

PUV Accessibility in an In-City Relocated Community: A Preliminary Study in LRB-Manggahan, Pasig City

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Abstract : This study assesses the perceived changes in public transport accessibility among residents of LRB-Manggahan in Pasig City following in-city relocation. Utilizing a structured questionnaire based on six dimensions of accessibility—Geographic Accessibility, Availability, Affordability, Acceptability, Accommodation, and Awareness—data were collected from 30 individuals who had undergone relocation. While the sample size is limited, the findings provide initial insights into the transport-related outcomes of in-city resettlement. The analysis revealed strong internal consistency across constructs ($\alpha = 0.861 - 0.971$) and significant shifts in Affordability, Acceptability, and Accommodation after relocation. Results point to changing views of accessibility, with availability having a more subtle impact and affordability and awareness being more significant in the post-relocation setting. These results demonstrate how accessibility dynamics and commuter experiences can be altered by relocation. These findings highlight the evolving nature of accessibility in resettled communities and emphasize the need for inclusive planning and targeted transport communication strategies to support equitable mobility.

Key Words: transport accessibility; in-city relocation; public utility vehicles; resettled communities

1. INTRODUCTION

Public utility vehicles (PUVs) are vital to ensuring mobility, particularly for communities displaced by urban redevelopment. In-city relocation, such as the case of the LRB-Manggahan relocation site in Pasig City, offers a promising strategy by maintaining residents' proximity to their previous informal settlements, ensuring continued access to essential social and economic opportunities (REACH Alliance, 2025). This strategy aims to minimize the disruptions that often come with relocation, reducing the risk of exclusion that can arise when displaced communities are relocated too far from their original neighborhoods

(Iuchi, 2023). Furthermore, the People's Plan advocates for the inclusion of marginalized communities in the decision-making process, emphasizing their right to access adequate transportation and support services within urban spaces (REACH Alliance, 2025).

The accessibility of public utility vehicles (PUVs) for residents of LRB-Manggahan, where public transport is essential for connecting individuals to employment, education, and vital services (Chuenyindee et al., 2022), is an important consideration. While in-city relocation generally offers better outcomes compared to off-city relocation, there are still aspects that need improvement to adequately address the mobility needs of relocated communities. Factors such as the

availability of PUV services and transport infrastructure are crucial in ensuring that relocated residents have reliable access to the resources they need for daily life (Chuenyindee et al., 2022).

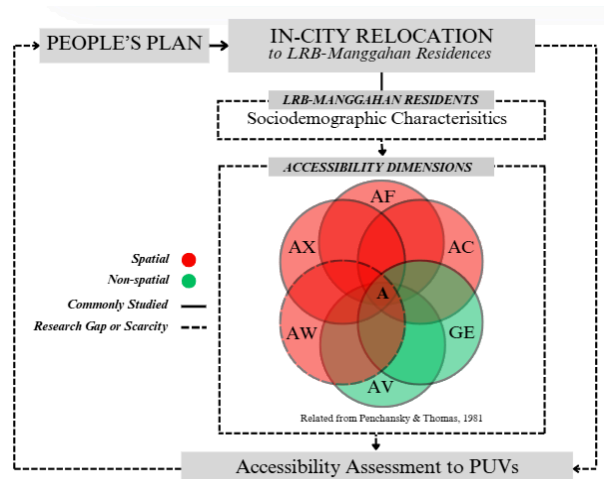


Figure 1. Modified Penchansky & Thomas (1981) Five-Dimensional Framework

Existing studies have emphasized the value of using multidimensional frameworks to evaluate public transport accessibility. This study adopts a modified version of the five-dimensional model originally proposed by Penchansky and Thomas (1981), as later applied by Fransen et al. The framework includes the following dimensions: Geographical Accessibility (GE), which refers to the physical distance and ease of reaching transport services; Availability (AV), which concerns the presence, frequency, and coverage of PUV operations; Affordability (AF), which assesses whether transport costs are manageable relative to household income; Acceptability (AX), which pertains to the comfort, safety, and cultural appropriateness of the service; and Accommodation (AC), which evaluates how well the service design (e.g., routes, schedules) aligns with users' needs. To capture the role of information and perception, Awareness (AW) is introduced as a sixth dimension, focusing on users' knowledge of transport options and their ability to make informed travel decisions. This six-dimensional framework serves as the analytical foundation for examining accessibility experiences in the context of in-city relocation (see Figure 1). For detailed variable descriptions and how they map to these dimensions, refer to Figure 2: List of

Measures and their Descriptions (Related from Lelis et al., 2024).

