A Comparison of Access and Egress Characteristics to and from Rail Stations in Bangkok and Metro Manila

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Abstract: The study compares access and egress characteristics of commuters going to/coming from urban rail stations in Bangkok and Metro Manila. Based on quota sampling and face-to-face questionnaire survey of rail users, key commonalities and differences were identified. Findings reveal that Manila commuters experience significantly longer travel distances and higher travel times when accessing and egressing rail stations. An analysis of personal characteristics and travel behavior shows that there is no significant difference in access distance and travel time between genders but there are some differences between age and income levels. Additionally, various access and egress scenarios were examined to assess commuter preferences when faced with challenges and commuters tend to rely on the most common and widely available transport modes as their default alternatives. These findings highlight the critical role of informal and widely accessible transport modes as well as emerging RHA services in first- and last-mile connectivity.

Keywords: Access Mode, Urban Rail System, Rail Stations, Egress, RHA Services

I. INTRODUCTION

Following the example of developed East Asian cities, such as Singapore, Tokyo and Seoul, major cities in Southeast Asia have been expanding their rail-based mass transport systems. Cities like Bangkok, Thailand, and Metro Manila, Philippines have prioritized rail network development to address worsening urban congestion. Notably, Metro Manila was the first major city in Southeast Asia to establish a rail transit system in 1985. However, Bangkok has since surpassed Metro Manila in terms of rail transit expansion. Figures 1.1 and 1.2 illustrate the existing railway network in Bangkok and Metro Manila, respectively. Table 1.1 provides the present and proposed future rail lines for both cities.

Despite these developments, severe traffic congestion persists in both urban areas, indicating that rail expansion alone is insufficient. A critical issue lies in station accessibility and integration with feeder and complementary transport modes.

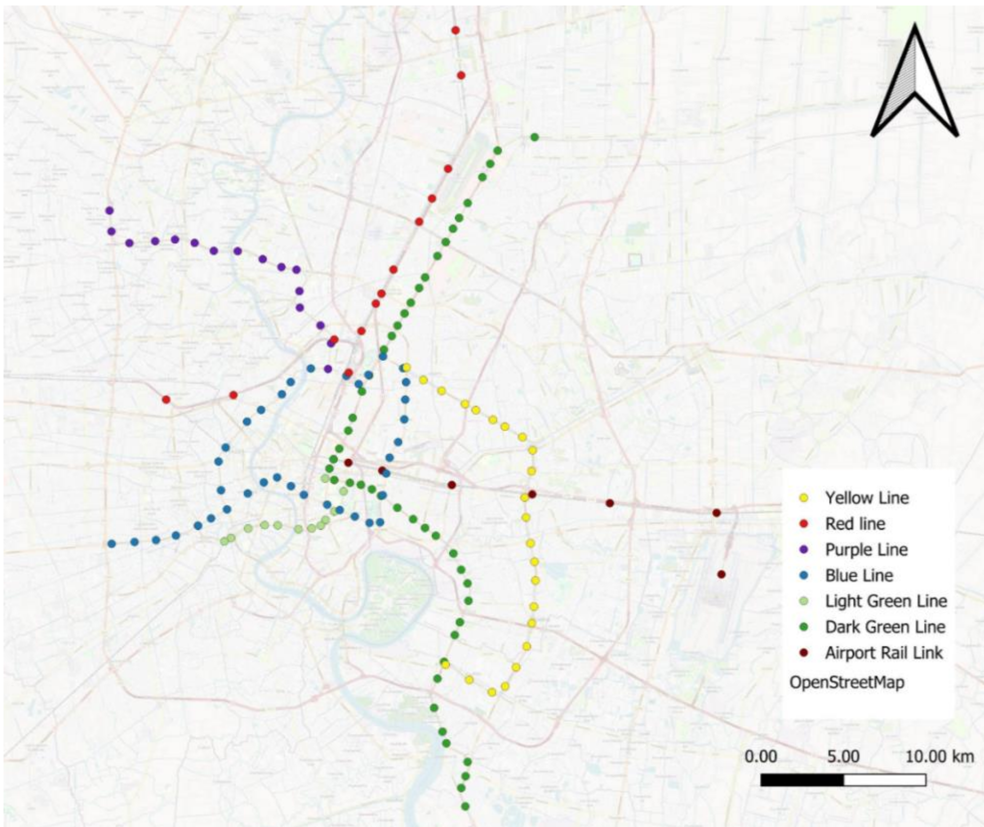

Figure 1.1 Metropolitan Bangkok Rail Transit Network

In Bangkok, even with an increasing number of rail lines, challenges remain due to rapid urbanization, population growth, and inadequate supporting infrastructure. Heavy reliance on road-based transport has exacerbated congestion, while poor integration among public transit systems – such as the BTS Skytrain, MRT, and buses – limits accessibility, particularly for low-income populations in peripheral areas (Pojani & Stead, 2015). The slow expansion of mass transit and limited pedestrian infrastructure discourage non-motorized transport, further exacerbating mobility challenges. Severe traffic congestion and urban sprawl have weakened bus reliability and profitability, limiting coverage, particularly in low-density areas. As a result, many commuters have turned to informal transport—such as motorcycle taxis—for first- and last-mile connectivity to the urban rail network Additional barriers include urban sprawl, fragmented governance, and insufficient investment in sustainable transport solutions. Addressing these issues requires integrated planning, increased public transit investment, and policies promoting walkability and cycling to enhance mobility and reduce socio-economic disparities in the city

