality of work life for motorcycle taxi drivers, focusing on the aspect of safe and healthy working conditions, from the environmental comfort concept. Finally, the correlation between motorcycle taxi stands and driver comfort conditions as well as significant findings are discussed. The results of the study are discussed as follows.

#### 4.1. Survey Results of Motorcycle Taxi Stands near BTS Stations

##### 4.1.1. General Information on Surveyed Motorcycle Taxi Stands

In the research area, a total of 25 registered motorcycle taxi stands were located in close proximity to BTS stations on the main roads. These stands were comprised of 22 small groups and 3 medium-sized groups, representing 88% and 12% of the total stands, respectively. The average number of members per stand was 18.12, with Win Asia Hotel Bangkok boasting the largest group size at 32 members. In contrast, the smallest groups, namely Win Soi Mahatlek Luang 3, Win AIA Center, and Win Noble Ploenchit, consisted of only 8 members each. Notably, members of the medium-sized groups reported a lower number of regular drivers in practice than those officially registered. Some absent members chose to exit the profession soon after joining, while some opted to work selectively based on personal convenience factors such as preferred days and hours.

The predominant approach for managing the motorcycle taxi queue was through the implementation of the key tag system. This system was employed by the majority of motorcycle taxi stands, with only a minority of eight stands employing a turnover

queuing system that remembers the order in which riders arrived and determines the next service provider based on this sequence. In the key tag system, a range of materials and equipment were utilized to create queue labels. Typically, motorcycle taxis featured a wooden or acrylic board with hooks to which key tags can be attached. However, some stands simply inscribed the sequential number of the next driver on a whiteboard or chalkboard, as exemplified by the practices of Win Rajavithi Hospital and Win Sathorn Pier.

Based on interviews conducted, the majority of motorcycle taxis have been operating for over a decade, with the longest operational tenure spanning 30-40 years and the shortest lasting 8-10 years. According to reports from members of newly established motorcycle taxi stands, they selected stand locations near the BTS stations due to the favorable location and increased demand for short-distance travel.

List of motorcycle taxi stands	BTS station	Size	Number of members	Queuing system
Win Rajavithi Hospital	Victory Monument	small	17	key tag
Win Victory Monument BTS station	Victory Monument	small	20	key tag
Win Century the Movie Plaza	Victory Monument	medium	31	turnover
Win BTS station (Nursing College side)	Victory Monument	small	15	turnover
Win CP Tower 3	Phaya Thai	small	12	key tag
Win Phaya Thai BTS station	Phaya Thai	small	13	turnover
Win Phaya Thai Plaza	Phaya Thai	small	10	turnover
Win Ratchathewi intersection	Ratchathewi	small	15	key tag
Win Asia Hotel Bangkok	Ratchathewi	medium	32	key tag
Win Siam Square Soi 6	Siam	small	20	key tag
Win Bangkok Bank	Siam	small	15	key tag

Win Siam Center	Siam	small	13	key tag
Win Noble Ploenchit	Phloen Chit	small	8	turnover
Win TOT Service Center	Chit Lom	small	17	key tag
Win Soi Kasemsan	National Stadium	small	16	key tag
Win Suksapan Panit	National Stadium	small	12	key tag
Win Soi Mahatlek Luang 3	Ratchadamri	small	8	key tag
Win Dusit Thani Bangkok	Sala Daeng	medium	31	turnover
Win Soi Thaniya	Sala Daeng	small	15	key tag
Win Chong Nonsi BTS station (inbound)	Chong Nonsi	small	30	turnover
Win Diamond Tower	Chong Nonsi	small	25	key tag
Win Soi Sathorn	Saint Louis	small	20	key tag
Win Surasak BTS station	Surasak	small	20	key tag
Win AIA Center	Surasak	small	8	turnover
Win Sathorn Pier	Saphan Taksin	small	30	key tag

Table 9 List of Surveyed Motorcycle Taxi Stands near BTS Stations in the CBD of Bangkok



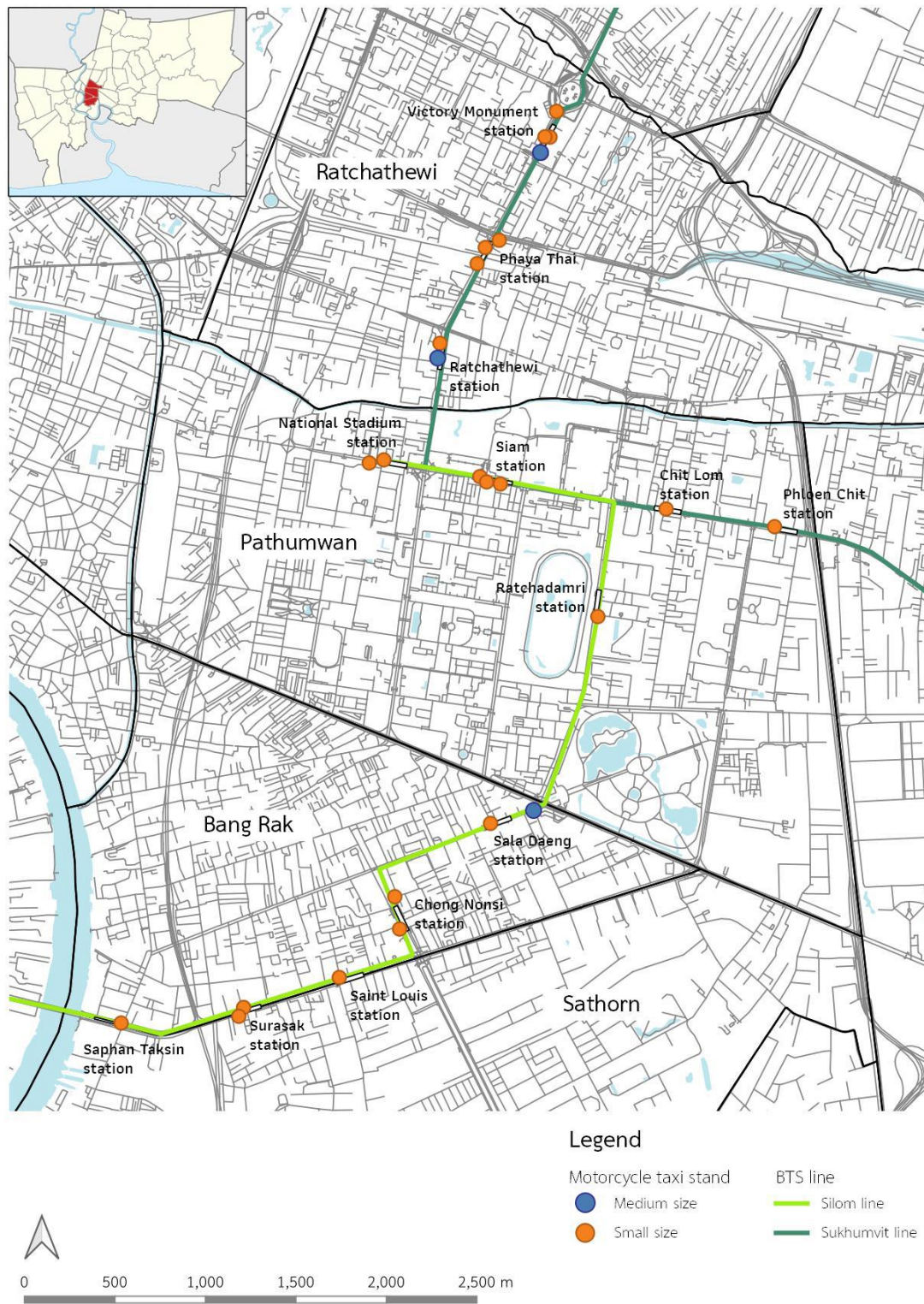


Figure 16 Distribution of Motorcycle Taxi Stands near BTS Stations in the CBD of Bangkok by Size

#### 4.1.2. Patterns of Motorcycle Taxi Stand Location

The average distance from the access point of BTS stations, specifically the stairs, was found to be 10.86 meters, with a mode value of 4 meters (40%). The maximum distance of 50 meters was observed at Win Diamond Tower, while the minimum distance of 3 meters was recorded at Win Victory Monument BTS station and Win Sathorn Pier.

Considering transit stop location criteria by APTA (2012) and DVRPC (2019), it is found that a substantial proportion of motorcycle taxi stands (72%) were situated in the middle of blocks, in close proximity to BTS stations to serve as feeder service. Far-side stands accounted for 16%, while near-side stands were least prevalent at 12%.

Type of stand location	Number of stands	%
Far-side	4	16
Midblock	18	72
Near-side	3	12

Table 10 Types of Motorcycle Taxi Stand Location

In terms of position on the sidewalk, the corner of the sidewalk emerged as a key strategic location for motorcycle taxi stands due to a convenient connection point for travel between main roads alleys and ease of access for motorcycle ingress and egress. The majority of stands (64%) were positioned on the corner of the driveway entrance of buildings, followed by 4 stands (16%) on the curbside pathway, 3 stands (12%) at the mouth of alleys, and 2 stands (8%) at road corners.

Position on the sidewalk	Number of stands	%
Entrance corner	16	64
Mouth of the alley	3	12
Pathway	4	16
Road corner	2	8

Table 11 Position on the Sidewalk

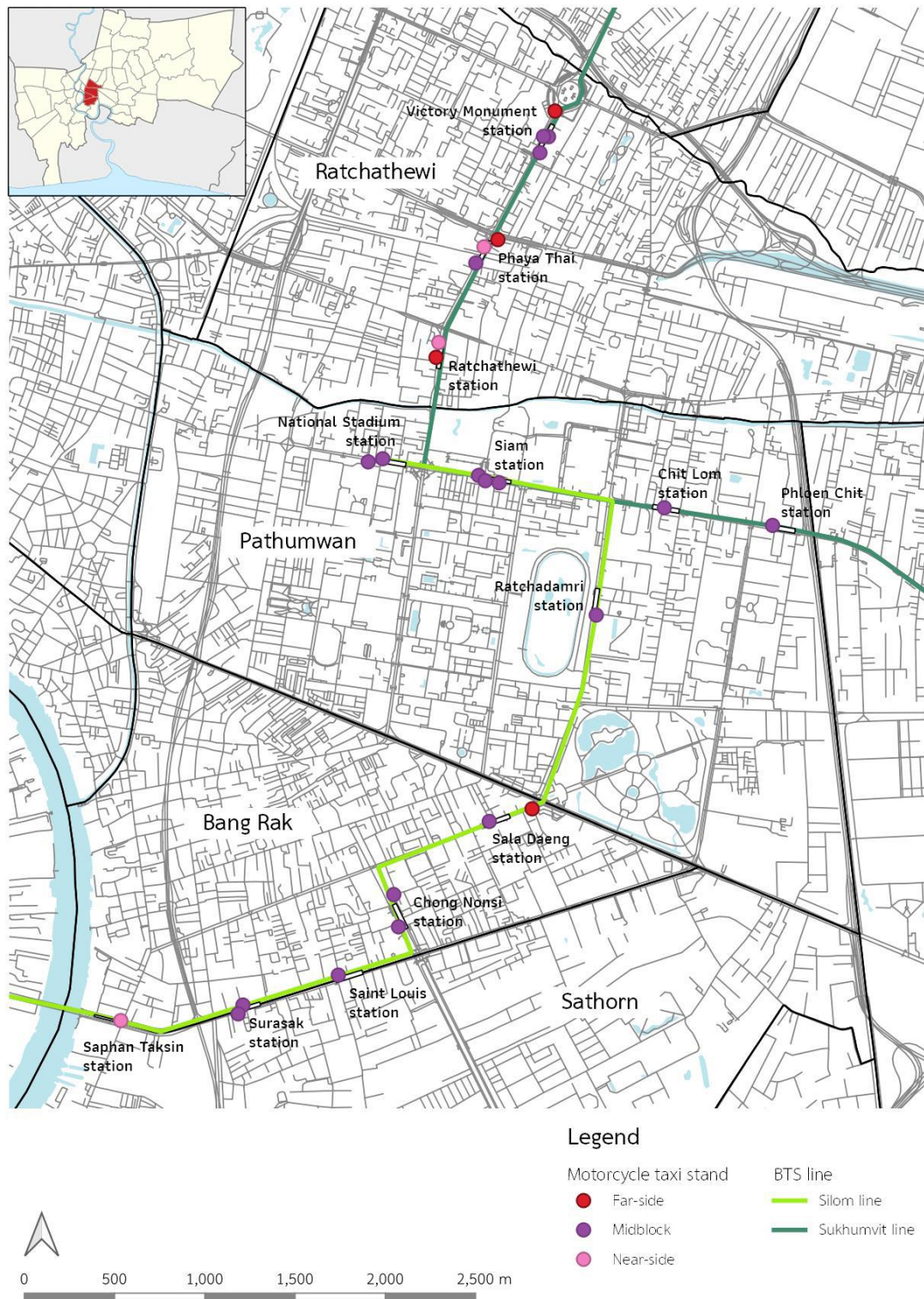


Figure 17 Distribution of Motorcycle Taxi Stands near BTS Stations in the CBD of Bangkok by Location

#### 4.1.3. Motorcycle Taxi Stand Typology

In terms of the physical form, all motorcycle taxi stands identified in the on-site survey lacked fixed, permanent shapes and structures. The form of these stands was found to be contingent upon the physical context in which they were located, with motorcycle taxi operators utilizing the surrounding built and natural environment to define their spatial boundaries and sources of shade. These elements collectively created a subtractive form of stands that can be perceived by people. The classification of motorcycle taxi stands is based on common physical characteristics, including the utilization of space and the incorporation of physical elements that shape their form and space. Three main typologies of motorcycle taxi stands are BTS-attached stands, tree-reliant stands, and canopy-based stands. Further details regarding these three groups are described below.

##### 1) *BTS-attached stands*

This type of stand relies on various elements of the BTS structures, such as staircases, support pillars, and skywalk, to establish the stand's location and define its shapes and forms. These stands are primarily situated in areas where the sidewalk has a width of up to three meters which can accommodate the construction of such BTS structures. The stand layout is characterized by a linear shape that is aligned parallel to the road, with a width of around two meters and a length ranging from six to twelve meters. The space comprises parking and waiting areas situated in the buffer zone of the sidewalk. In most instances, motorcycle riders park their vehicles perpendicular to the road and enter or exit at the sidewalk's corner. The waiting area is typically positioned at the end of the space. The boundaries of the stand are defined by the structure's profile, either on one or both ends of the width, and the curbside edge on one side's length. Some stands have yellow lines painted on the pavement by the BMA to delineate the permitted parking area. As the stand's form is shaped by the BTS structures, the BTS stairs serve as the primary shade source and define the overhead plane of the stand. From observations, it was found that various activities take place under the stairs and around support pillars during long waiting periods, with furniture and equipment serving as additional amenities.



This stand type can be divided into three sub-groups: A, B, and C. In Type A, parking is conveniently located near the sidewalk corner, while in Type B, motorcycle taxis must travel through the pedestrian zone to access the road. Type C is the preferred option, as drivers' sight lines are not obstructed by large structures, reducing the risk of accidents while accessing the road.

