**ASIAN TRANSPORTATION RESEARCH SOCIETY**

# Successes, Failures, and Futures of Shared Micro-Mobility Services in Bangkok

**Saroch Boonsiripant**
**Peraphan Jittrapirom**
**Monthira Phamornmongkhonchai**
**Worakanya Khankhokkruad**

# Successes, Failures, and Futures of Shared Micro-Mobility Services in Bangkok

**ASIAN TRANSPORTATION RESEARCH SOCIETY**

# LIST OF MEMBERS

## Project Leader

Dr. Saroch Boonsiripant

Kasetsart University, Bangkok, Thailand

## Project Members

Dr. Peraphan Jittrapirom

Radboud University, Netherlands


Monthira Phamornmongkhonchai

Kasetsart University, Bangkok, Thailand


Worakanya Khankhokkruad

Kasetsart University, Bangkok, Thailand

## Advisors

Mr. Chamroon Tangpaisalkit

Chairperson and Deputy Permanent Secretary, MOT, Thailand


Dr. Alaksh Phornprapha

Board and Director of Safety Riding Training Center,

A.P. Honda Co., Ltd., Thailand

**Table of Contents**

**Page**

# CHAPER 1 INTRODUCTION

## 1.1    Background

Shared micro-mobility (SMM) services has emerged as a promising solution to enhance the sustainability of urban transport system. SMM services can be defined as a range of light-weight devices or mini-vehicle that operate at speed typically less than 45 kph that are provided to users through sharing scheme (Dias, Arsenio, and Ribeiro 2021).  Examples of SMM services are e-scooters, shared bicycle and e-bicycle that can be stationed or free floating. Research has identified roles of micro-mobility in providing flexible, sustainable, affordable transport modes that can reduce private vehicle dependency for short distance travel (Shaheen et al. 2020, Tiwari, 2019).

While there are positive prospects of SMM services to urban transport system in enhancing accessibility and reducing dependency on private car, the success of these services is still limited. These is only a handful of cities, such as Zurich, Vienna, and London, that have reported some successes with SMM operations and adoptions. SMM services in other cities, such as ofo bike sharing in Amsterdam, have not been successful. For cities in developing countries, such as Bangkok, the success of SMM services is even more limited. The attempts to launch several SMSS initiatives in the past decade have not been fruitful; SMM schemes such as Ofo and Mo bike (shared bicycle) or Neuron (shared electric scooter) in Bangkok drew much attention at the time of their launches but have since ceased their operations. Other schemes, such as Pun Pun (shared bicycle), are still in operations but with a limited adoptions and usages.

Despite the lack of success for SMM services in cities, such as Bangkok, there is still a clear need to support future implementation of SMM services as a sustainable urban transport solution. In the broader picture, SMM services can provide travelers with a last-first miles connections that complement public transport services to provide a viable alternative to private vehicle. Moreover, SMM can be among different mobility solutions that provide an integrated and personalised door-to-door transport concept purported in Mobility-as-a-Service (MaaS) that shift from ownership-based to an access-based mobility paradigm.

In this study, we contribute to the stated field by carrying out a systematic approach to review and reflect on the underlying reasons and factors that prohibited SMM services to be successful in Bangkok city. We will adopt research frameworks that help to explain the success and failure in innovation transport service adoptions, such as the Multi-Level Perspective (Geels, 2001), and integrate it with a system perspective approach in System Dynamics to identify the causal relationships between factors identified. In doing so, we seek to provide answers to these research questions:

- What are factors that influences their successes and failures of SMM services in general and in Bangkok?
- What are the interactions between these factors? And how are they differing in each case?

- What were/are the intended roles and value proposition of these services within the transport system and how were they implemented and to what end?
- What can be learnt from the incumbent transport services in Bangkok that have similar roles or provide similar services, such as Motorcycle taxi?
- What are the factors that can contribute to a successful SMM service and its contribution as a sustainable transport service in Bangkok? What policy and measures can contribute to this end?

The scope of this study includes the shared micro-mobility services such as shared e-scooters and shared bicycles operated both in closed areas (with access to a limited group of users e.g., university campus) and those operated in a publicly accessible area and within the proximity of mass transit stations (i.e., those serving as first-mile and last-mile connection). In this research project, we aim to carry out the following activities:

1)      A literature review on the factors that influence success and failure of SMM services in different contexts. We will examine peer-reviewed scientific publications and will include grey literature that are relevant to ensure the comprehensiveness of our review.