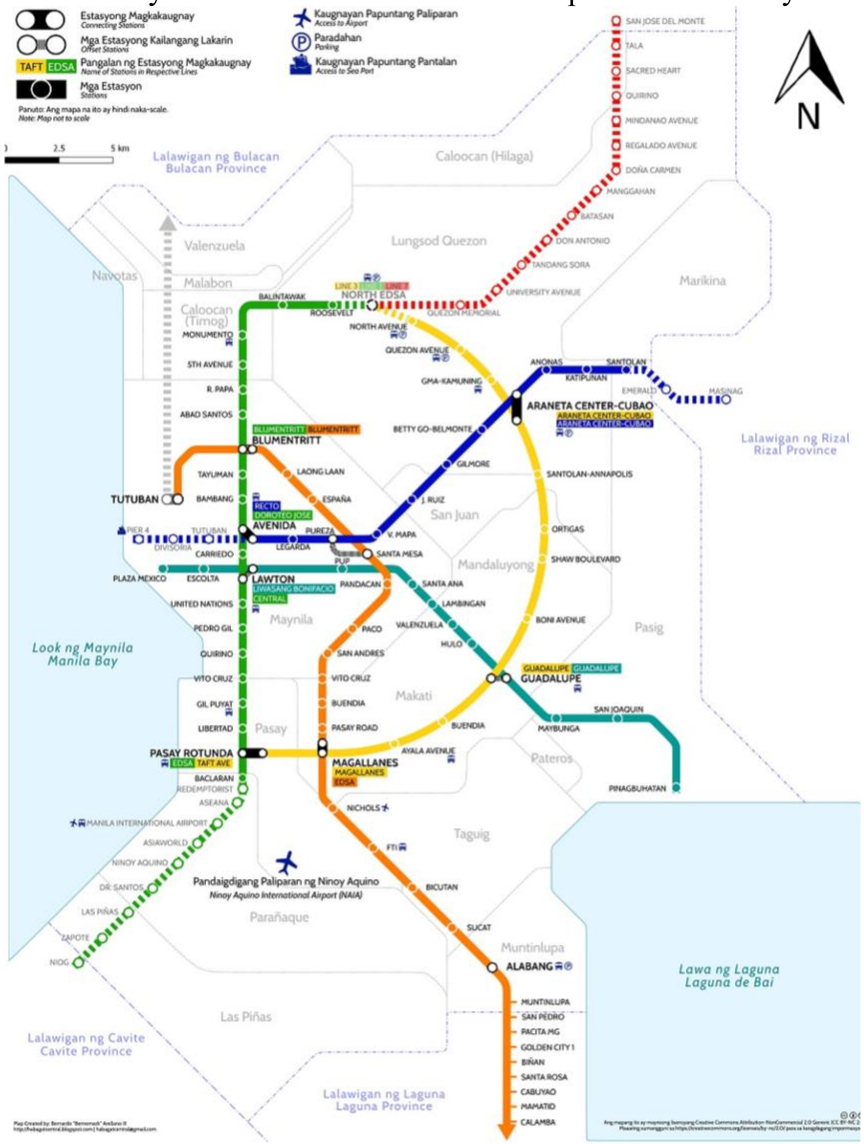

Figure 1.2 Metro Manila Rail Transit Description

In Metro Manila, the Public Utility Vehicle Modernization Program (PUVMP) was launched in 2017 to address systemic issues in the country's public transport system. Currently the program is renamed as Public Transport Modernization Program (PTMP). The program aims to provide a comfortable, accessible, reliable, environmentally friendly and safe (CARES) public transportation system. However, its implementation has not been fully realized. The inefficiency and unreliability of Metro Manila's road-based public transport – primarily jeepneys and city buses – have created a demand for alternative transport services. Consequently, ride-hailing services (RHS), including car- and motorcycle-based Transport Network Vehicle Services (TNVS), have emerged as a viable alternative. These services cater to commuters – primarily those who can afford them – who lack direct access to rail stations or whose trip origins and destinations are not within walking distance of stations.

This study aims to: (1) Compare the access and egress characteristics of rail commuters in Bangkok and Metro Manila, (2) Identify and compare the important socio-economic factors influencing access and egress choices in both cities, and (3) Assess the impact of RHS as an access/egress mode on commuter behavior.

Table 1.1 Present and future urban rail lines in Bangkok and Metro Manila

City	Project name	Length (km)	Project status
Bangkok	BTS Light Green Line Extension	19	Completed in 2020
	MRT Purple Line Extension	24	Under construction (2027)
	MRT Blue Line Extension	8	On hold
	BMA Gold Line	3	Under construction (2027)
	SRT Light Red Line	36	Under construction (2025)
	SRT Dark Red Line	26	Completed in 2021
	MRT Yellow Line	30	Under construction (2023)
	MRT Pink Link	35	Under construction (2023)
	MRT Orange Line	36	Under construction (2024)
	BMA Grey Line	16	Proposed
	M-MAP2 Future Rail Lines (5 total)	131	Proposed
Manila	MRT Line 1 Extension	12	Completed in 2021
	MRT Line 2 Extension	4	Under construction (2027)
	MRT Line 4	16	Under construction (2028)
	MRT Line 7	23	Under construction (2025)
	North-South Commuter Railway (PNR Clark 1)	38	Under construction (2024)
	Metro Manila Subway (Airport Alignment)	23	Under construction (2027)

Source: ITF (2023), "Transit-Oriented Development and Accessibility: Case studies from Southeast Asian cities", International Transport Forum Policy Papers, No. 124, OECD Publishing, Paris.

2. LITERATURE REVIEW

Access to urban railway systems remains a significant challenge in developing countries, often due to the fragmented responsibilities between different levels of government in transport planning and implementation. Big-ticket infrastructure projects, such as railway systems, typically fall under the purview of national government agencies, while access and feeder modes are planned, managed and enforced by local government units (LGUs). The division of responsibilities can lead to conflicting mandates. For instance, in Metro Manila, the national government prohibits motor-tricycles from operating along national highways, while some LGUs permit them on national roads within their jurisdictions. Such inconsistencies may reflect efforts by local governments to ensure equitable access to railway stations, which is crucial for fostering inclusive urban mobility (Theerathitichaipa, et al. (2023). However, achieving effective and sustainable integration requires coordinated policymaking across all levels of government.

Most accessibility studies on rail systems focus on macro-level impacts, such as the region's economic development, land use changes associated with Transit Oriented Development (TOD), access to employment and other opportunities. Tsumita et al. (2023) found that rail transit network expansion significantly enhances accessibility, and TOD policies further amplify these benefits. Accessibility-oriented development aims to balance employment accessibility with workforce distribution, fostering an environment conducive to economic growth (Deoosere, R. et-al., 2018). Levinson (1998) studied the effect of accessibility to employment and residential areas from both home and work perspectives, emphasizing its role in urban development.

Most rail accessibility studies have been conducted in developed countries, likely due to their extensive urban rail networks. Brons et al. (2009) explored two key objectives: (1) assessing the role of station accessibility in passenger satisfaction, and (2) analyzing how service characteristics, accessibility, and demographics influence rail usage in the Netherlands. Moyano et al. (2018) found that first- and last-mile segments significantly affect high-speed rail trips, increasing total travel time by 35% when using taxis and 55% when using public transport.