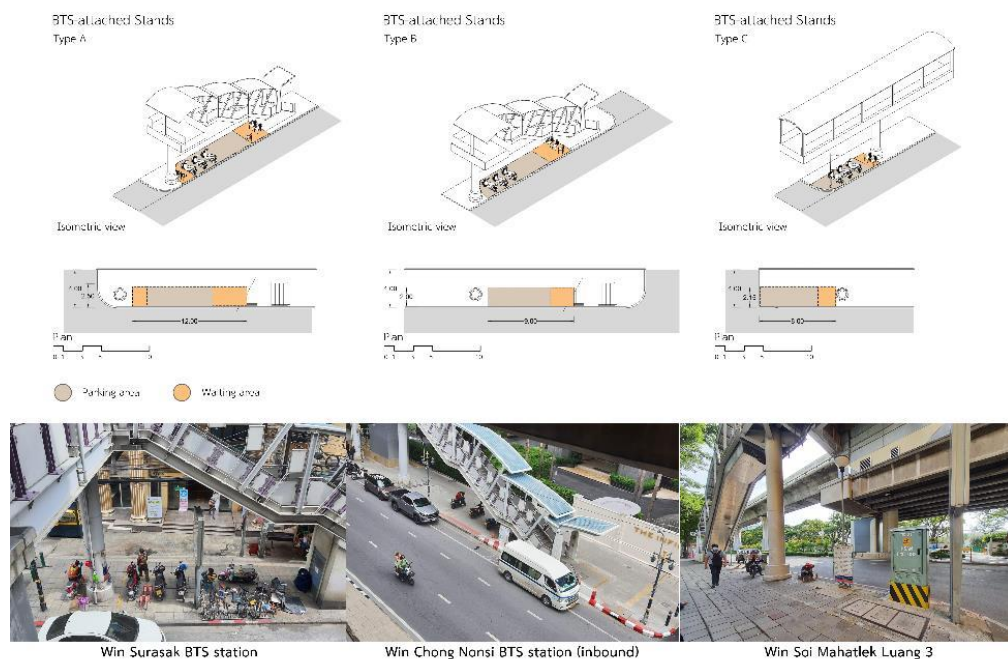


Figure 18 BTS-attached Stand Type

## 2) Tree-reliant Stands

This stand typology employs street plantings, such as trees or creeper pergolas, as a basis for determining stand location and creating shade. The stands in this group are situated away from BTS structures and instead rely on the nearest tree for this purpose, which is usually found at a distance of four meters or more from the BTS stairway. They are commonly found on sidewalks that have a width of at least three meters and are lined with street trees. The stand layout follows a linear pattern parallel to the road, situated in the buffer zone of the sidewalk, with an area that spans around two meters in width and six to twelve meters in length. Motorcycles at these stands are usually parked perpendicular to the road. Some stands have parking spaces on the roadside or in the bus bay area due to site

constraints. Waiting areas are clustered under trees or within the shade of the vegetation in the overhead plane. Stand boundaries are delineated by trees, curbs, and other street elements such as post boxes, lighting poles, and electrical cabinets.

This typology can be further categorized into three sub-groups: Type A, B, and C. Type A stands have a relatively clear boundary and compact space, defined by the sidewalk's corner on one end and a tree on the other. Type B stands are strategically placed next to the BTS stairway, with drivers often considering the structure as the beginning of the stand boundary, leading to the boundary appearing to expand from the tree towards the stair. Type C stands are characterized by a station-like waiting area, where driver members place self-made benches between the trees. Patio umbrellas are also incorporated into these stands to provide additional shade.

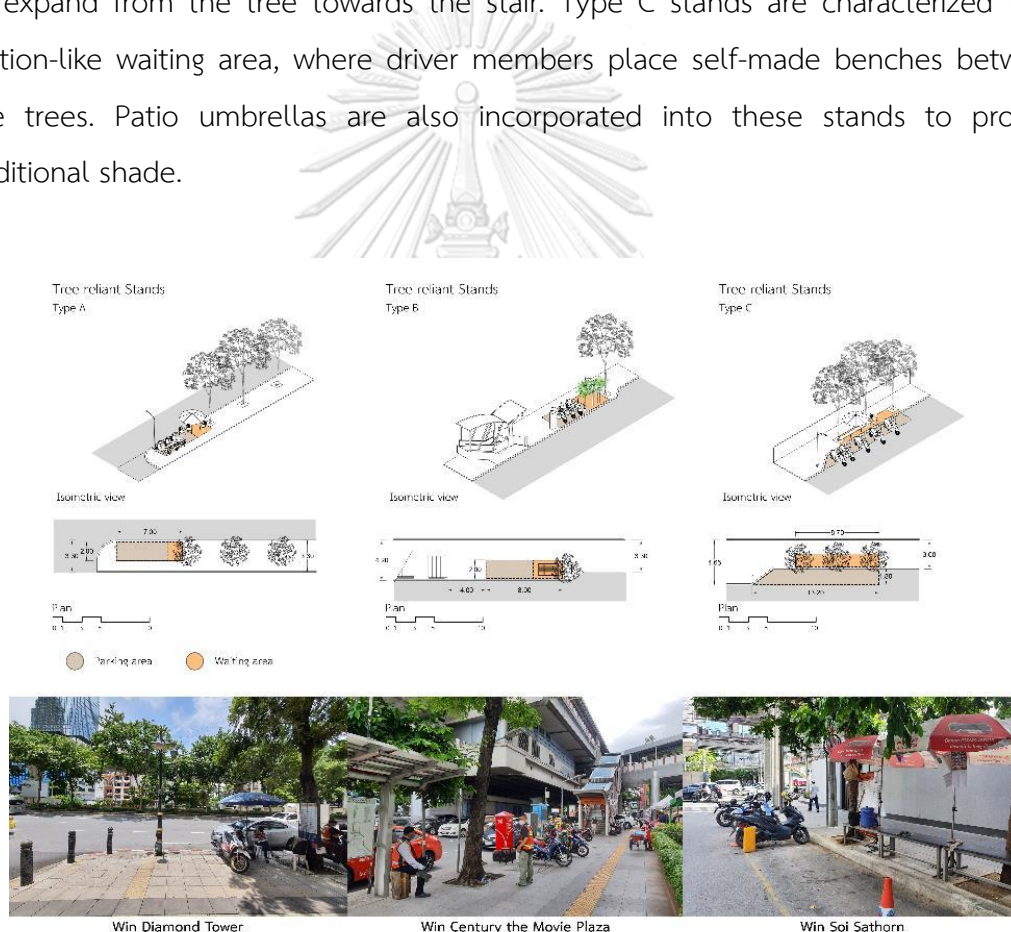


Figure 19 Tree-reliant Stand Type

### 3) Canopy-based stands

This typology of motorcycle taxi stands is characterized by their reliance on building canopies or other structures for shade and their utilization of various building components. These stands are typically situated on sidewalks with a

minimum width of 2 meters, with the parking space located either on the sidewalk in the buffer zone or on the roadside. The waiting area is located in the frontage zone. Drivers in this group commonly await passengers in front of the building, using steps, edges, or low walls as seating options. In cases where the waiting area is adjacent to a fence, drivers may move their seats close to the fence and use it as a leaning position or to hang their belongings. Nevertheless, the use of the area in front of the building for waiting is subject to the building owner's permission. Thus, this typology has a more flexible and ambiguous boundary than other groups.

This group can be further subdivided into three categories. Type A is characterized by parking space located on the sidewalk within the yellow line designated by the BMA. In Type B stands, drivers park their vehicles on the roadside or in the bus bay area. Members of Types A and B stands primarily wait for passengers under the shelter of building canopies. In contrast, Type C stands may face restrictions from building owners preventing drivers from sitting and placing objects in their properties, leading to a dispersed waiting area. In such cases, drivers may opt to occasionally sit on the building's steps or remain seated on their motorcycles throughout the day.

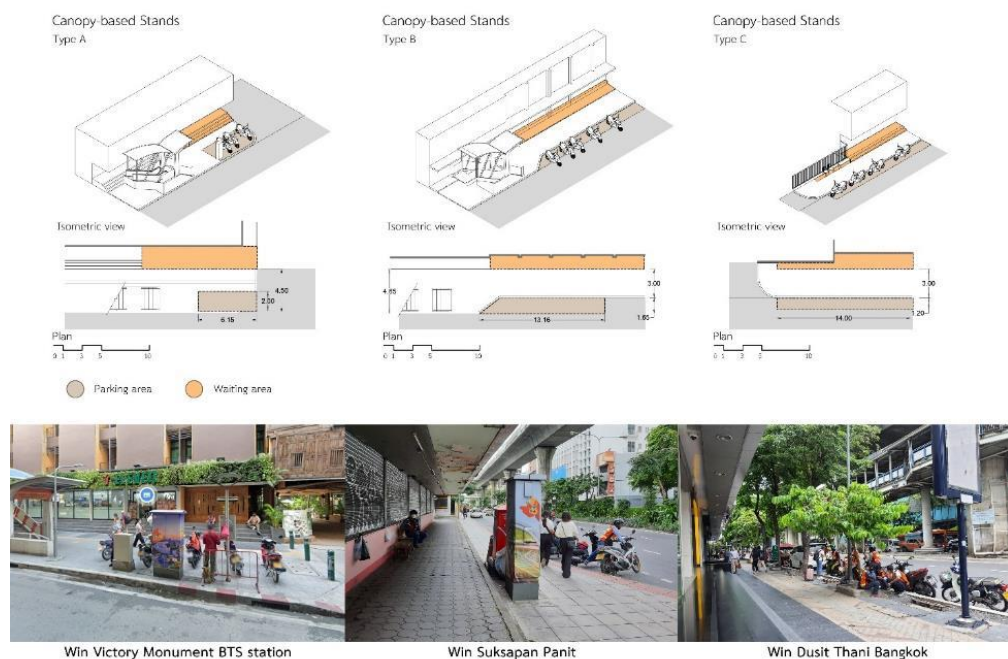


Figure 20 Canopy-based Stand Type

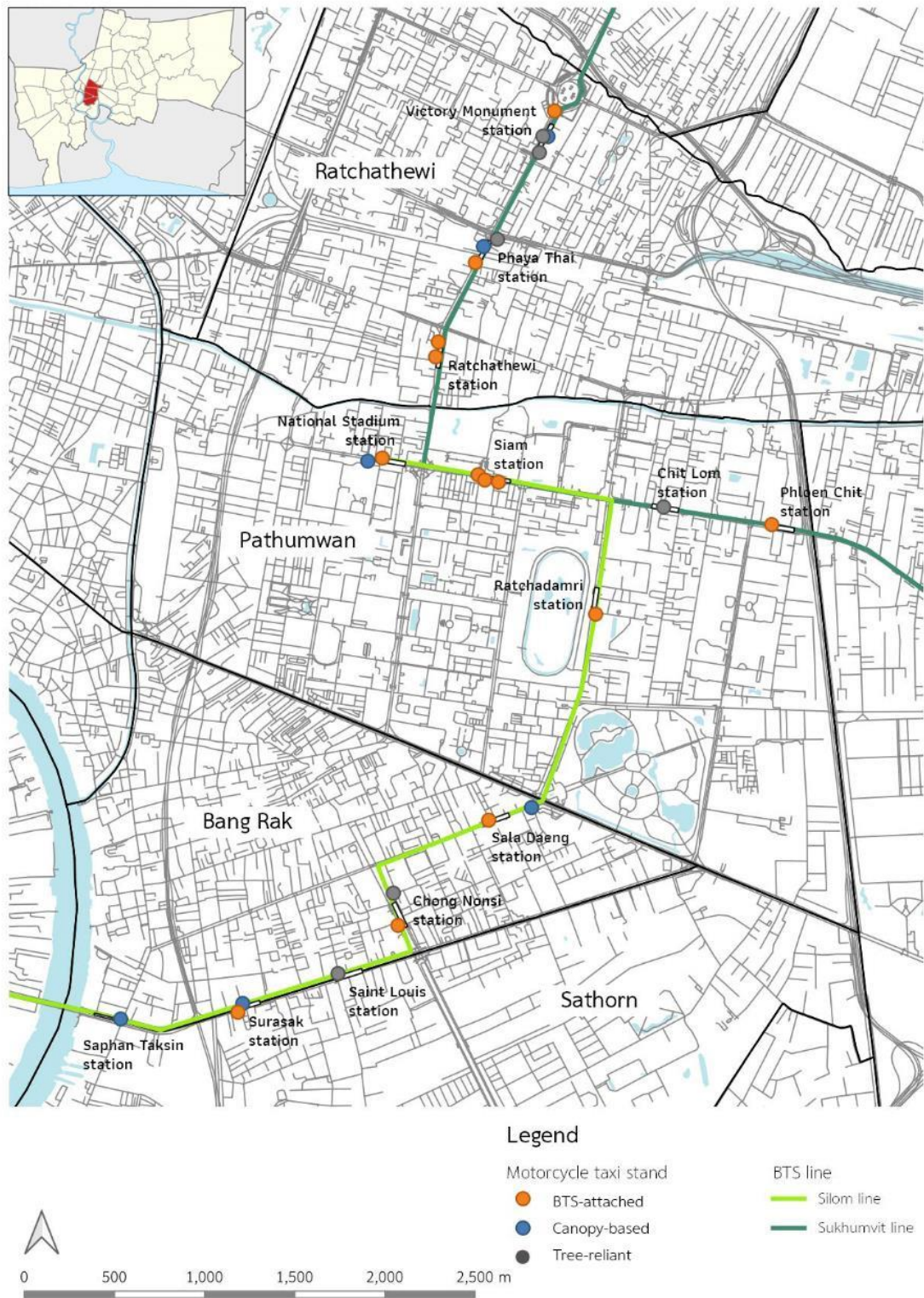


Figure 21 Distribution of Motorcycle Taxi Stands near BTS Stations in the CBD of Bangkok by Typology

#### 4.1.4. Features and Elements

The majority of physical amenities and items found within the motorcycle taxi stands were supplied by the members themselves, with only a limited number of objects being obtained through donations from Corporate Social Responsibility (CSR) initiatives. Various factors influence the presence of features and elements in the stands, including agreement among the group, site conditions, surrounding land use, and the permission of the BMA and the property owner. For instance, at Win Rajavithi Hospital and Win Chong Nonsi BTS station (inbound), both of which were situated beneath BTS stairs, the former group chose to acquire plastic chairs, while the latter group built wooden pallet stools to provide comfortable seating and deter theft and arbitrary movement. In another example, Win Phaya Thai BTS station and Win Century the Movie Plaza were Tree-reliant stands of Type B with similar settings. However, the latter group was not allowed to place any items due to the narrow sidewalk area with high pedestrian traffic. The surveyed motorcycle taxi stands exhibited the following common features and elements.

##### 1) *Fare rate sign*

Based on a survey conducted, all motorcycle taxi Wins had signs displaying the fare rates, in compliance with BMA and DLT regulations. These signs, which adhered to standardized formatting guidelines set by the BMA, were large vinyl signs, 1 meter wide and 1.5 meters long. The sign specified the name of the motorcycle Win, the fare rate based on distance, the name of the location, the operational advice for service provider, and the contact number of the relevant agency. Driver members printed and installed the signs themselves, mostly by hanging, tying, or attaching them to physical features nearby their stands, such as BTS support pillars, fences, walls, or trees. Some groups made created frame and plaster foundation for the sign out of easily accessible materials such as wood or PVC pipes. Most of the signs discovered were in usable condition, but only a few have faded or missing texts due to wear and tear.



Figure 22 Various Forms of Fare Rate Sign Installation

## 2) Lighting

All of the stands were found to lack lighting and depended on streetlights for illumination. However, stands located under BTS structures, including Win Surasak BTS station, Win Soi Thaniya, Win Rajavithi Hospital, Win Soi Kasemsan, and those in close proximity to Siam station, made use of the lights installed beneath the stations to light up their stands. Many motorcycle taxi stands also relied on lighting from adjacent shops, buildings, and landmarks, such as Win Victory Monument BTS station, Win CP Tower 3, Win TOT Service Center, and Win Diamond Tower.