Despite the increasing relevance of in-city relocation as a housing solution, there is a notable gap in research examining the accessibility of public utility vehicles (PUVs) within such contexts in the Philippines (Nogueira & Diaz, 2023). The specific transportation needs and preferences of relocated communities remain insufficiently explored, which limits the development of tailored solutions (Ryan & Martens, 2023). This study seeks to address this gap by evaluating PUV accessibility for residents of LRB-Manggahan, Pasig City, utilizing a six-dimensional framework.

Though the data scope is limited, the findings provide initial insights that can guide future research. By focusing on transport accessibility, this study identifies key challenges and gaps within the current system, informing policy recommendations that promote equitable mobility for relocated populations. This research also lays the foundation for future evaluations that can support evidence-based decisions and contribute to the alignment of relocation efforts with broader urban development policies, such as the People's Plan.

2. METHODOLOGY

A survey involving randomly selected respondents from LRB-Manggahan Residences was conducted utilizing a structured questionnaire to assess accessibility to public utility vehicles (PUVs) considering both the pre- and post-relocation. In which, the questionnaire was divided into three sections: (1) respondent profile (demographics, relocation background, and general accessibility concerns), (2) accessibility conditions prior to relocation, and (3) accessibility conditions after relocation.

In analyzing the data, the IBM SPSS Statistics was utilized. Wherein, the descriptive statistics (mean, standard deviation, skewness, and kurtosis) assessed the distribution and normality of the data set drawn from a sample of a population (Hayes, 2024). Also, Cronbach's Alpha reliability analysis (commonly used in Likert questions) was employed to assess the internal consistency of accessibility constructs using a 0.7 coefficient threshold for reliability as frequently used by analysts (Frost, n.d.). Additionally, a paired sample t-test was used to determine mean differences between two sets of observations (Statistics Solutions, 2024). In this case, the significant differences in accessibility perceptions both pre- and post-relocation were assessed. Moreover, the Principal Component Analysis (PCA) was applied to reduce dimensionality into a

Figure 2. List of Measures and their Descriptions
(Related from LELIS et al., 2024)