In contrast, fewer studies on rail accessibility have been conducted in East Asia. Chalermpong and Wibowo (2007) developed an access choice model that identified distance to the station as the most critical factor influencing walking propensity. However, their study also highlighted that station-specific characteristics also play a significant role in determining access choices. This study addresses gaps in the literature by providing new insights into commuters' access and egress patterns in Bangkok and Metro Manila. Additionally, it examines the role of RHA services as a first- and last-mile solution, assessing their viability as an alternative mode for urban rail users.

3. FRAMEWORK

The factors influencing commuter access to rail stations in urban rail systems can be categorized into four key components: (1) personal characteristics of the commuter, (2) travel characteristics, (3) transport supply availability, and (4) environmental factors (Figure 3.1). Furthermore, these components do not act independently but interact dynamically, shaping the decision-making process of rail commuters in Bangkok and Metro Manila.

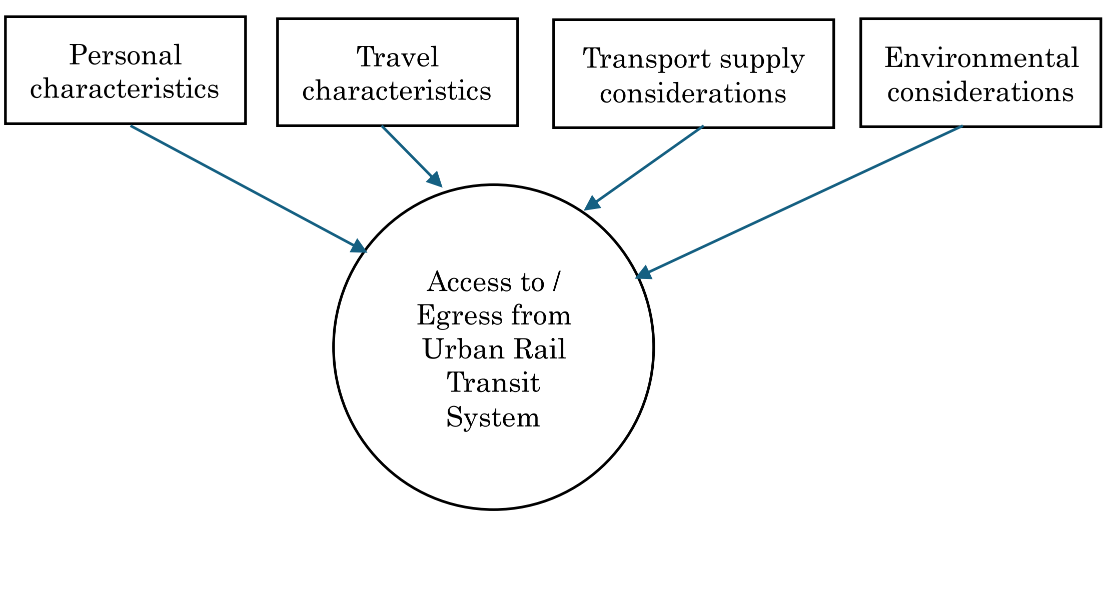

Figure 3.1 Conceptual Framework

Rahman et al. (2022) identified factors affecting commuter choices, including income, gender, waiting time, travel duration, cost, comfort, and mode availability. Their study found that female commuters tend to favor rickshaws, while lower-income individuals are more likely to use paratransit and buses. The study highlights the critical role of first- and last-mile connectivity in enhancing accessibility within Dhaka's public transport network.

The preference for rail travel over other modes, such as cars, is influenced by service quality, station accessibility, and population demographics (Brons et al., 2009). However, significant differences may exist between the two cities, particularly in commuter characteristics that shape access and egress patterns. Identifying these variations can help inform urban transport policies aimed at improving rail accessibility and enhancing the efficiency of the overall urban transport system.

4. METHODOLOGY

This study examines the first- and last-mile travel modes of rail users in Bangkok and Metro Manila, focusing on commuters who rely on urban rail transit. The target population consists of residents within Metropolitan Bangkok and Metro Manila who use rail transit services.

Data Collection and Sampling

In Bangkok, the study targeted urban rail users who commute by rail at least once a week and are 18 years old or older. A quota sampling approach was used, based on 2021-2023 ridership data. While the focus was on the BTS and MRT lines -- being the oldest and most heavily used rail systems – respondents were also surveyed from the Airport Rail Link (ARL), Red Line, and Yellow Line. The survey was conducted from October 2023 to November 2023.

In Metro Manila, data collection took place at stations of the LRT-1 (20 stations), LRT-2 (13 stations), and MRT-3 (13 stations) from November 2023 to December 2023. The target sample size was 1,000 respondents, proportionately distributed between access trips (morning, 500 respondents) and egress trips (afternoon, 500 respondents). Respondents were also given the option to provide information for both their access and egress trips.

Rail stations were also grouped based on surrounding land use, major transfer hubs, and connections with secondary public utility vehicle (PUV) routes, among others. More samples were gathered at origin and terminal stations, where commuter demand is highest. After processing and validating responses for consistency, a total of 434 valid survey forms were gathered from LRT-1 users, 249 from LRT-2 users, and 548 from MRT-3 users – with MRT-3 having the highest response rate, reflecting its higher daily ridership.

Survey Design and Data Collected

The questionnaire survey form was structured to capture key characteristics of rail users in both cities, covering:

(1) Transit trip characteristics, including frequency of rail use and trip purpose, origin and destination of trips, access and egress modes, estimated distance and travel time to/from the rail station and home, travel costs, including incidental expenses such as parking and toll fees for car users.

(2) Access and Egress Scenarios to evaluate how access and egress choices would change under different conditions, including: the unavailability of their usual travel mode, increment weather, lack of cash, carrying heavy luggage, late-night travel, traveling under the influence of alcohol, and traveling in a group.

(3) Socio-demographic characteristics, including age, gender, personal and household income, educational attainment, household composition (presence of children and seniors), driver's license ownership, car and motorcycle ownership, and housing type.

Data Analysis Approach

To identify similarities and differences between the Bangkok and Metro Manila commuters, the study employed descriptive analysis of access and egress characteristics, along with socio-demographic attributes. Additionally, statistical tests of homogeneity were conducted to compare access and egress behaviors between the two cities. Further statistical analysis examined the relationships between socio-demographic factors (e.g., gender, age, and income), and access and egress mode choices, assessing whether these characteristics significantly influence commuter behavior in both urban rail systems.