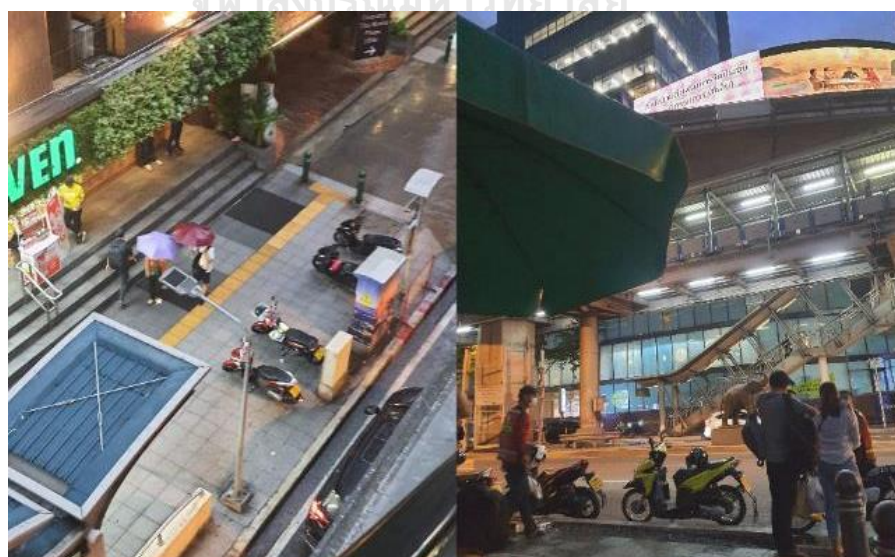


Figure 23 Lighting from Stand Surrounding Context

### 3) Seating

The seats found in most motorcycle taxi stands were provided or made by driver members themselves. The seating arrangements commonly found at the motorcycle taxi stands included plastic chairs measuring 46 x 51 x 81 cm, as well as handmade wooden benches. Some stands might have special types of chairs such as office chairs, deck chairs, foldable chairs, and even sofas. The distribution of chairs in the different types of stands varies; BTS-attached stands and Tree-reliant stands usually have a large number of chairs, whereas canopy-based stands had few or no chairs. There were also drivers found utilizing public benches as alternative seats, as seen at Win BTS station (Nursing College side) and Win Bangkok Bank.



Figure 24 Various Seating Types in Motorcycle Taxi Stands

#### 4) *Trash receptacles*

Most Wins had a garbage bag, usually a large plastic bag, placed inside or hung within their stand areas. However, driver members claimed that these bags were intended solely for the shared use of their group members. For stands lacking trash bags, drivers would gather their waste for proper disposal in nearby public trash receptacles or hand it over to the cleaning staff of the BTS SkyTrain or nearby shops.



Figure 25 Trash Bags Found in Motorcycle Taxi Stands

#### 5) *Integrated Advertisement*

Notably, motorcycle taxi stands have a unique means to incorporate advertisements and help promote neighboring services. Various features within the stands served as a platform for print media advertising, such as the premium umbrellas with a brand logo derived from a camera company seen at Win Soi Sathorn. This advertising practice was also witnessed in stands featuring fare rate signs that displayed beverage ads, shop flyers, or stickers with phone numbers for various services, creating a public relations area-like atmosphere. Such stands included Win Asia Hotel Bangkok, Win TOT Service Center, and Win Soi Kasemsan. Furthermore, drivers were found to be a target group for direct product promotion, as demonstrated by the presence of product samples and lucky draw boxes for beverage companies in stands such as Win Dusit Thani Bangkok.





Figure 26 Physical Features Integrated with Advertisements

#### 6) Other amenities and elements

The stands were found to have both shared items and personal belongings that varied in number and diversity. The shared items included water cooler boxes, brooms, mats, and calendars, while personal belongings were food delivery bags, water bottles, and products brought by members for selling during long waiting periods. From the survey, most stands (48%) had no more than three items, while 40% of stands had between four and six items, and only 12% of stands had between seven and ten items (see Table xx). BTS-attached stands, in particular, tended to have more objects than other types of stands. The drivers in these stands stored their belongings under the BTS stairs, which offered ample space and suitable structures for safe storage. In Tree-reliant stands, several items were hung with patio umbrellas, tied to tree trunks, or placed on benches. Canopy-based stands generally had fewer items, with the exception of Win Sathorn Pier, which was able to utilize the public fence to display various items such as chalkboards, mirrors, baskets, and back cushions.

Table 12 provides a brief overview of the physical attributes and distinctive features of the 25 motorcycle taxi stands that were surveyed.

Number of items	Number of stands	%
0 – 3	12	48
4 – 6	10	40
7 – 10	3	12
Total	25	100

Table 12 The Number of Motorcycle Taxi Stands Classified by the Number of Items Found

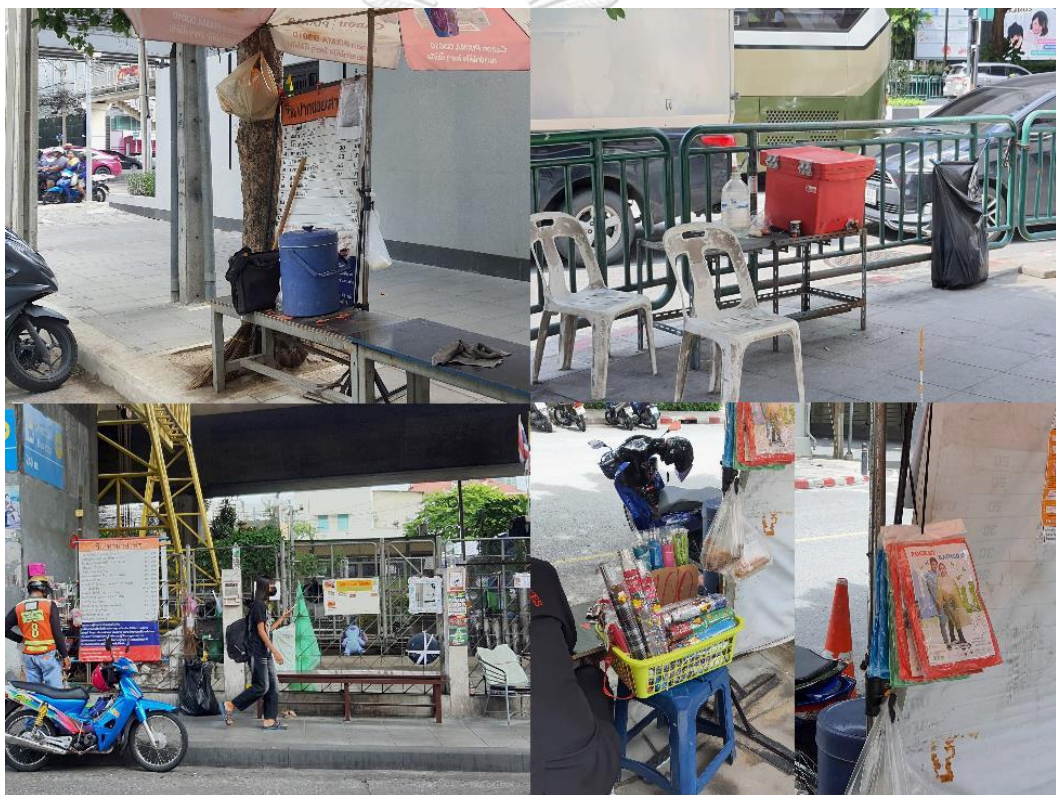


Figure 27 Amenities and Elements in Motorcycle Taxi Stands

List of motorcycle taxi stands	Fare rate		Key tag board	Source of shade		Stop area seating		Site lighting		Trash Receptacle		Integrated Advertisement		Other amenities
	sign			sign	structure	canopy	seating	lighting	Receptacle	Advertisement	Advertisement	amenities		
Win Rajavithi Hospital	✓		✓	BTS structure		✓	-	-	✓		-	-	✓	
Win Victory Monument BTS station	✓		✓	Building canopy		-	-	-	-		-	-	-	
Win Century the Movie Plaza	✓		-	Planting		✓	-	-	-		-	-	-	
Win BTS station (Nursing College side)	✓		-	Planting		✓	-	-	-		-	-	-	
Win CP Tower 3	✓		✓	Building canopy		-	-	-	✓		-	-	✓	
Win Phaya Thai BTS station	✓		-	Planting		✓	-	-	✓		-	-	✓	
Win Phaya Thai Plaza	✓		-	BTS structure		✓	-	-	✓		-	-	✓	
Win Ratchathewi intersection	✓		✓	BTS structure		✓	-	-	✓		-	-	✓	
Win Asia Hotel Bangkok	✓		✓	BTS structure		✓	-	-	✓		✓	-	✓	
Win Siam Square Soi 6	✓		✓	BTS structure		✓	-	-	✓		-	-	✓	
Win Bangkok Bank	✓		✓	BTS structure		✓	-	-	✓		-	-	✓	
Win Siam Center	✓		✓	BTS structure		✓	-	-	✓		-	-	✓	
Win Noble Ploenchit	✓		-	BTS structure		✓	-	-	-		-	-	-	
Win TOT Service Center	✓		✓	Planting		✓	-	-	✓		✓	-	✓	
Win Soi Kasemsan	✓		✓	BTS structure		✓	-	-	✓		✓	-	✓	
Win Suksapan Panit	✓		✓	Building canopy		✓	-	-	✓		-	-	✓	

Win Soi Mahatlek Luang 3	✓	✓	BTS structure	-	-	✓	-	-
Win Dusit Thani Bangkok	✓	-	Building canopy	-	-	✓	-	-
Win Soi Thaniya	✓	✓	BTS structure	✓	-	✓	-	✓
Win Chong Nonsi BTS station (inbound)	✓	-	BTS structure	✓	-	✓	-	✓
Win Diamond Tower	✓	✓	Planting	✓	-	-	-	✓
Win Soi Sathorn	✓	✓	Planting	✓	-	✓	✓	✓
Win Surasak BTS station	✓	✓	BTS structure	✓	-	✓	-	✓
Win AIA Center	✓	-	Building canopy	✓	-	-	-	-
Win Sathorn Pier	✓	✓	Building canopy	✓	-	✓	-	✓

Table 13 The List of Features and Elements Found in Each Stand

#### 4.1.5. Assessment of the Motorcycle Taxi Stand Physical Conditions

Based on the aforementioned survey results, it is evident that motorcycle taxi stands possess unique physical characteristics and placement that deviate from the standards and design guidelines for on-street transit stops in several respects.

##### 1) *Location aspect*

Market factors are the primary determinant of motorcycle taxi stand locations rather than spatial considerations. Stands are typically located at alley corners or near building entrances to attract customers. Most stands were established prior to the construction of BTS stations, but with the BTS's operation, the demand for feeder services has grown, leading to the establishment of new stands in proximity to the stations.

##### 2) *Physical form aspect*

Motorcycle taxi groups are generally small, with an average of 18.12 rider members, thus occupying little space. These stands typically consist of parking areas and driver waiting areas. Parking spaces are typically located on the sidewalk or on the roadside, within areas permitted by the BMA, which differ other types of public transportation, such as buses, which have a designated bay that is cut into the curb or stop area delineate on a parking lane. Unlike other public transport modes, motorcycle taxi stands do not have shelters, but instead, use buildings and other elements on the sidewalk for reference points and shade. Therefore, the stands do not have a distinct, fixed, and recognizable shape.

##### 3) *Features aspect*

The signs used for motorcycle taxi stands do not conform to universal design, being densely written in Thai with no symbol, and made of less durable materials without standing posts. The information displayed on the signs is limited to fare prices and the destination of the place where the motorcycle taxi regularly provides service. There is no information regarding the schedule or frequency of service, the first and last service time of the day, real-time arrival information, or a route map. Most stands have insufficient lighting and rely on ambient light from the surrounding environment, such as street and building lights. The seating arrangements for transit riders are not standardized and mostly consist of seats that members provide or

make themselves, using simple materials such as plastic chairs, wooden chairs, and stools. Trash receptacles found in motorcycle taxi stands are large plastic bags of various colors that are not made of durable materials, have no lids, and do not meet hygienic standards.

Nevertheless, motorcycle taxi stands have unique characteristics, including shared furniture, facilities, and personal belongings, that make them similar to an outdoor co-working space with various activities taking place while waiting for passengers. Another aspect is that motorcycle taxi stands can naturally tie-in with various products and services by using the benefits of the various components within the stands, as well as the flexibility of the stand features themselves.

Table 14 summarizes the evaluation outcomes for the physical conditions of motorcycle taxi stands in comparison to the standards and guidelines for on-street transit stops.

Criteria	Design standards	Motorcycle taxi stands
<b>Location</b>		
Location factor	Site-specific conditions	Market conditions
	Stop spacing	Spatial availability
	Passenger accessibility	Passenger accessibility
Position	Varied	Mid-block
	Away from sidewalk corners	Near sidewalk corners
Parking area	Roadside	Buffer zone/roadside
Waiting area	Buffer zone/frontage zone	Buffer zone/frontage zone
<b>Physical form</b>		
Main structure	Shelter	-
	Standardized figures	-
Materials and texture	Vandalism and scratch resistance	-
	Climatic durable	-
Layout and form	Fixed	Flexible
	Permanent	Temporary
	Clear and noticeable	Unclear and imperceptible

Boundary determination	By shelter form Clear	By surrounding physical elements Vague
Primary source of shade	Shelter canopy	Surrounding physical elements
<b>Features</b>		
Signage	Durable materials Universally intelligible Standard graphic symbol	Non-durable materials Locally intelligible -
Service information	Fare information Schedule of service frequency Real-time arrival information The first and last service time Route map Contact of transit agency	Fare rates - - - Service areas and destinations Contact of related agencies
Seating	Commuter-oriented Standardized Durable materials User-friendly and comfortable	Service providers-oriented Varied Readily available materials Uncomfortable
Lighting	Sufficient lighting at stops	Neighboring streetlight
Trash receptacle	Anchored to the ground Durable materials With lids	Attached with street features Non-durable materials Without lids
Integrated Advertisement	Integrated with shelter components	Integrated with various features and elements
Other amenities	Commuter-oriented Standardized amenities	Service providers-oriented Self-provided facilities

*Table 14 Comparison of Physical Characteristics of Motorcycle Taxi Stands with Design Standards*

## 4.2. Survey Results of the Comfort Conditions of Motorcycle Taxi Drivers

### 4.2.1. Demographic and Career Information

A total of 75 motorcycle taxi drivers, representing 25 surveyed stands, participated in both the questionnaire and interview phases of the survey. All participants in the study were male, and the majority fell within the age range of 35 to 50 years, with the oldest participant being 70 years old. Nearly half of the drivers (47.9%) had completed high school, while 45.8% had finished primary school. The majority of participants did not have any congenital diseases or experience chronic pain. Only four drivers reported having congenital diseases, including heart disease, air allergy, hypertension, and diabetes.