2)      Interviews with relevant stakeholders, such as service providers and decision makers to ascertain the influencing factors for success and failure of SMM in Bangkok city (approximately 20 interviews). The interviews will be transcribed and analyzed using Multilevel Perspective framework (MLP). We will also account for new and emerging trends that can affect SMM service, such as COVID-19 pandemic.

3)      Comparisons of the contributing factors identified in (2) with SMM in other contexts (e.g., Western cities or other developing cities) identified in 1). We will also compare the factors with those that contribute to the success of the incumbent mobility services in Bangkok (e.g., motorcycle taxi) identified through literature review and the stakeholder interviews.

4)      Organize focus group meetings for experts to discuss findings of 2) and 3) and to elicit the interconnectedness between the factors identified. We will use qualitative approach in System Dynamics modelling in form of causal loop diagramming method to capture the relationship proposed. We will also quantify experts' agreements of factors and relationships identified.

5)      Organize expert meetings with policymakers to discuss policy implications of the findings and provide a policy brief to outline the findings of this research project.

## 1.2    Research Objectives

To achieve the goal of the study, the objectives are five folds:

1) Determined the factors that influence successes and failures of SMM services in general and Bangkok.
2) Determined the interactions between the factors.
3) Determined the policy and measures that related to the SMM and support the SMM in Bangkok.

The outcomes of this project are expected to provide useful insight for future SMM service provider for Bangkok. Policymakers and transport planner can also use the knowledge to plan and design measures and policies to support SMM as a sustainable transport solution.

## 1.3     Research Framework

This research project consists of 4 tasks that expected different outcome. The details are as follows:

- Task 1: Literature review
- Task 2: Undertake success and failure analysis
- Task 3: Create system dynamic model of existing and potential roles
- Task 4: Reporting

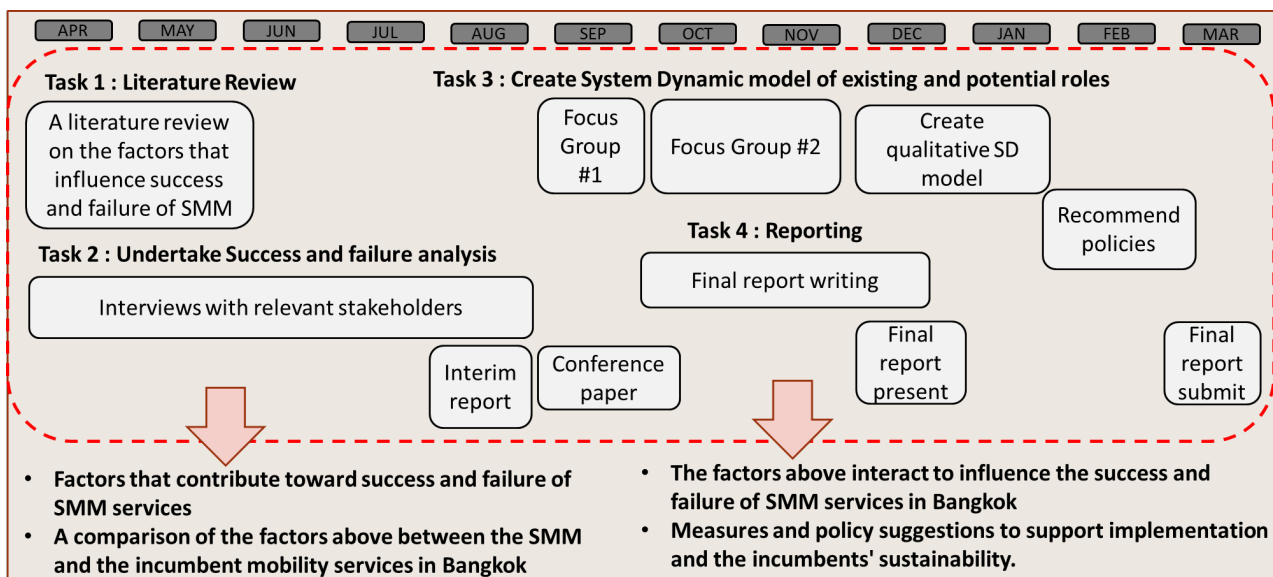The research framework is illustrated in Figure 1.1.