5. RESULTS AND ANALYSIS

5.1 RESPONDENTS' PROFILE/DEMOGRAPHICS

The socio-demographic characteristics of respondents in Bangkok and Metro Manila reveal the following:

- **Gender Distribution:** In Bangkok, the majority of respondents are male (61%), whereas in Metro Manila, more females responded to the survey (54%).
- **Educational Attainment**: Majority of rail user respondents in both cities have attained at least a Bachelor's degree.
- **Age Profile:** Rail users in both cities are predominantly young adults. The largest age group in both Bangkok (38%) and Metro Manila (41%) falls within the 18-30 years old range, followed by the 31-40 years old group (28% in Bangkok, 32% in Metro Manila).
- **Personal Monthly Income:** Bangkok respondents generally have higher nominal incomes than those in Metro Manila. The largest income group in Bangkok (35%) falls within the USD 445 – USD 890 range, while in Metro Manila, the highest proportion of respondents (31%) earn less than USD 297 per month. Based on Expatistan (2025), a

widely used cost-of-living comparison platform that aggregates crowdsourced price data from cities worldwide, the cost of living in Bangkok is about 35% higher than in Manila. Accounting for this difference, an income of USD 445-890 in Bangkok would have a purchasing power equivalent to about USD 330-659 in Metro Manila. Despite accounting for cost-of-living differences, income levels in Bangkok remain relatively higher than in Metro Manila.

- **Driving License Ownership:** A significantly higher percentage of Bangkok respondents hold driving licenses: 44% for car licenses and 37% for motorcycle licenses. Only 28% of Metro Manila respondents hold a car driving license, and 14% possess a motorcycle license.
- **Trip Purpose:** The majority of rail users in Metro Manila (93%) primarily commute for work or business-related travel, whereas in Bangkok, only 64% fall under these trip categories. This suggests that rail commuters in Metro Manila are more work-related, whereas Bangkok commuters might have more diverse travel purposes, including leisure and shopping.

Table 5.1 presents a detailed comparison of the sociodemographic characteristics of respondents from Bangkok and Metro Manila. Due to some missing data in a number of respondents N = 1,324 and N=1191 for Bangkok and Metro Manila, respectively.

Table 5.1 Summary of socio-demographic characteristics of respondents in Metro Manila and Bangkok

	Socio-Economic Characteristics	**Bangkok (N= 1324)**	**Metro Manila (N=1191)**
Gender	Female Male	38.42% 61.43%	53.91% 46.09%
Educational Attainment	High school or below Bachelor’s degree of equivalent Master’s degree and above N/A	25.13% 68.83% 5.89% 0.15%	14.25% 74.48% 11.26% 0%
Age	18 - 30 31 - 40 41 - 50 51 - 60 > 60	38.04% 28.53% 19.55% 10.11% 3.77%	41.29% 32.33% 15.98% 7.89% 2.6%
Personal Monthly Income	< = 296.56 296.59 - 444.84 444.87 - 889.68 > 889.68 (Dollars, USD/THB - 33.72, USD/PHP - 57.99)	13.58% 25.28% 34.64% 26.50%	30.98% 20.21% 26.38% 14.43%

	Socio-Economic Characteristics	Bangkok (N= 1324)	Metro Manila (N=1191)
Car driving license	Yes No	43.70% 56.30%	28.30% 71.7%
Motorcycle driving license	Yes No	36.83% 62.94%	13.91% 86.09%
Trip purpose	Commuting Work related business trip Shopping Leisure Others	41.58% 22.72% 10.11% 17.43% 8.15%	44.71 48.04 - 4.48% 2.75%

5.2 ACCESS AND EGRESS CHARACTERISTICS

Table 5.2 provides a detailed breakdown of access and egress modes usage in both cities. The most frequently used access modes to urban rail stations differ significantly between Bangkok and Metro Manila. In Bangkok, the dominant access mode is motorcycle taxis (34%), 13followed by buses (22%), and other public transport modes (13%). In Metro Manila, traditional jeepneys (41%) are the primary access mode, followed by walking (29%), and motorcycle RHA services (7%). For egress, Bangkok commuters primarily use motorcycle taxis (38%), buses (21%), and other public transport modes (13%), while in Metro Manila, the most common modes are traditional jeepneys (37%), walking (29%), and motorcycle RHAs (13%). Notably, in Metro Manila, motorcycle RHAs have gained traction as a modern alternative for first- and last-mile connectivity, gradually complementing or replacing traditional feeder modes such as jeepneys and motor-tricycles.

A significant difference exists in transit access distances between Bangkok and Metro Manila. The mean access distance in Metro Manila (9.18 km) is more than quadruple that of Bangkok (2.80 km). Furthermore, Metro Manila's variance is considerably larger, indicating a more dispersed distribution of access distances.

Similar trends are observed in transit access time, where Metro Manila's mean access time (~24 mins) is around double that of Bangkok (~11 mins), again also showing higher variance. The egress distance and time also follow the same pattern, reinforcing the observation that Metro Manila's urban rail system is not well-integrated with secondary public transport and feeder modes.

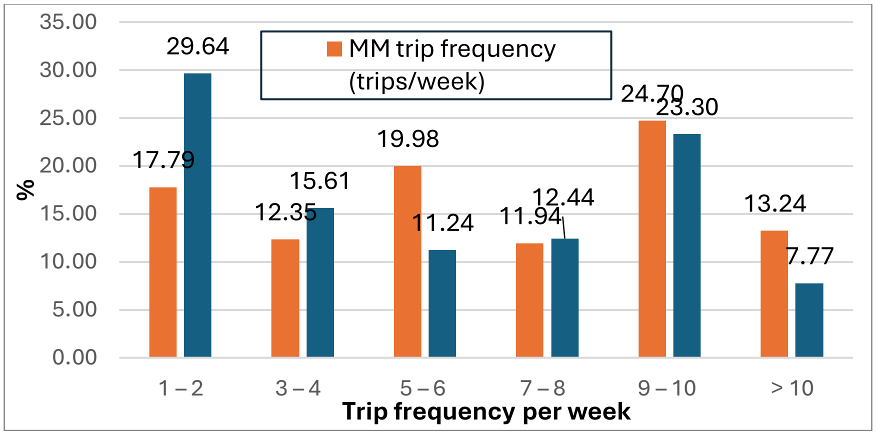

Figure 5.1 Comparison of urban rail trip frequency per week between Bangkok and M. Manila

These longer access and egress distances and travel times in Metro Manila directly correlate to higher access and egress costs compared to Bangkok. Table 5.3 summarizes these disparities.