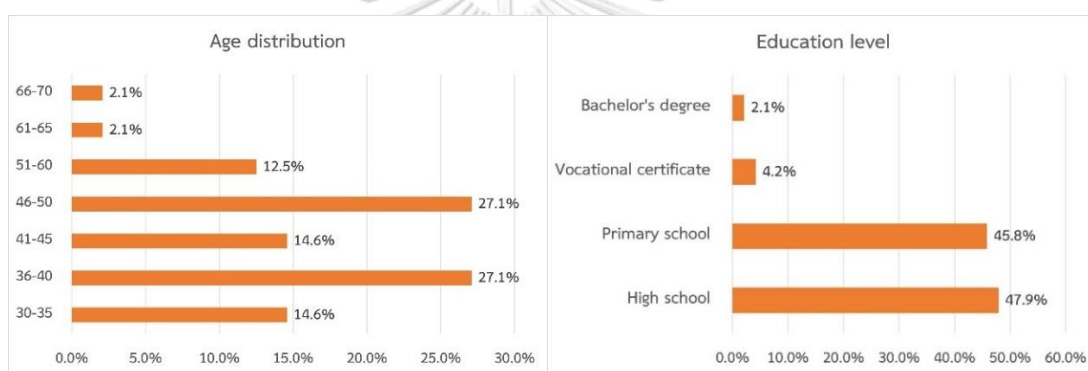


Figure 28 Age Distribution and Education Level of Motorcycle Taxi Drivers

The majority of participants had over 10 years of experience as motorcycle taxi drivers, with some exceeding 20 years. The duration of their daily work varied, spanning from 4:30 am to 22:00 pm, depending on individual dedication and convenience. Typically, most drivers worked every day for an average of 8 to 12 hours, with only a few individuals reporting working more than 12 hours.



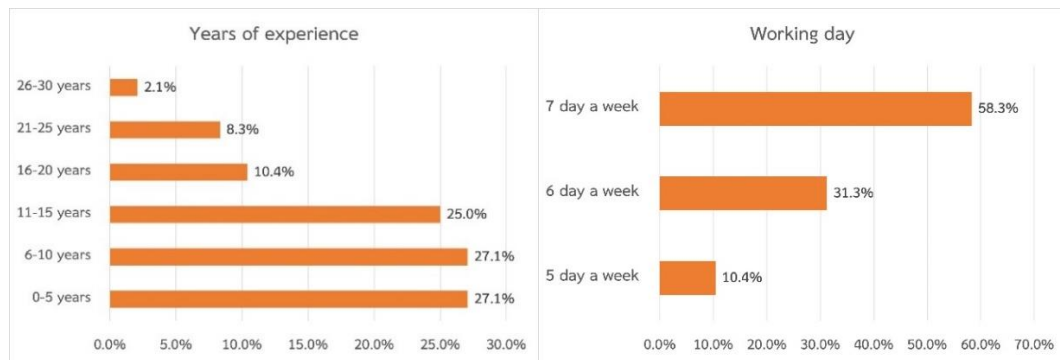


Figure 29 Years of Experience and Working day of Motorcycle Taxi Drivers

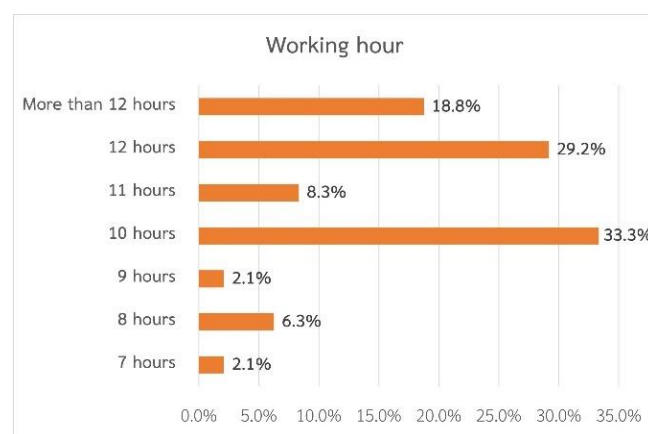


Figure 30 Working Hours of Motorcycle Taxi Drivers

The peak periods for motorcycle taxi service were observed to be from eight to ten in the morning and four to seven in the evening. During these hours, there was a surge in demand, resulting in minimal waiting times of less than 5 minutes. Conversely, during off-peak hours, 50% of drivers reported spending around 15-30 minutes waiting for passengers, while 38.1% experienced waiting times exceeding 30 minutes.

These findings illustrate that motorcycle taxi riders dedicate a significant portion of their day to transporting passengers on the road and waiting collectively at the stands, which serve as their primary workplaces.



Figure 31 Waiting Duration of Motorcycle Taxi Drivers during Peak and Off-peak Hours

Most of the respondents earned daily incomes between THB300-700, with the average approximately THB 680. However, variations in daily incomes were observed based on working hours and location. Certain drivers opted for overtime work to increase their earnings. Those drivers whose stands were situated in prime areas near educational institutions, offices, and shopping malls, such as Win TOT Service Center and Win Dusit Thani Bangkok, reported the highest average daily income, ranging from THB 1,000 to 3,000. Aside from working overtime, certain respondents revealed that they earned extra income by engaging in food delivery services or undertaking errands for neighboring businesses, such as delivering documents and working as part-time security guards. These opportunities arose from their regular presence at the motorcycle taxi stand.

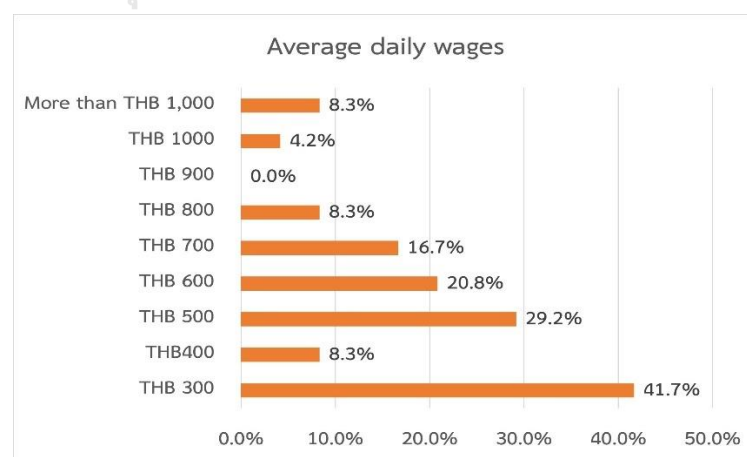


Figure 32 Average Daily wages of Motorcycle Taxi Drivers

#### 4.2.2. Physical Comfort Conditions

##### 1) *Safety concerns and perceptions of motorcycle taxi drivers*

In terms of safety concerns, the majority of drivers stated that they rarely encountered road accidents or criminal incidents during their time at the stands within the past three months prior to the interview. Only a few respondents reported occasional witnessing of such cases. When asked about their perceptions of safety, the drivers generally expressed that while they had become accustomed to the traffic atmospheres, they indicated occasional feelings of unsafe due to the risk of being involved in accidents near the roadside and annoyed by speeding vehicles passing by. However, the drivers consistently expressed a sense of security against criminal acts, citing the collective presence of fellow drivers complemented by well-illuminated and bustling surroundings.

##### 2) *Exposure to extreme weather conditions*

Among the respondents, 40% reported encountering occasional challenges due to extreme weather conditions while stationed at their stands. For example, drivers stationed at tree-reliant stands, such as Win TOT Service Center and Win Soi Sathorn, faced difficulties during heavy rainfall. To mitigate this issue, the drivers obtained parasols to provide additional canopy coverage. Likewise, drivers at the canopy-based stand, such as Win CP Tower, sought refuge in nearby convenience stores during rainy weather. In contrast, drivers stationed at BTS-attached stands generally experienced fewer climatic challenges. Representatives from Win Phaya Thai Plaza, Win Asia Hotel Bangkok, and Win Surasak BTS station highlighted the advantage of being situated under the BTS stairs, which offered effective protection from the sun throughout the day. However, they also acknowledged that these structures were inadequate in shielding them from rainstorms.

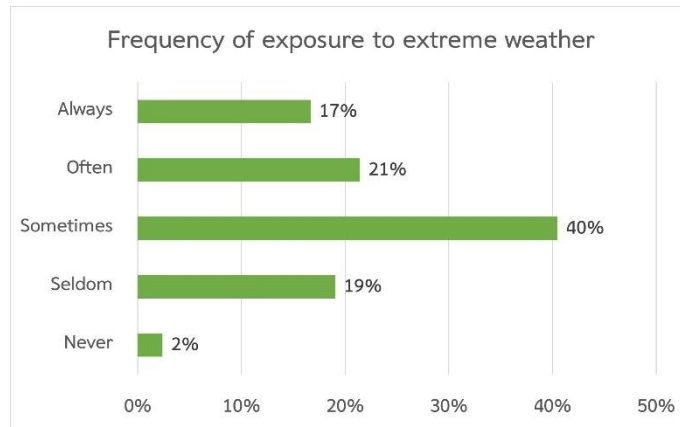


Figure 33 Frequency of Exposure to Extreme Weather Conditions during Waiting at the Stands

### 3) Hygiene practices and maintenance of motorcycle taxi stands

In terms of hygiene practices, the majority of respondents (55%) reported cleaning and organizing their stands more than 5 times a month. This was followed by 21% who cleaned their stands 1-2 times a month, and 17% who did so 3-5 times per month. The cleaning activities primarily involved basic tasks such as sweeping the area, arranging items, and disposing of garbage. Many drivers noted that the BMA street sweepers regularly clean the stand floors every morning. However, due to continuous exposure to pollution and weather conditions, there was a visible accumulation of dust, stains, and signs of disrepair on various features and elements within the stands.

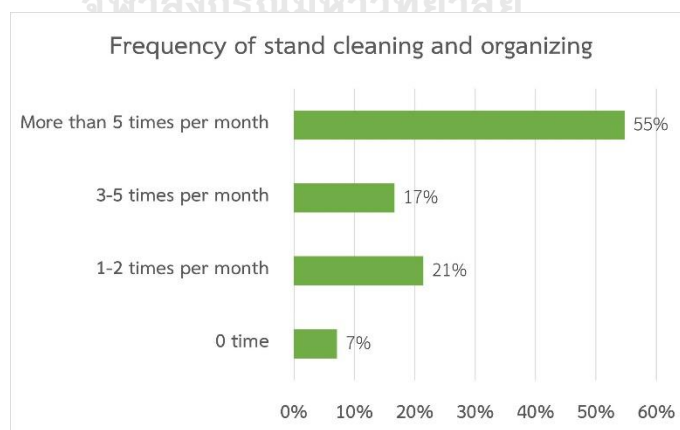


Figure 34 Frequency of Stand Cleaning and Organizing

### 4.2.3. Functional Comfort Conditions

#### 1) *Parking issues and conflicts*

Most respondents parked their vehicles on the sidewalk perpendicular to the road, while a few parked on the road parallel to the curbs or on the road perpendicular to the sidewalk. Approximately 47.6% of drivers reported occasional parking difficulties. These problems primarily revolved around the lack of shade (30.4%), insufficient parking space (23.9%), and parking inconvenience (21.7%). Drivers who parked on the sidewalk often faced challenges in maneuvering their vehicles due to various factors, including the absence of ramps, obstructions caused by street bollards, and the distance between the stand and the sidewalk corner.

These issues sometimes led to conflicts with various individuals. For example, a head of Win Century the Movie Plaza shared an incident where he had a dispute with staff from a well-known Facebook page. The staff took a photo of him using sandbags as ramps to access the designated parking area on the sidewalk and posted it on Facebook, leading to public backlash and subsequent reporting of the incident to the BMA. Similarly, drivers from Win Siam Center mentioned that despite parking within the designated area, they were often mistaken by tourist pedestrians as arbitrarily parking on the sidewalk when they were turning their motorcycles towards the entrance corner to exit onto the road. Another issue was reported by drivers stationed at Win Chong Nonsi BTS station (inbound) and Win Soi Kasemsan, who sometimes encountered conflicts with other forms of public transport, such as Grab bikes and taxis, over parking close to their area.

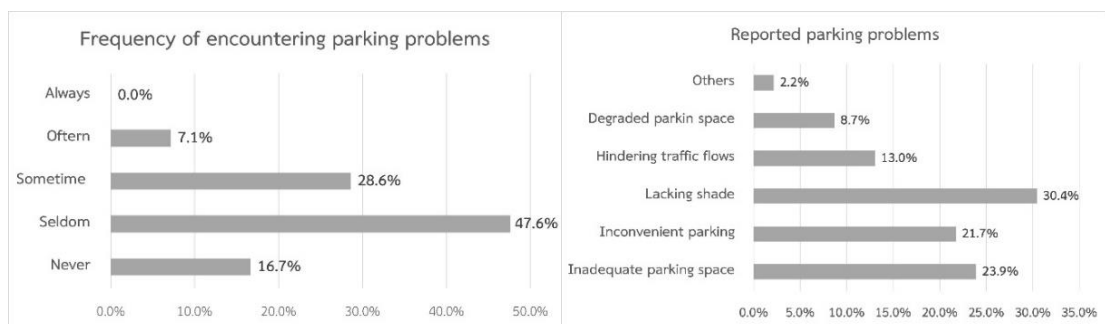


Figure 35 The Frequency of Encountering Parking Problems and the Types of Problems Reported

## *2) Queue management*

The majority of respondents indicated minimal challenges in managing queues among fellow members, whether through the use of a key tag or a queue system. Furthermore, the survey revealed that most drivers rarely encountered issues related to the absence of fare rate signs or route maps. One driver mentioned that regardless of the presence of such signs, passengers were already familiar with the service area and would inform him of their desired destination while also inquiring about the fare. This observation highlights the distinct informal nature of the motorcycle taxi service.

## *3) Restroom usage patterns and challenges*

Based on the survey results, most respondents used the gas station restroom by stopping on their way back to the motorcycle taxi stands after dropping off a passenger. For stands located near shopping malls or office buildings, drivers typically accessed the restrooms inside those buildings, as mentioned by members of various stands including Win Century the Movie Plaza, Win CP Tower 3, Win Siam Square Soi 6, Win Bangkok Bank, Win Siam Center, Win Soi Thaniya, and Win AIA Center.

Respondents from Win Soi Thaniya reported encountering reluctance from property owners to allow them to use the restroom. Instances were observed where drivers were asked to remove their Win vests before entering due to perceived inappropriateness. A similar experience was shared by drivers at Win Surasak BTS station, which had a stand located in front of commercial buildings. It was found that Win Rajavithi Hospital had a public toilet situated behind the stand, but respondents mentioned that it required user fees. Therefore, some drivers opted to walk or drive to a gas station located 300 meters away from the stands. Certain drivers mentioned that such difficulties occasionally resulted in the loss of customers when they had to make a trip to find a restroom.

#### 4) *Food consumption patterns*

Approximately 47.6% of respondents reported occasionally consuming food at their stands, while 28.6% did so sometimes and 7.1% did so often. The drivers typically purchased food and beverages from street food vendors, shops, markets, and plazas that offered affordable meals. They accessed these food sources by walking, driving, or seeking assistance from fellow members. Some drivers opted to bring their own meals from home or dine out elsewhere.

Notably, at stands equipped with chairs, members purchased raw ingredients to prepare meals on-site together, as reported by drivers at Win TOT Service Center. In cases where stands lacked seats, drivers were observed sitting on the base of BTS support pillars, building steps, or on their motorcycle seats while having simple meals, exemplified by Win Soi Mahatlek Luang 3, Win Suksapan Panit, and Win Dusit Thani Bangkok.