Construct	Code	Measures	References
Geospatial Accessibility (GE)	GE1	Distance of LRB-Manggahan from major transport terminals.	Abad, et al. (2021), Goetz & Rodrigue (1999), Daniels & Mullet (2011), Ivan, et al. (2019), Park, et al. (2017)
	GE2	Distance of LRB-Manggahan from waiting sheds and loading zones.	
	GE3	Proximity of commercial establishments to transport terminals.	
	GE4	Proximity of commercial establishments to waiting sheds/loading zones.	
	GE5	Distance to essential services (schools, hospitals, government offices).	
	GE6	Accessibility of pedestrian paths to PUV stops.	
	GE7	Presence of alternative routes for accessing key destinations.	
Availability (AV)	AV1	Number of available vehicle stops and waiting sheds near the community.	Lindasan (2022), Roquel, et al. (n.d), Remillard, et al. (2022), Shaer & Haghshenas (2021), Zhao, et al. (2020), Smith & Wong 2018)
	AV2	Number of PUVs operating during regular hours.	
	AV3	Number of PUVs operating during peak/rush hours.	
	AV4	Availability of PUVs heading toward key destinations (e.g., schools, workplaces, essential services).	
	AV5	Seating capacity of PUVs heading toward destinations.	
	AV6	Adequacy of seating capacity during regular hours.	
	AV7	Adequacy of seating capacity during rush hours.	
	AV8	Capacity of PUVs considering health and safety protocol restrictions (e.g., Alert Level 1).	
	AV9	Frequency of PUV trips during peak hours.	
	AV10	Availability of backup transportation options during emergencies or vehicle shortages.	
Affordability (AF)	AF1	Travel fare relative to respondents' income levels.	Polasek, et al. (2019), Wang, et al. (2018), Zhao, et al. (2020), Buehler & Pucher (2017), Mackett, et al. (2021), Hagett, et al. (2020)
	AF2	Availability of transport mode options within budget constraints.	
	AF3	Adequacy of social pension in covering travel costs (for SCs/PWDs).	
	AF4	Adequacy of government financial assistance for transportation needs.	
	AF5	Effectiveness of 20% fare discount for SCs, PWDs, and students.	
	AF6	Perceived affordability of daily commuting via PUVs.	
	AF7	Cost comparison between PUVs and alternative transport modes.	
Acceptability (AX)	AX1	Perceived safety from accident risks when using PUVs.	Shaer & Haghshenas (2021), Tariq & Khan (2020), Mackett & Paskins (2018), Tse & Ho (2019), Rose & Johnson (2020), Chen & Li (2021), Jiang & Zhang (2020), Chien & Ding (2019)
	AX2	Absence of discrimination from PUV drivers based on age or disability.	
	AX3	Availability of passenger assistance during boarding and alighting.	
	AX4	Ease of communication with drivers through passenger assistance.	
	AX5	Observance of safe and disciplined driving practices by PUV drivers.	
	AX6	Stress-free commuting experience while using PUVs.	
	AX7	Compliance with proper loading and unloading zones.	
	AX8	Perceived efficiency of travel duration via PUVs.	
	AX9	Preference for PUVs over private vehicles for regular commuting.	
	AX10	Average waiting time at PUV loading zones.	
Accommodation (AC)	AC1	Accessibility and proximity of safety handrails inside PUVs.	Buehler & Pucher (2017), Mackett & Paskins (2018),
	AC2	Adequacy of stair heights for easy entry/exit.	
	AC3	Availability of sufficient seating space inside PUVs.	
	AC4	Proximity of doors to priority seats for easier access.	

	AC5 AC6 AC7 AC8 AC9 AC10 AC11 AC12	Space for walking aids (e.g., canes, crutches). Visibility and clarity of destination sign boards inside PUVs. Ergonomic comfort of passenger seating. Cleanliness of PUV interiors and seats. Adequacy of ventilation and airflow inside PUVs. Compliance of operators with health protocols. Compliance of drivers with health and safety regulation. Presence of lighting in waiting sheds for nighttime travel.	Li & Yang (2020), Wang & Zhang (2021), Chen & Gao (2020), Shen & Lee (2021), Tan & Li (2019), Gupta & Sharma (2020), Xie & Zhang (2019), Park & Yang (2021)
Awareness (AW)	AW1 AW2 AW3 AW4 AW5 AW6 AW7 AW8	Awareness of PUV routes and designated stops. Awareness of fare discounts for SCs, PWDs, and students. Awareness of available alternative transport options. Knowledge of designated loading and unloading zones. Awareness of health and safety protocols in PUVs. Awareness of government programs supporting transportation access. Awareness of travel rights and protections for commuters. Access to updated information on changes in PUV routes and services.	Wang & Liu (2021), Lee & Wang (2020), Zhang & Li (2020), Gupta & Sharma (2020), Kim & Park (2021), Li & Zhou (2020), Chien & Li (2019)
Mobility and Access to PUVs (MO)	MO1 MO2 MO3 MO4 MO5 MO6 MO7	Overall rating for Geographical Accessibility (GE) Overall rating for Availability (AV) Overall rating for Affordability (AF) Overall rating for Acceptability (AX) Overall rating for Accommodation (AC) Overall rating for Awareness (AW) Overall perception of PUV reliability and accessibility.	Fransen, et al. (2016)
Note: In this study, the "A" and "B" labels in the predictors refer to the time of measurement. B indicates pre-relocation measures based on participants' recollections (e.g., B-GE5, B-AW2), while A refers to post-relocation measures reflecting their current conditions (e.g., A-AF2, A-OA6):			

smaller set of variables (IBM, 2023), revealing the components of accessibility. Lastly, the Stepwise Regression Analysis was administered to assess the predictive relationship between the accessibility factors (Hayes, 2022).