**Figure 1.1 Research Design Framework**

This research is composed of 3 key tasks including identifying the factors that influence success and failure of SMM, interviews with relevant stakeholders for analyze success and failure, and finally, we set up the focus group for create system dynamic model for existing and potential roles and determined recommended policies. The details are as follows:

### Task 1: Literature Review

In the first step of this research, the researcher team reviewed relevant literature on the following elements:

- Shared mobility
- Factors influence the success and failure on SMM, and
- Policies relevant to SMM

### Task 2: Undertake Success and Failure Analysis

To have an understanding of success and failure of SMM in Bangkok, we reviewed then identified key stakeholders within the shared micro-mobility of Bangkok and set up interview with them. The interview

was guided by a set of questionnaires that help to identify the factors influence the success and failure on SMM. After interviewed, we will summarize and analyze interview transcripts by using MLP framework.

**Task 3: Create System Dynamic model of existing and potential roles**

To have an understanding of the roles of relevant stakeholder on SMM, we set up two workshops with the relevant stakeholders. We monitored and processed the outputs in between each session. The sessions involve a combination of Focus group technique, qualitative SD model and feedback identification from relevant stakeholders. Outputs of this session is system dynamics model of existing and potential roles and recommend policies to support SMM in Bangkok.

## 1.4    Project Schedule

The duration of this study is 12 months starting from April 2022 to March 2023 as shown in Table 1.1.

**Table 1.1 Schedule/timeframe of the project**

| Task | 2022 | | | | | | | | | 2023 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar |
| **Task 1 – Literature review** | | | | | | | | | | | | |
| Literature Review | ■ | ■ | | | | | | | | | | |
| **Task 2 - Undertake Success and failure analysis** | | | | | | | | | | | | |
| Desktop study | ■ | | | | | | | | | | | |
| SMM service provider id and contact | | ■ | | | | | | | | | | |
| Interview 20 stakeholders | | | ■ | ■ | | | | | | | | |
| Summarize and analyze the interview transcripts using MLP framework | | | | ■ | ■ | | | | | | | |
| **Task 3 - Create System Dynamic model of existing and potential roles** | | | | | | | | | | | | |
| Focus Group #1 | | | | | | ■ | | | | | | |
| Focus Group #2 | | | | | | | ■ | ■ | | | | |
| Create qualitative SD model | | | | | | | | | ■ | ■ | | |
| Recommend policies | | | | | | | | | | | ■ | |
| **Task 4 - Reporting** | | | | | | | | | | | | |
| Inception report due | ■ | | | | | | | | | | | |
| Conference paper | | | | | | ■ | | | | | | |
| Interim report presentation | | | | | ■ | | | | | | | |
| Interim report submitting | | | | | | ■ | | | | | | |
| Final report writing | | | | | | | ■ | ■ | ■ | | | |
| Final report presentation | | | | | | | | | ■ | | | |
| Final report submission | | | | | | | | | | | | ■ |

# CHAPER 2 LITERATURE REVIEW

This section presents a literature review by using the systematic literature review method on shared mobility, factors influencing the success and failure on SMM, and policies relevant to SMM.

## 2.1    Systematic Literature Review Method

The systematic literature review method is different from the traditional literature reviews and has several advantages including makes the results less biased and provides an exhaustive outcome.

The systematic literature review methodology starts with a pre-determined and documented review protocol that allows researchers to identify their research objectives, questions, and methods to perform the review.

The systematic literature review methodology relies on a clearly defined search strategy to structure and classify the literature and identify gaps in knowledge. The methodology also uses sophisticated search engines which comprise inclusion and exclusion criteria to filter and categorise relevant studies. The systematic literature review methodology includes the following tasks (see Figure 2.1).
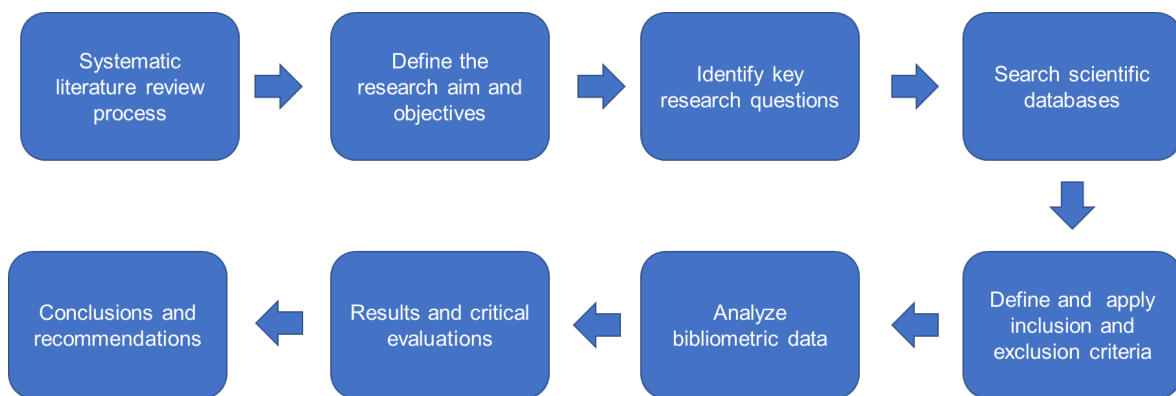