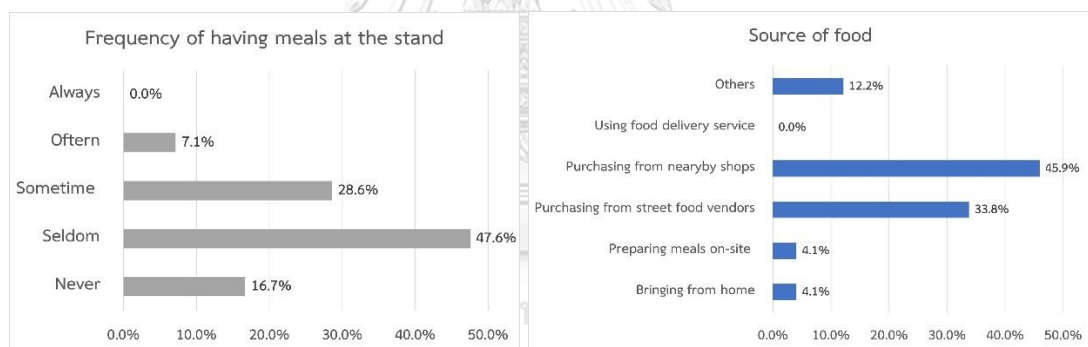


Figure 36 The Frequency of Having Meals at the Stand and Sources of Food

#### 5) *Activities during long waiting times at stands*

The period from noon to 15:00 p.m. was identified as the longest waiting time for passengers at the motorcycle taxi stands. During this time, respondents engaged in various activities that required limited space. These activities included resting, taking short naps, socializing with fellow drivers, and using smartphones for browsing social media, listening to music, reading news, watching shows, messaging, and online shopping (Figure 37). However, many drivers experienced fatigue and back pain due to the uncomfortable chairs at the stands, hindering their ability to engage in these

activities for an extended period. Furthermore, constraints imposed by the BMA or property owners prohibiting drivers from storing items within the stand area also limited their activities in certain areas. Therefore, some drivers were observed walking around, smoking, stretching muscles against street features, or interacting with street vendors outside their stand area. In some cases, drivers even assisted street vendors in selling their products, as observed at the Win AIA Center.

Furthermore, it was found that small businesses had emerged within the stands that were equipped with seats and canopies. For instance, one driver at Win Phaya Thai Plaza utilized the space under the BTS stairway to offer shoe repair services, while another member of Win Soi Sathorn sold miscellaneous items such as umbrellas and raincoats.

Figure 38 illustrates the observed driver space usage behavior and activities during extended waiting periods at Win Dusit Thani Bangkok, Win Surasak BTS station, Win CP Tower 3, Win Ratchathewi intersection, Win Phaya Thai Plaza, Win Bangkok Bank, Win Siam Center, Win Soi Kasemsan, Win Suksapan Panit, and Win AIA Center.

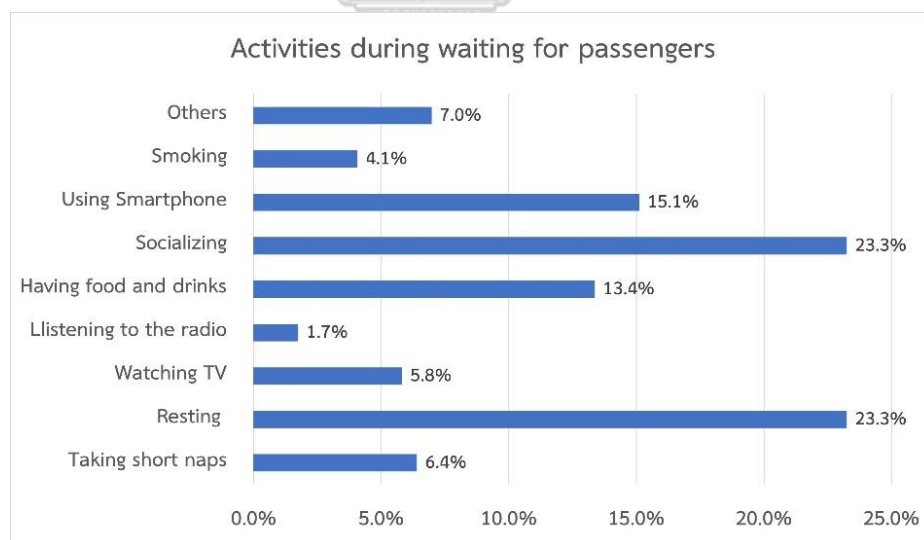


Figure 37 Proportion of Activities Performed while Waiting for Passengers





Figure 38 Photos of Observed Activities

6) *Assessment of necessary features and amenities in motorcycle taxi stands*

Based on the Likert rating scale assessment regarding the necessary amenities and features at the motorcycle taxi stands, the majority of respondents consistently assigned higher ratings to basic features directly associated with their profession compared to other features (Figure 39). These essential job-related features included a canopy, trash receptacles, seating, stand signage, fare rate labels, route and service information, and a key tag board. Some drivers also emphasized the importance of access to drinking water, a first aid kit, storage for helmets and vests, and food preparation facilities. In contrast, features such as audiovisual equipment, tables and chairs, and board games received lower ratings from the majority of drivers.

The survey revealed variations in the assessment of drivers from different stand characteristics. Drivers stationed at stands with stable shade and seating to value additional features and amenities more highly. At the Win Phaya Thai BTS station and Win TOT Service Center, which had many seating under planted shade, drivers considered food preparation space and clean drinking water essential. Similarly, respondents from the Win Sathorn Pier, situated under a flyover with various features, rated the first aid kit highly. For the Win Ratchathewi intersection, Win Asia Hotel Bangkok, and Win Soi Thaniya, drivers assigned moderate to high scores to additional features such as a first aid kit, drinking water, power plugs, food preparation facilities, and storage options for helmets and Win vests. However, the evaluation could be influenced by factors like preferences, experience, and subjective feelings during questionnaire participation.

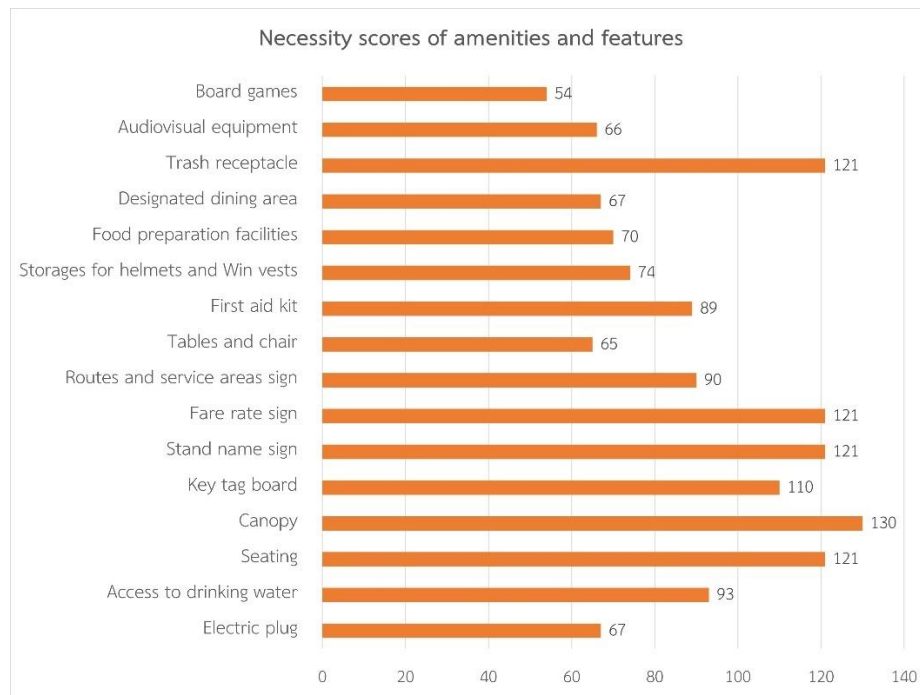


Figure 39 Necessity Scores of Motorcycle Taxi Stand Amenities and Features

#### 7) Opinions and issues of motorcycle taxi stand physical features

Through in-depth interviews, drivers identified common issues related to motorcycle taxi stands. These issues encompassed insufficient shade, lack of lighting at the stands, and inadequate and inconvenient parking spaces. Furthermore, site-specific concerns were raised by the interviewees. At Win Century the Movie Plaza, the absence of a ramp was problematic. Fencing barriers at Win Siam Center hindered motorcycle access to the road. Another issue arose at Win Chong Nonsi BTS station (inbound), where car drivers failed to turn off their engines while parking nearby the stand area. Additionally, many drivers expressed dissatisfaction with Grab drivers utilizing motorcycle taxi stand areas for passenger pick-ups and drop-offs.

Regarding desired features and suggestions for stand improvement, the majority of drivers expressed a sense of adaptation to the existing condition of their stands, resulting in limited feedback or ideas for enhancement. Nevertheless, they highlighted the importance of specific amenities, such as durable canopies for sun and rain protection, comfortable seating for back support. Respondents from Win Soi Sathorn also recommended standardization and organization of motorcycle taxi

stands, with high-quality shelters and signage. At Win Chong Nonsi BTS station (inbound), drivers highlighted the need for non-disruptive ramps and separate parking spaces from other modes of transportation, along with dedicated trash receptacles. Additional amenities, such as phone charging outlets, tables and chairs, toilets, hammocks, and televisions, were suggested by drivers from Win TOT Service Center, Win Soi Thaniya, and Win Ratchathewi intersection.

#### 4.2.4. Psychological Comfort Conditions

##### 1) *Personal objects*

The survey findings indicate that motorcycle taxi drivers at the stands seldom stored personal items. Generally, they only carried a water bottle or flask, which they stored in the under seat storage. However, stands relying on BTS structures tended to have a greater variety and quantity of personal belongings compared to those relying on building canopies. For example, at the Win Soi Kasemsan stand, a food delivery box and a portable water cooler were found stored under the BTS stairway. Helmets were observed hanging from steel stair beams at the Win Rajavithi Hospital.

##### 2) *Territorial awareness*

During the survey, drivers were asked to describe the territory of the motorcycle taxi stand and provide a brief sketch of the stand layout. It was observed that drivers, even among those belonging to the Win, exhibited varying perceptions of the stand territory. Many participants faced challenges in precisely defining their territory and instead resorted to broader identifications using adjacent buildings as reference points, such as "At the corner of CP Tower." Some drivers provided concise descriptions referring to specific components of buildings, such as "From BTS Gate 3 to the elevator" or "Under the BTS station until the end of the alley."

It was noted at that stands with distinct physical elements, respondents tended to define their stand boundaries and create site plans more specific and detailed. For example, drivers at the Win TOT Service Center described their stand boundary as "From one advertising signage to another advertising signage, covering approximately 10 meters." Similarly, at the Win Soi Sathorn stand, drivers stated, "From the corner of the alley to the tree, spanning around 15 meters" and "Within

the yellow lines designated by the BMA." These instances demonstrate a clear awareness of their territorial boundaries.

### *3) Decision-making participation in the stand design and improvement*

Most drivers indicated their involvement in decision-making processes concerning their motorcycle taxi Wins, including matters pertaining to the design and management of the stand space. Through interviews, it was discovered that the presence of furniture and appliances within the stands was a result of the collective efforts of Win members. Some drivers contributed financially towards acquiring the furniture, while others actively participated in their creation.

### *4) Meanings of the motorcycle taxi stands*

The majority of respondents commonly perceived motorcycle taxi stands as "waiting areas" and "workspaces." However, they provided additional definitions based on their use of spaces and their experiences with them (Figure 40). Among the drivers, 11% defined the stands as spaces for social interaction, where they could engage with fellow members, vendors, and regular customers. Interestingly, 10% of drivers viewed the stands as outdoor dining areas, providing a casual space to sit back and enjoy snacks. Another group (9%) regarded the stands as a physical refuge, providing respite from the fatigue of driving all day, while a minority (4%) considered them emotional sanctuaries, offering an escape from daily life stressors. Alternative definitions of the stands were also identified. For instance, a driver from Win Soi Mahatlek Luang 3 described the stands as "affinity spaces," where drivers with shared backgrounds, characteristics, interests, and life goals collaborated. Another perspective shared by drivers was the concept of a "supportive space where they could receive financial and work-related assistance. This was exemplified by a respondent at Win Asia Hotel Bangkok, who became a motorcycle taxi driver based on the recommendation and support of a senior member.

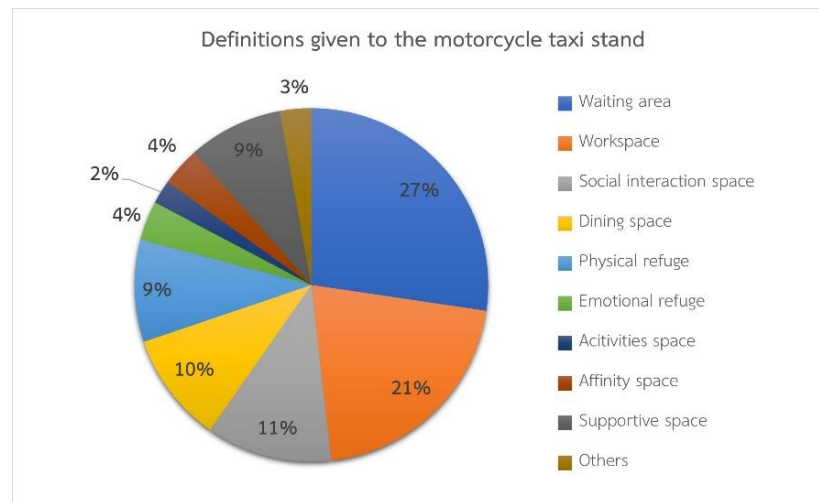


Figure 40 Definitions of Motorcycle Taxi Stands Given by Drivers

### 4.3. Comparative Analysis of Environmental Comfort among Different Types of Stands

The physical comfort and psychological comfort of motorcycle taxi stands were assessed using 5-point scale questionnaires. Scores obtained from the questionnaires were used to calculate the average comfort level for each stand. These average scores were then aggregated by stand type to examine significant differences between them.

#### 4.3.1. Analyzing Differences in Physical Comfort among Stand

##### Typologies

In Table 15, the average physical comfort scores for each stand type are presented. The dataset includes 13 BTS-attached stands, 6 canopy-based stands, and 6 tree-reliant stands, with average scores of 54.31, 43.17, and 46.50, respectively. T-test analysis was performed with an alpha value of 0.05.

The t-test analysis results, as shown in Tables 16 and 17, indicate significant differences in average physical comfort scores between BTS-attached stands and canopy-based stands, as well as between BTS-attached stands and tree-reliant stands. However, Table 18 demonstrates no significant difference between tree-reliant stands and canopy-based stands.