Metro Manila commuters tend to use urban rail services more frequently per week than Bangkok commuters (Figure 5.1). A larger proportion of Bangkok commuters fall into the 1-2 and 3-4 trips per week categories. Conversely, Metro Manila has a higher percentage of commuters in the 5-6, 9-10, and >10 trips per week categories. Bangkok slightly surpasses Metro Manila in the 7-8 trip frequency per week category. This suggests that urban rail plays a more integral role in daily commuting in Metro Manila than in Bangkok A chi-square (χ^2) test at a 99% confidence level shows a significant difference in how commuters use urban rail in Bangkok and Metro Manila. The computed χ^2-value of 92.929 is much higher than the critical value of 15.086 (with 5 degrees of freedom), confirming that commuters in the two cities have distinct rail usage patterns.

Table 5.2 Frequently used transit access mode in Bangkok and Metro Manila

	Access				**Egress**			
	Bangkok		**Metro Manila**		**Bangkok**		**Metro Manila**	
	Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
Walk	134	10.11	363	29.49	130	9.80	357	29.00
Bus	290	21.87	66	5.35	285	21.49	57	4.63
Traditional Jeepney	0	0.00	509	41.35	0	0.00	460	37.37
Modern Jeepney	0	0.00	17	1.38	0	0.00	9	0.73
Motorcycle RHA	6	0.46	89	7.22	8	0.60	161	13.08
Private Motorcycle	115	8.68	55	4.46	102	7.69	34	2.76
Taxi	17	1.28	0	0.00	20	1.51	0	0.00
UV Express	0	0.00	41	3.33	0	0.00	45	3.66
Motor-tricycle	0	0.00	74	6.01	0	0.00	90	7.31
Private Car	137	10.33	11	0.89	98	7.39	8	0.65
E-Trike	0	0.00	6	0.48	0	0.00	10	0.81
Bicycle	5	0.38	0	0.00	5	0.38	0	0.00
Other Public Transport	170	12.82	0	0.00	175	13.20	0	0.00
Car RHA	4	0.31	0	0.00	2	0.15	0	0.00
Motorcycle Taxi	448	33.79	0	0.00	501	37.78	0	0.00

Total	**1326**	**100**	**1231**	**100**	**1326**	**100**	**1231**	**100**

Table 5.3 Statistical summary of access and egress characteristics to train stations in Bangkok and Metro Manila

Category	City	Mean	Variance	Standard Dev.
Transit Access Distance (km)	Metro Manila	9.18	23.6	4.86
	Bangkok	2.80	7.43	2.73
Transit Access Time (min)	Metro Manila	23.86	239.3	15.47
	Bangkok	11.21	76.85	8.77
Transit Egress Distance (km)	Metro Manila	6.04	29.38	5.42
	Bangkok	2.75	7.78	2.79
Transit Egress Time (min)	Metro Manila	20.20	327.18	18.09
	Bangkok	11.51	94.96	9.74
*Cost of Access (USD)	Metro Manila	0.52	0.17	0.41
	Bangkok	0.37	0.18	0.42
*Cost of Egress (USD)	Metro Manila	0.72	1.02	1.01
	Bangkok	0.35	0.15	0.39

*Note: 1 USD = 33.91 Thai Baht ; 1 USD = 55.95 Phil. Peso

5.3 HYPOTHETICAL SCENARIOS ON ACCESS AND EGRESS

Respondents from Bangkok and Metro Manila were presented with various hypothetical scenarios to assess their choice of access and egress modes under different conditions.

a. ***Alternative Mode When the Usual Access/Egress Mode is Unavailable***

- When the usual access mode is unavailable, respondents in Metro Manila would primarily switch to traditional and modern jeepneys, followed by motorcycle RHA services, and motor tricycles. In Bangkok, the most common alternatives were motor taxis, followed by taxis, and private vehicles.
- When the usual egress mode is unavailable, Metro Manila respondents would tend to switch to jeepneys, tricycle and pedicabs, and motorcycle RHA services. In Bangkok, respondents would, similar to their behavior when their primary access mode is unavailable, switch to motor taxis, taxis, and private vehicles.
- For both cities, alternative access and egress mode choices are therefore found to be similar, suggesting that commuters opt for widely available and familiar modes as their primary alternative.

b. ***Access/Egress Mode During Heavy Rain***

- In Metro Manila, respondent commuters would shift to jeepneys, car and motorcycle RHA services, and buses to access the station, while jeepneys and RHA vehicles remained the primary choice for egress.
- In Bangkok, respondents preferred taxis, private vehicles, and RHA services for both access and egress.

- This scenario highlights the preference for sheltered vehicles that offer protection from the weather.

c. ***Access/Egress Mode Without Cash***

- In Metro Manila, respondents preferred walking or RHA services for both access and egress.
- In Bangkok, respondents also favored RHA services and taxis, with private vehicles as another option.
- The choices reflect the importance of cashless payment options, as RHA services and taxis often support mobile or digital transactions, while walking remains a no-cost alternative.

d. ***Access/Egress Mode When Carrying Heavy Items***

- In Metro Manila, respondents favored jeepneys, RHA services, and tricycles.
- In Bangkok, the preferred options were taxis, RHA services, and private vehicles.
- The selection of motorized and spacious transport options, excluding jeepneys, indicates a preference for comfort and convenience when carrying heavy loads.

e. ***Egress Mode for Late-Night Travel***

- Metro Manila respondents primarily opted for RHA services and jeepneys.
- Similarly, Bangkok respondents favored RHA services, in addition to taxis.
- The preference for safer and more private modes suggest that security and reliability are key concerns when traveling at night.

f. ***Access Mode After Consuming Alcohol***

- Respondents in both cities overwhelmingly chose RHA services (motorcycle and car) as their preferred mode. Additionally, Metro Manila respondents also chose jeepneys, while Bangkok respondents also chose taxis. The reliance on RHA and taxis suggests an awareness of road safety concerns and security, as these modes provide a safer alternative to driving under the influence and public transport.

g. ***Access/Egress Mode When Accompanying Someone***

- In Metro Manila, respondents primarily chose jeepneys, followed by walking.
- In Bangkok, top choices were private vehicles, taxis, and RHA services.
- This highlights the contrast between shared public transport in Metro Manila and the higher prevalence of private vehicle and taxi use in Bangkok when traveling with others.