**Figure 2.1 Systematic literature review process**

In literature review session, the research team used the systematic literature review method for find the related literature. We start with finding related article from search with keywords and then we exclusion based on paper title, exclusion based on abstracts, exclusion based on full article content, snowballing and corpus included in the analysis (see Figure 2.2).
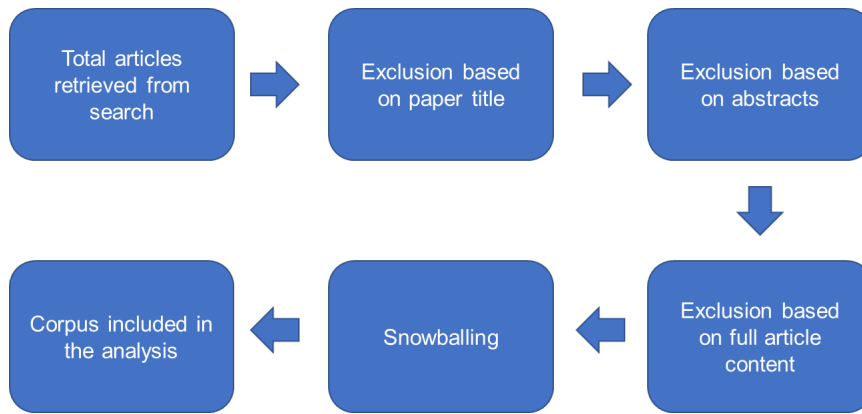
**Figure 2.2 Inclusion and exclusion criteria and corpus refinement**

In first step, the researchers team search the article with five keywords including shared mobility, e-scooter, success, failure and evalua* (evalue* for evaluation, evaluate), we got 169 articles retrieved from search. Next step, we exclusion articles based on paper title, we got 49 articles from this step. And then, we exclusion based on abstracts, we obtained 28 articles. In the next step, we would perform exclusion based on full article content, snowballing, and corpus included in analysis.
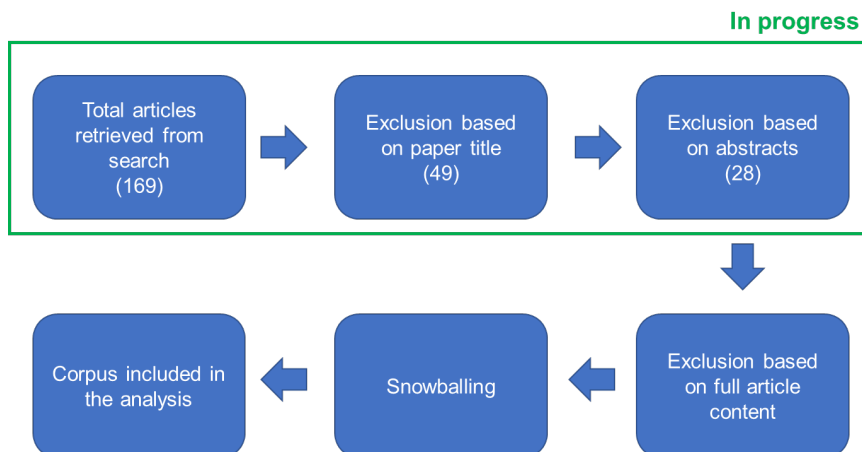


**Figure 2.3 Progress of systematic literature review method**

# CHAPER 3 SUCCESS AND FAILURE ANALYSIS

In this session, we summarize the factors that influence success and failure from literature review, create list of stakeholders and create questionnaire related to shared micro-mobility.