	<i>BTS-attached stands</i>	<i>Canopy-based stands</i>	<i>Tree-reliant stands</i>
	53	55	46
	55	45	55
	48	36	33
	55	33	58
	52	42	42
	60	48	45
	52		
	55		
	52		
	59		
	53		
	59		
	53		
Average	54.31	43.17	46.50

Table 15 The Average of Physical Comfort Scores by Stand Type

t-Test: Two-Sample Assuming Equal Variances

	<i>BTS-attached</i>	<i>Canopy-based</i>
Mean	54.30769231	43.16666667
Variance	11.56410256	64.56666667
Observations	13	6
Pooled Variance	27.15309201	
Hypothesized Mean Difference	0	
df	17	
t Stat	4.331975872	
P(T<=t) one-tail	0.000226367	
t Critical one-tail	1.739606726	
P(T<=t) two-tail	0.000452734	
t Critical two-tail	2.109815578	

Table 16 T-Test Analysis of Physical Comfort Differences between BTS-attached and Canopy-based Motorcycle Taxi Stands

**t-Test: Two-Sample Assuming Equal Variances**

	<i>BTS-attached</i>	<i>Tree-reliant</i>
Mean	54.30769231	46.5
Variance	11.56410256	81.9
Observations	13	6
Pooled Variance	32.25113122	
Hypothesized Mean Difference	0	
df	17	
t Stat	2.785612577	
P(T<=t) one-tail	0.006341732	
t Critical one-tail	1.739606726	
P(T<=t) two-tail	0.012683463	
t Critical two-tail	2.109815578	

*Table 17 T-Test Analysis of Physical Comfort Differences between BTS-attached and Tree-reliant Motorcycle Taxi Stands*

**t-Test: Two-Sample Assuming Equal Variances**

	<i>Canopy-based</i>	<i>Tree-reliant</i>
Mean	43.16666667	46.5
Variance	64.56666667	81.9
Observations	6	6
Pooled Variance	73.23333333	
Hypothesized Mean Difference	0	
df	10	
t Stat	-0.674660015	
P(T<=t) one-tail	0.257592924	
t Critical one-tail	1.812461123	
P(T<=t) two-tail	0.515185848	
t Critical two-tail	2.228138852	

*Table 18 T-Test Analysis of Physical Comfort Differences between Canopy-based and Tree-reliant Motorcycle Taxi Stands*



#### 4.3.2. Analysis of Differences in Psychological Comfort among Stand Typologies

The average psychological comfort scores for motorcycle taxi stands are 52.23 for BTS-attached type, 48.17 for canopy-based type, and 47.17 for tree-reliant type. T-test analysis was conducted with an alpha value of 0.05 (Table 19).

The t-test analysis results in Tables 20 indicate significant differences in average psychological comfort scores between BTS-attached stands and canopy-based stands. However, Table 21 suggests only slight differences between BTS-attached stands and tree-reliant stands. Additionally, there were no significant differences observed between the canopy-based type and the tree-reliant type (Table 22).

	BTS-attached stands	Canopy-based stands	Tree-reliant stands
	48	50	55
	52	45	53
	55	54	33
	54	48	57
	50	41	40
	55	51	45
	49		
	60		
	48		
	52		
	51		
	54		
	51		
Average	52.23	48.17	47.17

Table 19 The Average of Psychological Comfort Scores by Stand Type

**t-Test: Two-Sample Assuming Equal Variances**

	<i>BTS-attached</i>	<i>Canopy-based</i>
Mean	52.23076923	47.16666667
Variance	11.35897436	89.76666667
Observations	13	6
Pooled Variance	34.42006033	
Hypothesized Mean Difference	0	
df	17	
t Stat	1.748908869	
P(T<=t) one-tail	0.049169004	
t Critical one-tail	1.739606726	
P(T<=t) two-tail	0.098338008	
t Critical two-tail	2.109815578	

*Table 20 T-Test Analysis of Psychological Comfort Differences between BTS-attached and Canopy-based Motorcycle Taxi Stands*

**t-Test: Two-Sample Assuming Equal Variances**

	<i>BTS-attached</i>	<i>Tree-reliant</i>
Mean	54.30769231	46.5
Variance	11.56410256	81.9
Observations	13	6
Pooled Variance	32.25113122	
Hypothesized Mean Difference	0	
df	17	
t Stat	2.785612577	
P(T<=t) one-tail	0.006341732	
t Critical one-tail	1.739606726	
P(T<=t) two-tail	0.012683463	
t Critical two-tail	2.109815578	

*Table 21 T-Test Analysis of Psychological Comfort Differences between BTS-attached and Canopy-based Motorcycle Taxi Stands*

**t-Test: Two-Sample Assuming Equal Variances**

	<i>Canopy-based</i>	<i>Tree-reliant</i>
Mean	48.16666667	47.16666667
Variance	21.36666667	89.76666667
Observations	6	6
Pooled Variance	55.56666667	
Hypothesized Mean Difference	0	
df	10	
t Stat	0.232355766	
P(T<=t) one-tail	0.410473988	
t Critical one-tail	1.812461123	
P(T<=t) two-tail	0.820947975	
t Critical two-tail	2.228138852	

*Table 22 T-Test Analysis of Psychological Comfort Differences between Canopy-based and Tree-reliant Motorcycle Taxi Stands*

### 4.3.3. Examining Physical and Psychological Comfort Differences between Stands with and without Furniture

There was a total of 20 stands equipped with furniture, with an average physical comfort score of 48.9, and 5 stands without furniture, with an average score of 42. Regarding psychological comfort, stands with furniture had an average score of 51, while stands without furniture had an average score of 46.2. T-test analysis was conducted with an alpha value of 0.05 (Table 23).

The t-test analysis revealed a significant difference in average physical comfort scores between stands with and without furniture (Table 24). However, no significant difference was observed in the psychological comfort scores between stands with and without furniture (Table 25).

	Psychological comfort		Psychological comfort	
	With furniture	Without furniture	With furniture	Without furniture
	53	45	48	54
	46	45	52	45
	48	33	55	41
	34	42	50	51
	56	45	55	40
	52	45	49	54
	55		60	
	38		48	
	59		52	
	53		51	
	56		54	
	53		51	
	55		50	
	50		54	
	36		48	
	46		55	
	55		53	
	33		33	
	58		57	
	42		45	
Average	48.9	42	51	46.2

Table 23 The Average of Physical and Psychological Comfort Scores by the Existence of Furniture

**t-Test: Two-Sample Assuming Equal Variances**

	<i>With furniture</i>	<i>Without furniture</i>
Mean	48.9	42
Variance	67.56842105	27
Observations	20	5
Pooled Variance	60.51304348	
Hypothesized Mean Difference	0	
df	23	
t Stat	1.774003974	
P(T<=t) one-tail	0.044651883	
t Critical one-tail	1.713871528	
P(T<=t) two-tail	0.089303765	
t Critical two-tail	2.06865761	

*Table 24 T-Test Analysis of Physical Comfort Differences between Stands with and without Furniture*

**t-Test: Two-Sample Assuming Equal Variances**

	<i>With furniture</i>	<i>Without furniture</i>
Mean	51	46.2
Variance	30.63157895	37.7
Observations	20	5
Pooled Variance	31.86086957	
Hypothesized Mean Difference	0	
df	23	
t Stat	1.700757602	
P(T<=t) one-tail	0.05123613	
t Critical one-tail	1.713871528	
P(T<=t) two-tail	0.10247226	
t Critical two-tail	2.06865761	

*Table 25 T-Test Analysis of Psychological Comfort Differences between Stands with and without Furniture*

#### 4.3.4. Exploring the Relationship between Psychological Comfort and the Number of Objects in Motorcycle Taxi Stands

The study identified 18 stands with 0-5 objects and 7 stands with more than 6 objects, which included collective items and personal belongings of the drivers. The number of objects was analyzed in relation to score intervals to examine any potential correlation between psychological comfort and the number of items present within the stands. A Chi-square test analysis was performed with an alpha value of 0.10.

The results in of a Chi-square analysis, presented in Table 27, indicate a significant relationship between the number of objects and the level of psychological comfort among the drivers (Table 26).

*Table 26 Number of objects*

<i>Interval of psychological comfort score</i>	<i>0-5</i>	<i>More than 6</i>	<i>Total</i>
30-35	1	-	1
36-40	1	-	1
41-45	3	-	3
46-50	6	-	6
51-55	7	5	12
56-60	-	2	2
<b>Total</b>	<b>18</b>	<b>7</b>	<b>25</b>
<b>Chi-square</b>	<b>10.53240741</b>		
df	5		
Alpha	0.10		
The critical value	9.236		

*Table 1 Chi-square Test Analysis of the Relationship between Psychological Comfort and the Number of Objects in Motorcycle Taxi Stands*

#### 4.4. Significant findings

##### 1. *A lack of clear perception of the standards and desired features*

According to the survey, a significant number of motorcycle taxi drivers lacked a clear perception of the standards and desired features for motorcycle taxi stands. This lack of awareness may stem from their status as informal workers and their limited influence in government decision-making processes. As a result, they may feel marginalized and have limited voice in shaping the design and development of motorcycle taxi stands.

Interviewee from the Win TOT Service Center:

*"I think it's already good as it is. We do not need any fancy features. What we really need is more shade to protect us from the sun."*

Interviewee from the Win Century the Movie Plaza:

*"There is not much we can do. The district office does not allow it anyway. They say it would make the area look messy and disorganized, so we are not allowed to place anything there."*

Interviewee from the Win Soi Thaniya:

*"What kind of motorcycle taxi stand will they create? Is there room for improvement? That would be great! If possible, I would love to have a TV at the stand so I can watch it while waiting for passengers. (laughs)"*

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##### 2. *Limited knowledge regarding the key responsible actor*

While many drivers were able to identify the responsible agencies involved in overseeing motorcycle taxi services, they had limited knowledge regarding the key actor responsible for the design and improvement of stands. The lack of clarity in understanding the specific entity or organization in charge of stand management may contribute to challenges and uncertainty in implementing necessary improvements and addressing needs at the stands of drivers.

### 3. A situation of “varying standards and influences.”

The establishment and conditions of motorcycle taxi stands can be described as “a situation of varying standards and influences.” Firstly, the permission granted by the BMA and the property owners plays a significant role in determining the location and physical conditions of the stands. However, the standards for granting permission appear to differ. For example, stands located near the same BTS station may receive different treatment, with one stand being allowed to have plastic seats while another is required to remove them due to various reasons such as frequent royal motorcades, high pedestrian traffic, and the need to maintain cleanliness and order. Another variation was observed in the permission and collaboration levels with BTS. Drivers from Win Soi Kasemsan reported favorable treatment from BTS, allowing them to place seats and items under the stairway.

Interviewee from the Win Soi Kasemsan:

*"I feel that the BTS is quite understanding of our situation. They have permitted us to have chairs at our stand, as long as we keep it clean and organized. And during the COVID pandemic, they even went the extra mile to help us out. BTS staff came over and helped us spray disinfectant to keep our stand safe."*

In contrast, drivers from the similar stand type were prohibited from using the space around support pillars for reasons of orderliness. Moreover, drivers from Win Noble Ploenchit mentioned that although BTS did not explicitly prohibit them from placing seats, the high-end condominium property owner requested their cooperation in not adding many features.

Interviewee from the Win Noble Ploenchit:

*"The BTS staff actually told us that it is not really appropriate to have too many things placed here I think what they were trying to say is that the property owners prefer to maintain a tidy and organized environment, especially in these luxurious areas."*



Secondly, the presence and quality of stand amenities and features depend on the financial resources and cohesion among members. Wins with group savings and close-knit members reported having better and more varied features.

Interviewee from the Win Phaya Thai BTS station:

*"In our group, we have a savings system. We all contribute money every month, and with that, we were able to buy the water cooler and those plastic utensils you see there. a fund that allows members to borrow money at a low-interest rate. When we have saved up enough, we even plan a group trip for the New Year, just like we did last year."*

#### 4. The potential of the BMA to take responsibility for stand improvement

The BMA holds significant potential to be a key agency that establish design standards and enhance motorcycle taxi stands. In-depth interviews revealed that drivers recognized the role of BMA office districts in marking stand areas, maintaining cleanliness and orderliness, addressing complaints related to these areas. Drivers also acknowledged the positive impact of BMA-led sidewalk improvements, such as pavement modifications and installing street features. However, drivers also disclosed that monthly maintenance fees were required by Wins as a form of compensation for utilizing public spaces, and these fees varied even within the same district, such as in Phaya Thai district.

Interviewee from the Rajavithi Hospital:

*"Our Win contributes around THB 500 each month to the district office, and in return, they let us have plastic chairs and keep some shared items at the stand. They just ask us to make sure everything is kept tidy, and that is all they require."*

Interviewee from the Win Century the Movie Plaza:

*"Every month, our group has to pay a maintenance fee of THB 1,000. To be honest, I do not really see the point of it."*

##### *5. Social contributions of the motorcycle taxi stand*

The presence of motorcycle taxi stands fulfills the social needs of drivers who have migrated to urban areas for employment, corroborating the findings of Ibrahim and Bize (2018) and Sopranzetti (2018). Despite experiencing discomfort while waiting at these stands, drivers valued the social connections formed during their time spent with fellow drivers. Furthermore, the stands play a role in facilitating wayfinding and creating a welcoming urban environment. For instance, one driver from the Win Soi Thaniya reported actively promoting neighboring businesses by providing directions to tourists and inviting them to shop in the malls. Similarly, a driver from the Win Soi Mahatlek Luang 3 shared his knowledge of local eateries and occasionally recommended them to his passengers. These findings support the research conducted by Sirijintana (2016) regarding the role of motorcycle taxis in urban surveillance, as drivers possess knowledge of various locations within service areas.

##### *6. The use of smartphone and digital platform*

The survey results indicate a significant adoption of smartphones and digital platforms among motorcycle taxi drivers for their work. During the COVID-19 pandemic, some drivers turned to ride-hailing applications as an alternative income source, as observed among Win CP Tower drivers. Additionally, many drivers engaged in part-time work as food delivery riders on digital platforms. These findings align with the research conducted by Punnoi (2018) that reveals the prevalence of use of smartphone among drivers in their daily lives. This digital connectivity highlights their potential to aid governments in reporting issues within public spaces via smartphone.

However, when asked about their attitudes towards ride-hailing platforms and the possibility of shifting all motorcycle taxi drivers to online platforms, most drivers expressed a preference for remaining as traditional motorcycle taxi drivers due to the higher income. Additionally, older drivers expressed difficulties in using smartphones but acknowledged the potential for integrating the service with applications to enhance efficiency. These underscore the continued importance of physical stands despite the rise of online platforms. Enhancing existing motorcycle taxi stands is crucial to meet evolving needs and expectations.

## CHAPTER 5

### CONCLUSION AND RECOMMENDATIONS

This chapter provides a comprehensive overview of research findings pertaining to the physical conditions of motorcycle taxi stands and the comfort levels experienced by the drivers. It presents strategic recommendations aimed at enhancing the quality of work life of motorcycle taxi drivers and improving the public transit system in Bangkok. The chapter also includes a discussion of the study's limitations and proposes potential areas for future research.

#### 5.1. Conclusion and Discussion

The quality of work life (QWL) has gained increasing attention in recent decades. Given the significant amount of time people spend at work, it is crucial to ensure safe and healthy working environment that improve well-being and productivity of workers. Comfort is a fundamental for setting environmental standards and indicator of the QWL affected by the work environment. While numerous studies have examined the influence of the physical work environment on work-life quality, they mainly focus on indoor workspaces and formal laborers.

Motorcycle taxis play a crucial role as a feeder mode, complementing the mass transit system and offering on-demand services in the CBD of Bangkok. The presence of motorcycle taxi stands near BTS stations reflects the demand for this mode of transportation. Despite their contributions in the public transit system, motorcycle taxi drivers face a lack of measures and regulations that support their work-life quality, particularly in terms of their workspace.

This research investigates the physical working conditions of motorcycle taxi drivers, specifically focusing on the motorcycle taxi stands near BTS stations in the CBD of Bangkok. The evaluation framework employed in this study is based on the standards of transit stops. The research also explores the comfort conditions experienced by drivers through the concept of environmental comfort. The key findings of the study are summarized as follows.

### 5.1.1. Current Physical Conditions of Motorcycle Taxi Stands

The 25 surveyed motorcycle taxi stands near BTS stations in the CBD of Bangkok comprised small-to-medium size groups, utilizing a key tag system to manage their queue. These surveyed stands possess unique characteristics and do not meet the standards for public transport stops in several aspects.