A pattern emerged from the responses: (a) Metro Manila respondents consistently prefer jeepneys as their alternative mode across various scenarios, reinforcing their accessibility, affordability, and widespread availability, (b) Bangkok respondents exhibit greater flexibility in using more expensive transport modes (e.g., taxis and RHA services) when necessary, likely due to their higher income levels and the greater availability of these services. (c) Income level plays a crucial role in alternative mode selection – Bangkok commuters are more capable of affording RHA services, while Metro Manila commuters tend to rely more on affordable and communal transport modes. (d) Comfort, convenience, and safety considerations influence mode choice in weather-related, late-night, and alcohol consumption scenarios, with commuters in both cities favoring enclosed, private, and reliable modes such as RHA services and taxis. Table 5.4 and Table 5.5 summarize these access and egress modes, respectively, under the hypothetical scenarios provided.

5.4 TEST OF HOMOGENEITY OF ACCESS AND EGRESS TRIP CHARACERISTICS

This section examines access and egress trips of rail commuters in Bangkok and Metro Manila, focusing on the similarities and differences in their travel behavior. Statistical tests were done to assess: (a) variations in access and egress characteristics between both cities, and (b) test of homogeneity in gender, age, and income groups in relation to access and egress choices.

Access and Egress Distance and Time Comparisons. Keijer, et al (1999) highlight that proximity to a station significantly influences commuters' mode choice. Typically, for distances under 1 km, active transport, such as walking or cycling, is preferred, whereas distances exceeding 2 km require motorized transport.

Table 5.4 Major access modes to rail stations under several hypothetical scenarios

ACCESS		Motor taxis	Taxis	Private Vehicles	Jeepneys	Car & Motorcycle RHAs	Motor-tricycles / pedicabs	Buses	Walking
a. Unavailability of Access Mode	Bangkok (%)	32.60	26.34%	41.05%					
	Metro Manila (%)				57.51%	34.68%	7.80%		
b. Access Mode During Heavy Rain	Bangkok (%)		51.74%	28.43%		19.84%			
	Metro Manila (%)				62.67%	4.74%		32.59%	
c. Access Mode Without Cash	Bangkok (%)		20.43%	45.15%		34.42%			
	Metro Manila (%)					62.69%			37.31%
d. Access Mode When Carrying Heavy Items	Bangkok (%)		51.25%	21.10%		27.65%			
	Metro Manila (%)				81.85%	6.35%	11.80%		
e. Access Mode for Late-Night Travel	Bangkok (%)		59.44%			40.56%			
	Metro Manila (%)				45.58%	54.42%			
f. Access Mode After Consuming Alcohol	Bangkok (%)		57.19%			42.81%			
	Metro Manila (%)				60.11%	39.89%			
g. Access Mode When Accompanying Someone	Bangkok (%)		52.63%	21.66%		25.71%			
	Metro Manila (%)				70.45%				29.55%
Average		32.60	45.57%	31.48%	63.03%	32.81%	9.80%	32.59%	33.43%

Table 5.5 Major egress modes from rail stations under several hypothetical scenarios

EGRESS		Motor taxis	Taxis	Private Vehicles	Jeepney	Car & Motorcycle RHAs	M-tricycles / pedicabs	Buses	Walking
a. Mode When the Usual Egress Mode is Unavailable	Bangkok (%)	32.39%	27.37%	40.24%					
	Metro Manila				55.08%	8.39%	36.52%		
b. Egress Mode During Heavy Rain	Bangkok (%)		55.82%	26.49%		17.69%			
	Metro Manila				59.89%	6.47%		33.65	
c. Egress Mode Without Cash	Bangkok (%)		22.87%	42.39%		34.73%			
	Metro Manila					62.23%			37.76%
d. Egress Mode When Carrying Heavy Items	Bangkok (%)		55.39%	19.05%		25.56%			
	Metro Manila				78.65%	8.93%	12.42%		
e. Egress Mode for Late-Night Travel	Bangkok (%)		67.14%			32.86%			
	Metro Manila				47.08%	52.92%			
f. Egress Mode After Consuming Alcohol	Bangkok (%)	-	-	-	-	-	-	-	-
	Metro Manila	-	-	-	-	-	-	-	-
g. Egress Mode When Accompanying Someone	Bangkok (%)					27.04%			
	Metro Manila				67.44%				
Average		32.39%	45.72%	32.04%	61.63%	27.68%	24.47%	33.65	37.76%

Comparing access distances between Bangkok and Metro Manila, responses in Metro Manila exhibit a wider distribution, indicating greater variability in station proximity and transport connectivity. In Bangkok, most commuters travel between 0.51 to 5 km to reach a rail station, with the highest percentage falling within the 2.01 to 5.0 km range, a pattern similarly observed in Metro Manila.

Table 5.6 Egress distance and time from the rail station in Bangkok and Metro Manila

Parameter		**Bangkok** N = 1324	**Metro Manila** N = 1191
EGRESS Travel distance (km)	< = 0.5 km	3.17%	17.93%
	0.51 - 1.00	25.13%	28.51%
	1.01 - 2.00	29.66%	18.39%
	2.01 - 5.00	30.19%	20.34%
	5.01 - 10.00	9.06%	8.62%
	> 10.00	2.79%	6.3%
EGRESS Travel time (min)	< = 0.5	18.94%	25.75%
	6 - 10	41.28%	14.25%
	11 - 15	20.23%	20.92%
	16 - 60	19.17%	27.59%
	> 60	0.38%	11,49%

Travel time differences are also evident. While Metro Manila respondents display a broader distribution of access times, the majority take 16 to 60 minutes to reach a station. In contrast, Bangkok commuters, despite traveling comparable distances, typically reach their stations within 6 to 10 minutes. These disparities can be attributed to transport infrastructure, the availability of feeder services, and road congestion levels. The 2022 Urban Mobility Readiness Index ranked Metro Manila 58th out of 60 global cities, reflecting significant inefficiencies in public transport, including slow travel speeds, affordability concerns, and long waiting times. This highlights why access and egress trips in Metro Manila take considerably longer than in Bangkok, where more structured transport networks and feeder services reduce first- and last-mile travel times.

Egress trips exhibit similar trends. Bangkok commuters primarily travel 0.51 to 5.0 km, whereas Metro Manila respondents have egress distances from less than 5 km to 2 km. The greater reliance on walking for egress in Metro Manila suggests that station proximity plays a key role in last-mile mode choice. However, despite Bankok's longer egress distances, travel times are shorter than in Metro Manila, reinforcing the impact of efficient transit integration and urban congestion. Ultimately, these findings emphasize the role of public transport efficiency and multimodal integration in shaping commuter behavior.

Access and Egress Characteristics. Important critical factors influencing commuters' access and egress to and from urban rail stations include distance, travel time and cost. To statistically assess whether these characteristics are homogeneous between Bangkok and Metro Manila, a test of homogeneity was conducted with the following hypotheses:

- Null hypothesis (H_0): The access/egress distance, time, and cost in Bangkok and Metro Manila are the same
- Alternative Hypothesis (H_a): There are significant differences in access/egress distance, time, and cost in Bangkok and Metro Manila.