## 3.1    Factors Influence Success and Failure of SMM

Shared micro-mobility has gained much attention and popularity because the transport mode provides for a short-distance trip option including first/last-mile service. It is a flexible, cost-effective, on-demand, sustainable transport alternative and decreases on use of private vehicles, especially for short-distance trips (Abhishek Tiwari 2019; Regina Clewlow 2018). The rapidly adopting of shared micro-mobility has also helped promote that transport mode travel which has health benefits, and it is recognised as an important urban mobility system that can be adapted to users' needs that are either individual or family also for parcel delivery in urban areas (Metrobike 2009)

Major cities around the world that operate implementation of shared micro-mobility in a variance of alternative vehicles for a short trip and SMM has been successful in many countries. Raviv and Kolka (2013) explains that a crucial factor in the success of such a system is its ability to meet the fluctuating demand for both bicycles and vacant lockers at each station. In addition, shared system can help cities with environmental issues such as reducing air pollution, reducing inequality in access to transport, promoting money-saving, and improving mobility resilience.

However, many countries have not been successful. Several studies have addressed barriers to the success of SMM. Almannaa et al (2021) said the major obstacle for deploying e-scooters in Saudi Arabia is the lack of sufficient infrastructure. Pistelok and Straub (2022) said insufficient cooperation between the private and public sectors that would ensure the mobility points are virtually implemented into the service operation.

## 3.2    List of Relevant Stakeholders

The researcher team determined list of relevant stakeholders. There are details as follows:

**Table 3.1 List of stakeholders**

| Criteria | Description | Participants |
|---|---|---|
| Academia perspective | Views of expert working domain in transportation planning have a knowledge of traditional travel behavior theories | Academician of transportation in university |
| Consultant perspective | Views of expert having know-how in planning and design of shared micro-mobility system | Consultant of urban transport planning company |
| Enforcement officer | | Traffic police |

| Criteria | Description | Participants |
|---|---|---|
| | Views of expert having know-how in nationwide policy | Department of Land Transport |
| Service providers perspective | Views of expert handing real time projects and undergone public interaction during operational stages | Shared micro-mobility company |
| Decision makers perspective | Views of expert dealing in policy framework in government officials (Ex. transport planner, urban planner) | Office of Transport and Traffic Policy and Planning (OTP) |
| | | Traffic and Transportation Department |
| User perspective | Views of user that facing the problem while applying a services | Shared micro-mobility's customer, bike club |
| Insurance company | View of who has to pay money after the situation in the injury of road user | Insurance company |
| vendor | view of the expert who operates the sale micro-mobility vehicles | E-scooter sale company |

## 3.3    Next Step

We will create a question list for the semi-structure interview of the stakeholders. We will also start contacting stakeholders in the list.

## References

Abhishek Tiwari. 2019. "Micro-Mobility: The next Wave of Urban Transportation in India." https://yourstory.com/journal/micro-mobility-edc6x8f1y1/amp (May 2, 2022).

Almannaa, Mohammed Hamad et al. 2021. "Perception Analysis of E-Scooter Riders and Non-Riders in Riyadh, Saudi Arabia: Survey Outputs." *SUSTAINABILITY* 13(2).

Dias, Gabriel, Elisabete Arsenio, and Paulo Ribeiro. 2021. "The Role of Shared E-Scooter Systems in Urban Sustainability and Resilience during the Covid-19 Mobility Restrictions." *SUSTAINABILITY* 13(13).

Metrobike, Paul Demaio. 2009. "Bike-Sharing: History, Impacts, Models of Provision, and Future." *Journal of Public Transportation* 12(4): 3. https://digitalcommons.usf.edu/jpt/vol12/iss4/3 (May 2, 2022).

Pistelok, Pawel, and Daniel Straub. 2022. "It Is Time to Get Virtual: Limitations of Shared e-Scooter Mobility Points, Case Study in Cracow (Poland)." *GEOGRAFIE* 127(1): 1–29.

Raviv, Tal, and Ofer Kolka. 2013. "Optimal Inventory Management of a Bike-Sharing Station." *IIE TRANSACTIONS* 45(10, SI): 1077–93.

Regina Clewlow. 2018. "The Micro-Mobility Revolution. The Introduction, Adoption, and Use Of… | by Regina Clewlow | Populus | Medium." https://medium.com/populus-ai/the-micro-mobility-revolution-95e396db3754 (May 2, 2022).

# Inception Report

**Research Grant 2022**

# ATRANS