#### 1) *Location*

Most stands were located in the close proximity to the access point of the BTS stations, typically within a range of 4 to 10 meters. The selection of stand locations was primarily determined by the operators, taking into consideration factors such as marketability and high demand from potential riders. The majority of these stands were positioned in the mid-block of the road, with a particular emphasis on the sidewalk corner, including both entrance corners and alley corners.

#### 2) *Physical form*

The surveyed motorcycle taxi stands lacked permanent structures, resulting in a fluid physical form that was shaped by the surrounding environment. Operators relied on the built and natural elements to determine the location, boundaries, and provision of shade for the stands. Based on common physical characteristics, the stands could be categorized into three typologies. BTS-attached stands were situated near BTS structures, utilizing features like staircases, support pillars, and skywalks to define their location and form. These stands typically included parking areas in the buffer zone and resting areas beneath or around the BTS structures. Tree-reliant stands relied on street plantings for shade and stand placement, with drivers gathering under the shade provided. Canopy-based stands relied on building canopies for shade and utilized various building components. Parking spaces for these stands were either in the buffer zone or on the roadside, with waiting areas in the frontage zone.

#### 3) *Features*

Most surveyed stands were predominantly characterized by the absence of standardization in their amenities and elements, with members taking responsibility for providing them. The presence of these features and elements within the stands

was influenced by various factors, including agreement among the group, site conditions, land use, and the permission of the BMA and the property owner.

Common features observed in the motorcycle taxi stands included vinyl fare rate signs, seating arrangements comprising plastic chairs and handmade wooden benches that lacked ergonomic support, lighting arrangements that were often insufficient and relied on streetlights or the existing lights in the surrounding area, trash receptacles typically in the form of large plastic bags, and integrated advertisements. Other items varied including shared objects and personal belongings. BTS-attached stands tended to have more objects, utilizing space beneath the BTS stairs for storage.

#### **5.1.2. Comfort Conditions of Surveyed Motorcycle Taxi Drivers**

Overall, the 75 motorcycle taxi drivers experienced physical and functional discomfort. However, the informal nature of the stands positively influenced the psychological comfort of the drivers.

##### **1) Physical comfort**

The level of physical comfort for motorcycle taxi drivers at the stands appears to be moderate. Drivers generally perceived the stands as safe, although occasional feelings of unsafety arose from roadside accidents and speeding vehicles. The presence of fellow drivers and well-lit surroundings contributed to their overall sense of security. Many respondents faced challenges with extreme weather conditions, such as heavy rainfall. Although many drivers made efforts to maintain cleanliness at the stands, constant exposure to pollution and weather caused dust accumulation, stains, and wear on stand features.

##### **2) Functional comfort**

Motorcycle taxi drivers encountered various challenges related to parking, engaging in activities during off-peak periods, and access to restroom facilities. Parking difficulties were primarily attributed to the lack of shade, limited space, and inconvenience. Sidewalk parking presented maneuvering challenges due to the absence of ramps, leading to conflicts and negative public reactions.

Queue management was generally smooth among members, and the absence of fare rate signs or route maps had no impact as passengers were already familiar with the informal nature of the service.

During off-peak periods, drivers engaged in various activities requiring minimal space, although uncomfortable furniture and restrictions imposed by authorities or property owners limited their engagement. Restroom access posed challenges, with drivers relying on gas station restrooms or accessing facilities in nearby shopping malls or office buildings. Some drivers encountered reluctance from property owners regarding restroom usage. Additionally, drivers occasionally consumed food at the stands, with those equipped with seating having more options for eating.

When rating the necessary amenities and features at the stands, most drivers prioritized essential job-related elements at the stands. Still, those stationed at stands with stable shade and seating desired additional amenities. Overall, drivers expressed concerns about parking, shade, and lighting and highlighted the need for improvements in canopies and seating, standardization, and additional amenities

### 3) Psychological comfort

The study findings indicate that motorcycle taxi drivers reported a relatively high level of psychological comfort while at the stands. Instead of personalizing their spaces for privacy, drivers engaged in collective practices of space customization, such as arranging shared items and decorating stand features to mark territories.

They also displayed territorial awareness, using nearby buildings or distinct physical elements as reference points to define their stand boundaries.

Most drivers were actively involved in the design and improvement of their stands and contributing financially or creatively.

The perception of motorcycle taxi stands varied among drivers, with some viewing them as waiting areas and workspaces, while others saw them as spaces for social interaction, outdoor dining, emotional sanctuaries, or support. These diverse perceptions highlight the multifaceted nature of motorcycle taxi stands and their significance in the lives of drivers beyond functional aspects, rooted in the collective practices of territorial marking and waiting.

### 5.1.3. Results of the Comparative Analysis of Environmental Comfort among Different Types of Stand

Significant differences in physical comfort scores were observed between BTS-attached stands and canopy-based stands, as well as between BTS-attached stands and tree-reliant stands. However, no significant difference was found between tree-reliant stands and canopy-based stands in terms of physical comfort.

Regarding psychological comfort scores, significant differences were found between BTS-attached stands and canopy-based stands. Marginal differences were observed between BTS-attached stands and tree-reliant stands, while no significant differences were found between canopy-based stands and tree-reliant stands.

Stands with furniture exhibited significant differences in physical comfort scores compared to stands without furniture, while no significant difference was found in psychological comfort scores.

A significant relationship was discovered between the number of objects present at the stands and the level of psychological comfort.

In conclusion, the motorcycle taxi stands near BTS stations deviate from the standards of conventional transit stops and display unique attributes regarding location selection, physical structure, and features offered. Consequently, drivers experience physical discomfort and lack functional support in their workspace. However, the informal nature of the stands and the haphazard arrangement of various items, along with the involvement of driver in providing them, contribute to a sense of psychological comfort.

The absence of standards for motorcycle taxis is influenced by the complex and ambiguous roles of responsible agencies, as well as a disregard for recognizing motorcycle taxis as a crucial element in the public transport system. The involvement of multiple stakeholders and various agencies with different responsibilities creates confusion among drivers regarding the establishment of motorcycle taxi stands. This includes uncertainties about the responsible party for setting standards, reporting issues related to stands, and the criteria for allowing the setup of motorcycle taxi stands. Additionally, this situation contributes to unequal

treatment and instances of bribery by officials, as evident in the unequal monthly maintenance fees.

The motorcycle taxi stands hold psychological significance for drivers, as they foster social connections and camaraderie through shared waiting experiences, space customization, and involvement in stand creation. However, it is important to note that this represents only one positive aspect reported by drivers. There may be other undisclosed concerns or factors that influence the drivers' need for stands to exist.

To enhance the workspaces of motorcycle taxi drivers and address existing challenges, it is crucial to establish clear standards, streamline responsibilities among relevant agencies, involve stakeholders in decision-making processes, and implement a system for continuous improvement. These measures will contribute to creating safer, more comfortable, and functional work environments for drivers.

## 5.2. Strategy Recommendations

The research findings provide strategic recommendations to improve the quality of work life for motorcycle taxi drivers in Bangkok. These recommendations focus on four key areas: spatial strategy, social protection, design, and management strategies (see Figure 41). The details of each strategy are outlined below.

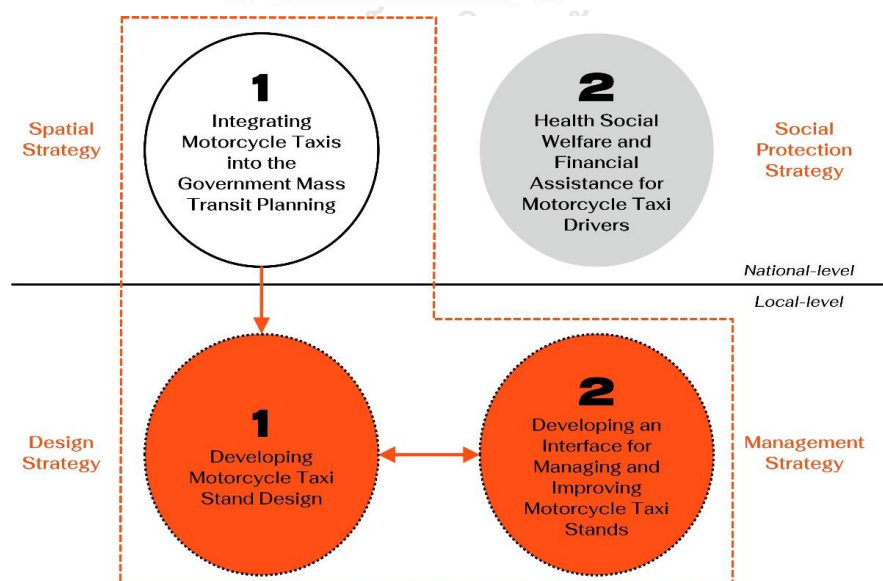


Figure 41 Strategy Suggestions



### 5.2.1. National-level Strategies

#### 1) *Integrating Motorcycle Taxis into the Government Mass Transit Planning*

The integration of motorcycle taxis into government mass transit planning aims to establish efficient connectivity and encourage greater use of public transportation. This policy proposes the inclusion of motorcycle taxi stands within the mass transit station areas to facilitate seamless travel between rail mass transit and feeder modes.

The implementation involves consideration of current and prospective locations of mass transit stations, such as BTS and MRT stations, to determine the appropriate placement and quantity of motorcycle taxi stands along railway corridors that can accommodate the commuter travel volume. Factors such as road and sidewalk conditions, as well as surrounding land use, will be considered to optimize infrastructure efficiency and space utilization.

The implementation of this strategy involves the active participation of the DLT and the BMA. Initially, the DLT and the BMA will engage in discussions with the Office of Transport and Traffic Policy and Planning (OTP), an organization responsible for constructing a policy framework for the national transport and traffic plan. These discussions will explore the potential integration of motorcycle taxi stands into the mass rapid transit master plan for the Bangkok Metropolitan Region. Furthermore, the key operators of mass transit systems in Bangkok and vicinity, which are the Bangkok Transit System Corporation (BTSC) and the Mass Rapid Transit Authority of Thailand (MRTA), will collaborate with the OTP to assess and revise the master plan and develop policies.

During the project implementation process, the DLT and BMA will coordinate with relevant agencies, including the BTSC, MRTA, Bureau of Public Works, Department of Highways, Department of Rural Roads, State Railway of Thailand, and the Traffic and Transport Department. This coordination aims to assess suitable locations for the stands, the feasibility of integrating them with existing structures, and the necessary infrastructure improvements required to support the establishment of these stands.

## *2) Health Social Welfare and Financial Assistance for Motorcycle Taxi Drivers*

Motorcycle taxi drivers face numerous challenges in their daily work, including unfavorable working conditions, extreme weather conditions, environmental pollution, and the constant risk of road accidents. These drivers typically lack adequate social protection measures, relying primarily on the universal welfare provided to all citizens. Some motorcycle taxi drivers fall within the scope of Section 40 of the Social Security Act, B.E. 2533, which offers certain benefits to individuals who are informally employed or self-employed and choose to voluntarily register. However, the coverage provided by Section 40 is limited in terms of addressing the needs of drivers. Specifically, while this section offers compensation for income loss in the event of an accident or illness, it does not provide coverage for medical expenses. Additionally, as motorcycle taxi drivers are considered independent transport workers, they are responsible for bearing all the costs associated with their occupation, such as motorcycle installments, maintenance, fuel, and registration fees, despite earning low incomes on a daily basis. Consequently, many drivers find themselves compelled to work longer hours to cover these expenses.

Therefore, it is necessary to have welfare and protection measures to assist not only motorcycle taxis but also other informal transport workers who are a part of vulnerable group facing similar working conditions. The Ministry of Labor (MLO) can be the primary agency driving the expansion of coverage within the social protection system and enhancing the list of available protective measures. For instance, the ministry can consider extending support to cover medical treatment expenses arising from occupational injuries or illnesses. Additionally, the introduction of targeted health promotion initiatives for transport workers can be explored. These initiatives might encompass complimentary annual health check-ups, implementation of physical treatment programs, and provision of essential supplies such as face masks and first aid kits to each individual working within the transportation industry.

Furthermore, the ministry can collaborate with the DLT to develop assistance measures targeted at specific occupational groups to facilitate their work and enhance their livelihoods in urban areas. Examples of such measures may include fuel discounts, motorcycle maintenance subsidies, and low-interest rate loan services

for transport workers. By adopting these measures, the Ministry of Labor can significantly contribute to the well-being and welfare of motorcycle taxi drivers, as well as other informal transport workers.

### 5.2.2. Local-level Strategies

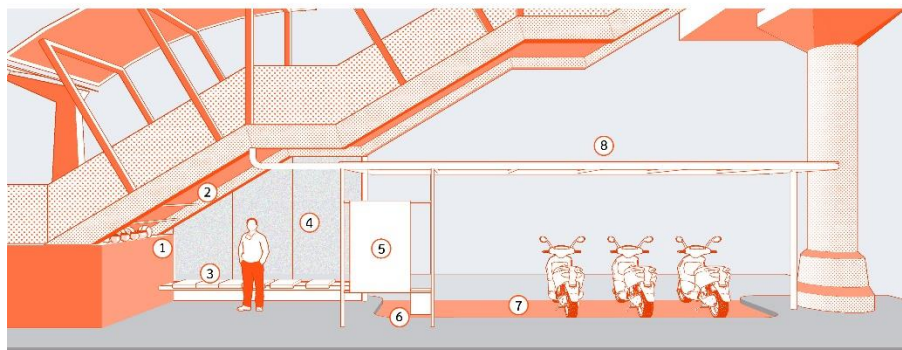
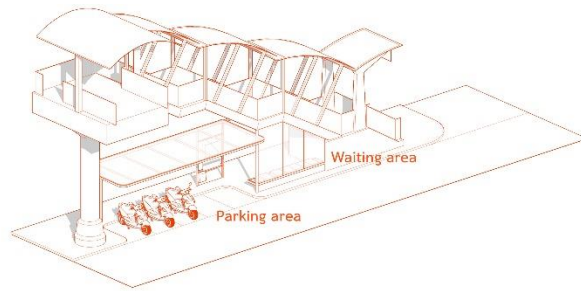
#### 1) *Developing Motorcycle Taxi Stand Design*

The inclusion of motorcycle taxis within the government's mass transit plan will lead to the motorcycle taxi stand design strategy. This strategy aims to establish guidelines for the design and improvement of motorcycle taxi stands, with the objective of enhancing the physical and functional comfort of drivers. Additionally, the strategy aims to align motorcycle taxi stands with established standards observed at other transit stops and mitigate spatial conflicts between sidewalk users.

The development of motorcycle taxi stand prototypes is based on typologies derived from the research findings. Each prototype typically includes two main areas: parking and waiting spaces. While standardized elements are incorporated, the design also takes into consideration the diverse usage behaviors of motorcycle taxi drivers within the limited space available.

#### A. *BTS-attached Stand Prototype*

The design prototype for motorcycle taxi stands located near existing or upcoming BTS stations involves integrating the stand structure with various parts of the BTS infrastructure, such as staircase beams. Figure 42 provides an illustration of the stand features and components in this prototype. The space beneath the stairs is utilized as a waiting area and storage space. The seat pads are designed to be adjustable to accommodate different seating positions. Additionally, the underside of the seats features a durable panel that can serve as a stool (refer to Figure 43). Standardized information signs, a trash receptacle, and a magnetic glass key tag board are affixed to the stand structure. To accommodate parking, a designated space will be carved out from the pedestrian footpath, thus preventing motorcycle taxis from obstructing the road or being stationed on pedestrian pathways.