Table 5.7 summarizes the results. At 99% confidence level, the results indicate that access and egress distance, access and egress time, and egress cost for the two cities are significantly different. However, access cost was found to be statistically similar between Bangkok and Metro Manila, meaning that despite differences in travel distance and time, the cost of accessing rail stations does not differ significantly between the two cities.

Table 5.7 Test of homogeneity of access and egress distance, travel time and cost to urban rail stations between Bangkok and Metro Manila

Test of homogeneity between variables	Computed χ^2-value	Degrees of freedom, v	Critical χ^2-value	Remarks
Access Distance	1207.032	4	13.277	Reject H_0
Access Time	819.255	5	15.086	Reject H_0
Egress Distance	398.235	4	13.277	Reject H_0
Egress Time	279.607	5	15.086	Reject H_0
Access Cost	5.483	4	13.277	Accept H_0
Egress Cost	159.000	4	13.277	Reject H_0

The non-homogeneity of egress cost between Bangkok and Metro Manila, may be due to the dissimilarity in the egress characteristics of commuters in the latter to their access characteristics where different egress modes and routes were used when going home compared to the access component from the origin to the rail station.

Access Distance and Access Time by Gender. To determine whether male and female commuters in Bangkok and Metro Manila exhibit differences in access distance and access time, a homogeneity test was conducted with the following hypotheses:

- Null hypothesis (H_0): The access distance of male and female commuters is the same.
- Alternative Hypothesis (H_a): The access distance of male and female commuters is the different.

As shown in Table 5.8, at a 99% confidence level, the computed χ^2-value for access distance is lower than the critical χ^2-value of 13.277 (degrees of freedom of 4) in both Bangkok and Metro Manila. Similarly, for access time (Table 5.9), the computed χ^2-value is less than the critical χ^2-value of 15.086 (degrees of freedom of 5). Thus, we fail to reject the null hypothesis, indicating that access distance and access time are statistically similar between genders in both cities.

These findings suggest that both male and female commuters face comparable levels of accessibility challenges when traveling to rail stations in Bangkok and Metro Manila. The results imply that gender does not play a significant role in determining how far commuters travel or how much time they spend accessing urban rail systems in these cities.

Table 5.8 χ^2 – test for homogeneity of gender with respect to access distance

Access Distance by Gender (km)	Bangkok			Metro Manila		
	Male, Actual (Expected)	Female, Actual (Expected)	Total	Male, Actual (Expected)	Female, Actual (Expected)	Total
<=1	142 (130.71)	198 (209.29)	340	9 (7.89)	9 (10.11)	18
1.01-2	156 (153.39)	243 (245.61)	399	23 (24.11)	32 (30.89)	55
2.01-5	157 (166.46)	276 (266.54)	433	101 (92.48)	110 (118.52)	211
5.01-7.5	31 (31.14)	50 (49.86)	81	97 (100.81)	133 (129.19)	230
>=7.51	23 (27.30)	48 (43.70)	71	292 (296.72)	385 (380.28)	677
Total	**509**	**815**	**1324**	**522**	**669**	**1191**

Computed χ2-value = 2.156 Chi-squared value = 3.629
Degrees of freedom, v = (r-1)(c-1) = 4
Critical value from χ2 table = 13.277

Table 5.9 χ^2 – test for homogeneity of gender with respect to access time

Access Time by Gender (mins)	For Bangkok			For Manila		
	Male, Actual (Expected)	Female, Actual (Expected)	Total	Male, Actual (Expected)	Female, Actual (Expected)	Total
<= 5	107 (96.11)	143 (153.89)	250	12 (9.20)	9 (11.80)	21
6 – 10	216 (209.52)	329 (335.48)	545	64 (62.24)	78 (79.76)	142
11 – 15	98 (108.03)	183 (172.97)	281	88 (81.08)	97 (103.92)	185
16 – 20	45 (49.21)	83 (78.79)	128	101 (108.26)	146 (138.74)	247
21 – 30	29 (28.45)	45 (45.44)	74	170 (165.23)	207 (211.77)	377
>=31	14 (17.68)	32 (28.32)	46	87 (95.98)	132 (123.02)	219
Total	**509**	**815**	**1324**	**522**	**669**	**1191**

Computed χ^2-value = 5.259 Chi-squared value = 5.691
Degrees of freedom, v = (r-1)(c-1) = 5
Critical value from χ^2 table = 15.086

Access Distance and Access Time by Age and Income Groups. Further tests of homogeneity were conducted to examine differences across age and income groups (Table 5.10). The results indicate:

- Access distance differs significantly across age groups in both cities.
- Access time is similar across age groups in both cities.
- Access distance differs by income group in both Bangkok and Metro Manila.
  Access time by income group differs between two cities. In Bangkok, access time is similar across income groups. In Metro Manila, access time varies significantly across income groups.

Table 5.10 Summary of χ^2 – test for homogeneity of access and egress characteristics with respect to commuter personal characteristics in Bangkok and Metro Manila

Test of homogeneity between variables	City	Computed χ^2-value	Degrees of freedom, v	Critical χ^2-value	Remarks
Access Distance by	Bangkok	3.629	4	13.277	Accept H_0

Test of homogeneity between variables	City	Computed χ^2-value	Degrees of freedom, v	Critical χ^2-value	Remarks
Gender	Metro Manila	2.156	4	13.277	Accept H_0
Access Time by Gender	Bangkok	5.691	5	15.086	Accept H_0
	Metro Manila	5.259	5	15.086	Accept H_0
Access Mode by Gender	Bangkok	6.456	4	13.277	Accept H_0
	Metro Manila	4.432	4	13.277	Accept H_0
Access Distance by Age	Bangkok	26.669	12	26.217	Reject H_0
	Metro Manila	28.334	12	26.217	Reject H_0
Access Time by Age	Bangkok	25.215	15	30.578	Accept H_0
	Metro Manila	18.454	15	30.578	Accept H_0
Access Mode by Age	Bangkok	21.208	12	26.217	Accept H_0
	Metro Manila	27.162	12	26.217	Reject H_0
Access Distance by Income	Bangkok	31.965	8	20.09	Reject H_0
	Metro Manila	27.030	8	20.09	Reject H_0
Access Time by Income	Bangkok	22.792	10	23.209	Accept H_0
	Metro Manila	26.874	10	23.209	Reject H_0
Access Mode by Income	Bangkok	28.614	8	20.09	Reject H_0
	Metro Manila	11.754	8	20.09	Accept H_0