**Legend**

- |                              |                       |                  |                       |
|------------------------------|-----------------------|------------------|-----------------------|
| 1. Storage                   | 2. Steel hanging bars | 3. Pad seats     | 4. Transparent panels |
| 5. Signage and key tag board | 6. Trash receptacle   | 7. Parking space | 8. Translucent roof   |

Figure 42 Isometric and Elevation Views of BTS-attached Stand Prototype

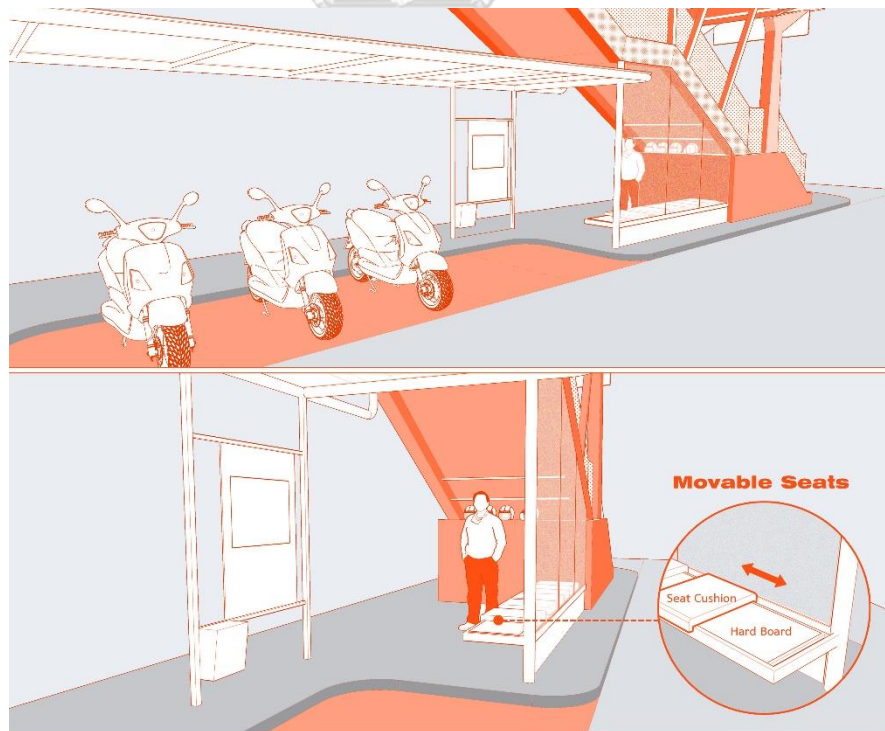


Figure 43 Perspectives of BTS-attached Stand Prototype

### B. Tree-reliant Stand Prototype

In situations where motorcycle taxi stands are located on the sidewalk, independent of the BTS structure, the design strategy involves the integration of street trees within the stands (refer to Figure 44). This integration serves to enhance the visual appeal of the stands and provide additional shade through the foliage canopy. The areas beneath or between the trees are effectively utilized as waiting spaces for motorcycle taxi passengers. Furthermore, a translucent roof is extended from the waiting area to the designated parking space, creating a linear layout that offers shade specifically for seated drivers and also for passengers during queuing.

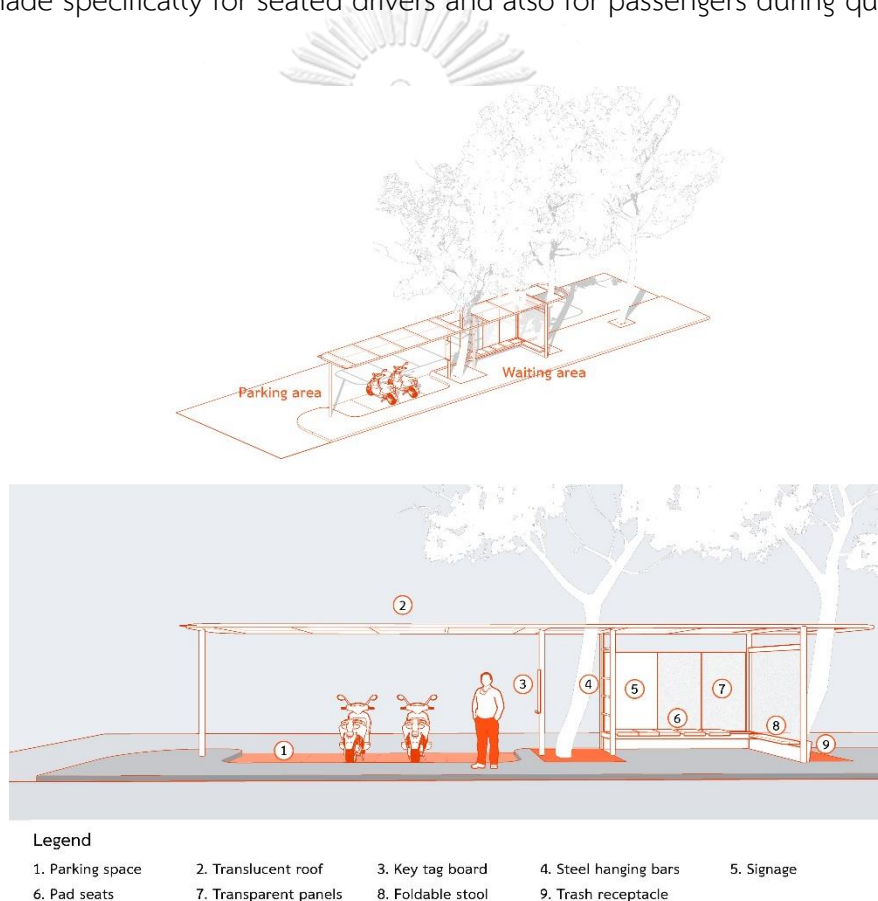


Figure 44 Isometric and Elevation Views of Tree-reliant Stand Prototype

The steel frame surrounding the tree not only defines the stand area but also serves as a support for the tree. It allows easy access for maintenance activities such as watering and trimming by the garden maintenance staff of the BMA. Additional

design elements are depicted in Figure 45, including foldable stools that serve multipurpose uses and a durable key tag board.

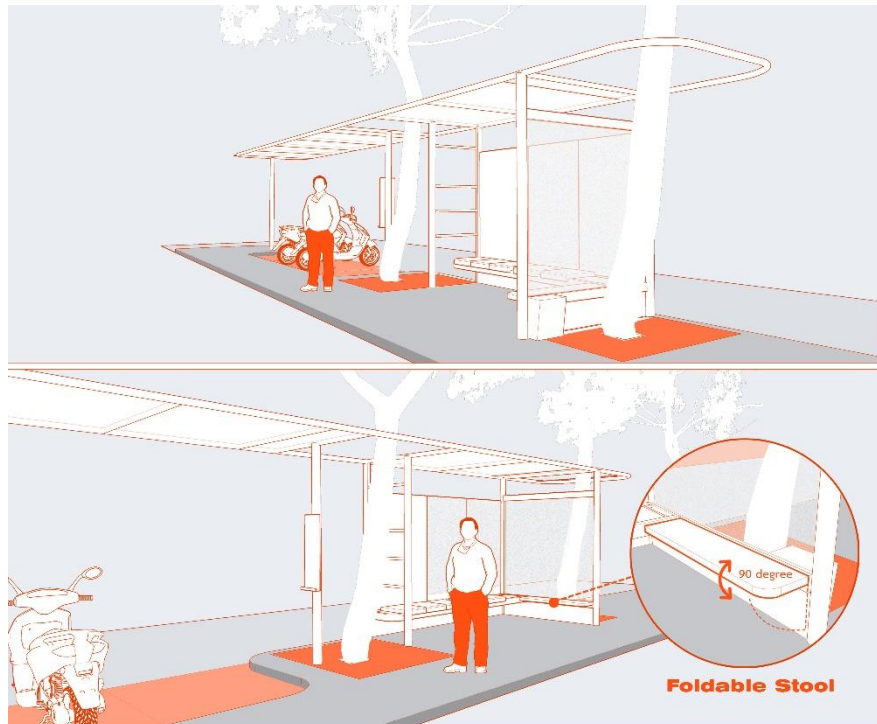
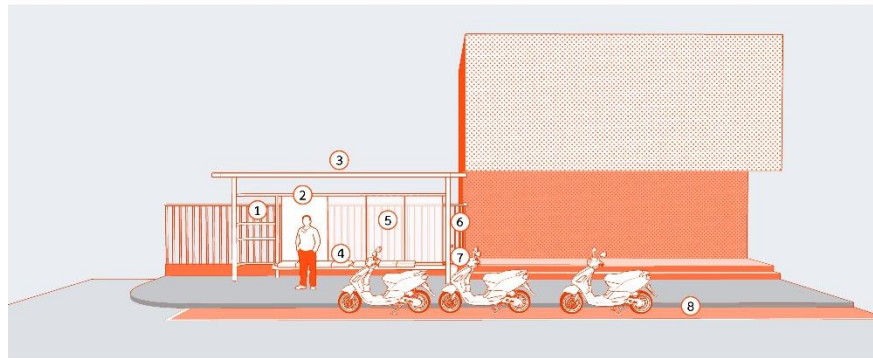
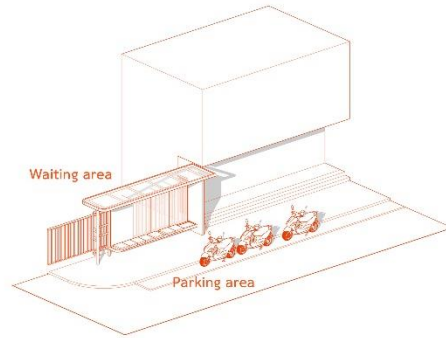


Figure 45 Perspectives of Tree-reliant Stand Prototype

### C. Canopy-based Stand Prototype

This proposed design prototype is intended for motorcycle taxi stands situated on the sidewalk, which may involve private or government properties. It offers a solution specifically for stands located in narrow sidewalk areas. In such cases, the design recommends that the parking space be allocated on the roadside, with vehicles parked parallel to the curbs. To demarcate the parking area, the design suggests utilizing painted markings on the road surface (see Figure 46 and 47).

The waiting area of this prototype will feature a shelter installed near building structures, specifically away from areas with accessibility or high pedestrian traffic. This shelter will be positioned adjacent to elements like fences, walls, or low walls.



Legend

- |                       |                  |                     |                  |
|-----------------------|------------------|---------------------|------------------|
| 1. Steel hanging bars | 2. Signage       | 3. Translucent roof | 4. Pad seats     |
| 5. Transparent panels | 6. Key tag board | 7. Trash receptacle | 8. Parking space |

Figure 46 Isometric and Elevation Views of Canopy-based Stand Prototype

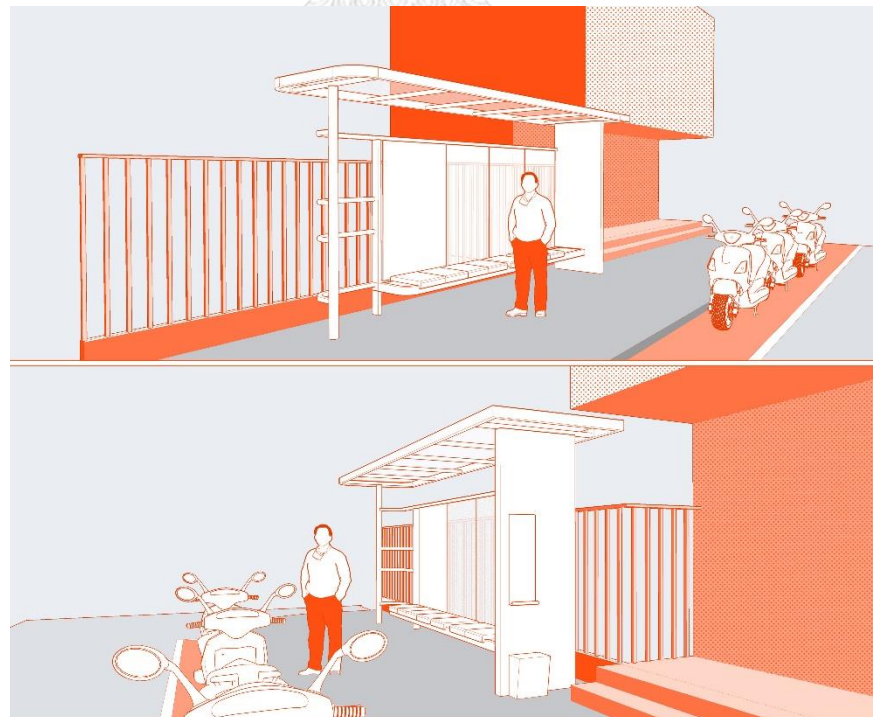


Figure 47 Perspectives of Canopy-based Stand Prototype

This implementation strategy will be carried out in an incremental approach. The BMA is well-positioned to play a crucial role in driving the implementation of the design strategy. Collaborating with academic institutions specializing in architectural design, the BMA can develop the design of the motorcycle taxi stands. During design process, voluntary motorcycle taxi drivers will be actively engaged as co-designers through workshops. These drivers, as representatives of the Wins, will gather valuable input from fellow drivers regarding their stands, including site constraints, ideas, preferences, and concerns. The driver representatives will then communicate this information to the BMA representatives and the design team.

Once three prototypes are created, they will be installed as pilot projects in selected locations for a period of two weeks. The design team and BMA officials will assess the results by observing the stands and gathering feedback to revise the prototypes accordingly. The finalized prototype will be developed and implemented for stands belonging to three typologies, strategically located near BTS stations.

The BMA will also serve as an intermediary, coordinating with relevant stakeholders involved in the usage of space for motorcycle taxi stands. Discussions with the BTSC will primarily address space utilization and structural integration for BTS-attached stands. In cases where stands are situated on private or government land, the BMA will seek collaboration or negotiate with property owners to secure stand spaces or incorporate building elements, such as facades, steps, or low walls, to accommodate driver rest areas. As all stand types are located on sidewalks, coordination with responsible agencies, such as the Bureau of Public Works, Department of Highways, Department of Rural Roads, and the State Railway of Thailand, will be necessary for stand construction and sidewalk improvements.

The BMA will also advocate for a review and amendment of the Act on the Maintenance of the Cleanliness and Orderliness of the Country B.E. 2535 (1992). This includes specifying exceptions for the use of space for motorcycle taxi operations, as they play an essential role in public transportation in Bangkok. Such amendments would replace fines for law violations with a clear and equitable monthly maintenance fee for all motorcycle taxi groups, thus addressing issues related to illegal payments and bribery by officials.



## *2) Developing an Interface for Managing and Improving Motorcycle Taxi Stands*

Considering that the majority of motorcycle taxi drivers are accustomed to using chat apps on their smartphones, the LINE application emerges as a suitable choice to be primary digital platform that serves as an interface for collective management and oversight of motorcycle taxi stands in Bangkok.

Collaboratively developed by the BMA and DLT, the platform features a comprehensive database containing information on registered motorcycle taxi groups, including names, locations, driver lists, service area maps, and fare rates. Through this interface, motorcycle taxi drivers have the opportunity to verify their status and explore available stands for joining. In addition, this communication channel would enable drivers to actively participate in the supervision and improvement of stands by reporting issues related to their stands and surrounding areas, as well as providing suggestions for desired stand features (refer to Figure 48). This approach not only promotes the creation of stands that support the work and well-being of drivers but also empowers them to have a voice in decision-making concerning their workspaces.

Furthermore, the platform facilitates the identification of responsible agencies involved in regulating services and stand improvements, along with their specific roles. This transparent system would enable drivers to easily approach the appropriate individuals for assistance when needed.

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