Table 5.11 χ^2 – test for homogeneity of gender with respect to modes used

Mode by Gender	Bangkok			Metro Manila		
	Male, Actual (Expected)	Female, Actual (Expected)	Total	Male, Actual (Expected)	Female, Actual (Expected)	Total
Walk	61 (51.52)	73 (82.48)	134	165 (152.96)	184 (196.04)	349
Auxiliary Modes	3 (1.92)	2 (3.08)	5	32 (34.19)	46 (43.81)	78
Public Transport	171 (176.84)	289 (283.16)	460	268 (269.11)	346 (344.89)	614
RHA & Taxis	188 (181.84)	285 (291.16)	473	35 (38.13)	52 (48.87)	87
Private Vehicles	86 (96.88)	166 (155.12)	252	22 (27.61)	41 (35.39)	63
Total	**509**	**815**	**1324**	**522**	**669**	**1191**

Computed χ^2-value = 4.432 Chi-squared value = 6.456
Degrees of freedom, v = (r-1)(c-1) = 4
Critical value from χ^2 table = 13.277

Access Modes by Gender. When choosing the availability and convenience of access and egress modes to and from rail stations, the following hierarchy emerges: (1) walking; (2) auxiliary modes; (3) public transport; (4) RHA services and taxis; and (5) private vehicles. This hierarchy reflects mode availability and affordability, influencing commuters' choices in both Bangkok and Metro Manila.

A homogeneity test was conducted at a 99% confidence level to determine whether access mode choices differ by gender in both cities (Table 5.11). The results indicate that access mode usage does not significantly differ between male and female commuters in either Bangkok or Metro Manila.

Access Modes by Age and Income. Further homogeneity testing of access mode by age group for Bangkok and Metro Manila revealed different results. In Bangkok, access mode usage does not significantly differ across age groups. In Metro Manila, access mode use varies significantly by age. The variation in Metro Manila suggests that younger and older commuters may have different mobility patterns, likely influenced by income levels, trip purpose, and safety considerations.

Homogeneity testing of access mode by income group in each city also found that in Bangkok, access mode differs significantly by income group, indicating that higher-income commuters are more likely to use private vehicles or RHA services, while lower-income commuters rely on public transport and motorcycles. In Metro Manila, access mode does not significantly vary by income group, suggesting that commuters across income levels primarily rely on the same set of available transport options.

Summary. The tests of homogeneity revealed several key insights into the access and egress characteristics of rail commuter respondents in Bangkok and Metro Manila. First, Gender does not significantly influence access mode choices in either city, suggesting that both male and female commuters face similar transport conditions when accessing urban rail stations.

However, age plays a more significant role in access mode selection in Metro Manila than in Bangkok. The results indicate that in Metro Manila, access mode choices vary significantly across age groups, while in Bangkok, they remain relatively consistent. This suggests that younger and older commuters in Metro Manila have different mobility patterns.

Table 5.12 Summary of χ^2 – test for homogeneity of access and egress characteristics with respect to commuter personal characteristics in Bangkok and Metro Manila

Test of homogeneity	City		Degrees of freedom, v		Remarks
Access Mode by Gender	Bangkok	6.456	4	13.277	Accept H_0
	Metro Manila	4.432	4	13.277	Accept H_0
Access Mode by Age	Bangkok	21.208	12	26.217	Accept H_0
	Metro Manila	27.162	12	26.217	Reject H_0
Access Mode by Income	Bangkok	28.614	8	20.09	Reject H_0
	Metro Manila	11.754	8	20.09	Accept H_0

When examining income-based differences, the findings reveal that income influences access mode choice in Bangkok, but not in Metro Manila. In Bangkok, higher income commuters are more likely to use private vehicles or RHA services, while lower-income commuters rely on public transport and motorcycles. In Metro Manila, commuters across all income groups predominantly use the same transport mode. Table 5.12 summarizes the homogeneity tests of gender, age, and income.

6. CONCLUSION AND RECOMMENDATIONS

This study highlights significant differences in access and egress characteristics between Bangkok and Metro Manila rail commuters. In Bangkok, commuters experience shorter access and egress distances and travel times, leading to lower overall transport costs. In contrast, Metro Manila commuters experience longer distances and travel times, resulting in higher access and egress costs. This means that despite paying similar amounts, Metro Manila commuters receive less efficient and more time-consuming journeys, highlighting the economic burden of travel. The higher access and egress costs in Metro Manila may partly be attributed to the increasing use of motorcycle RHAs, a modern transport service that has gained traction as an alternative to traditional jeepneys and motor-tricycles for first- and last-mile connectivity (Chalermpong, et al. (2023). Given that jeepneys remain the most widely used access and egress mode, fast-tracking the PTMP is crucial to improving service quality and benefiting majority of commuters who depend on this mode.

A key takeaway from this analysis is that Metro Manila commuters face a "double disadvantage" – higher transport costs combined with longer and more inefficient trips, whereas Bangkok's transport system allows for lower costs over shorter distances with better connectivity. The results emphasize the need for improving multimodal integration and enhancing last-mile connectivity in Metro Manila to reduce excessive time and cost burdens on commuters. Brons et al. (2009) argue that enhancing station accessibility can be a cost-effective strategy to increase rail ridership, rather than focusing solely on service improvements. This underscores the importance of improving feeder systems and last-mile transport, particularly in Metro Manila, where access difficulties limit the effectiveness of the rail network. Aside from general transport inefficiencies, the study also revealed age and income-based disparities in access and egress characteristics, pointing to the need for more targeted policy interventions. In Metro Manila, significant variations exist in access mode choice across different age groups, while Bangkok commuters exhibit more uniform travel patterns across all ages. This suggests that younger and older commuters in metro Manila may have distinct transport needs, possibly due to safety concerns, trip purposes, or limitations in transport availability. Policies should prioritize safer and more accessible mobility options for vulnerable age groups. Investing in improved pedestrian infrastructure, such as wider sidewalks and safer crossings near rail stations, can benefit vulnerable age group commuters.

Additionally, as seen in the case of the South Commuter Rail (SCR) project, rail investments can significantly improve job accessibility for Metro Manila residents. However, the immediate beneficiaries tend to be middle- to upper-income groups and skilled workers, highlighting the need for inclusive transport planning that ensures equitable access to mobility solutions for all socio-economic segments.

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