3. RESULTS AND DISCUSSION

Initial understanding of the socio-demographic and relocation profiles of LRB-Manggahan residents is presented in Tables 1 and 2, respectively. The sample consists predominantly of female respondents (64.5%), with varying age groups and employment statuses. A significant portion (38.7%) is employed, while 35.5% are unemployed. Household sizes are generally moderate, with most respondents living in households of 3-6 members. Income levels are diverse, with the largest group earning between ₱10,001 - ₱15,000 per month.

Table 1. Sociodemographic Characteristics

Characteristics	Category	%
Gender	Male	29
	Female	64.5
	Rather Not Say	6.5
Age group	18-25	6.5
	26-40	25.8
	41-60	61.3
	60 & above	6.4
Employment Status	Student	12.9
	Senior Citizens (SCs)	12.9
	Working	38.7
Household Income (₱)	Non-Working	35.5
	Below 5,000	22.6
	5,000 - 10,000	16.1
	10,001 - 15,000	25.8
	15,001 - 20,000	25.8
Household Size	Above 20,000	9.7
	1-2	6.5
	3-4	35.5
	5-6	35.5
	More than 6	22.5

As shown in Table 2, the majority (74.2%) have lived in their current location for over six years, with unsafe housing conditions (61.2%) being the primary reason for relocation. Despite these circumstances, a high percentage (77.4%) report being satisfied with their current residence. However, 45.2% indicated that their relocation was forced rather than voluntary.

Table 2. Relocation Profile

Characteristics	Category	%
Years of Residency	1 - 3	9.7

	4-6	16.1
	above 6	74.2
Primary Reason of Relocation	Unsafe Housing	61.2
	Better Housing Quality	19.4
	Due to Gov't Project/s	19.4
Relocation Satisfaction	Satisfied	77.4
	Not Satisfied	3.2
	No Opinion	19.4
Nature of Relocation	Forced	45.2
	Voluntary	54.8

Table 3. Mode of Transportation, Walking Time to Waiting Shed, and Years of Residency

Chi-Square Tests			
Mode	Value	df	Asymptotic Significance (2-sided)
	Pearson Chi-Square	. ^b	
	N of Valid Cases	1	
Walk	Pearson Chi-Square	. ^c	
	N of Valid Cases	2	
Bicycle	Pearson Chi-Square	. ^b	
	N of Valid Cases	1	
Motorcycle	Pearson Chi-Square	6.000 ^b	2 0.050
	Likelihood Ratio	5.407	2 0.067
	N of Valid Cases	6	
Tricycle	Pearson Chi-Square	2.182 ^e	6 0.902
	Likelihood Ratio	2.698	6 0.846
	N of Valid Cases	16	
Jeep or Bus	Pearson Chi-Square	. ^f	
	N of Valid Cases	5	
Total	Pearson Chi-Square	37.289 ^a	12 0.00020
	Likelihood Ratio	16.247	12 0.180
	N of Valid Cases	31	

a. 18 cells (90.0%) have expected count less than 5. The minimum expected count is .03.

b. No statistics are computed because Years of Residency and Walking Time to Waiting Shed (mins) are constants.

c. No statistics are computed because Walking Time to Waiting Shed (mins) is a constant.

d. 6 cells (100.0%) have expected count less than 5. The minimum expected count is .17.

e. 11 cells (91.7%) have expected count less than 5. The minimum expected count is .06.

f. No statistics are computed because Years of Residency is a constant.

The descriptive analysis of key travel characteristics reveals significant shifts in transportation

patterns following relocation. As indicated in Table 3, prior to relocation, respondents predominantly relied on tricycles and jeepneys, which aligns with the availability of informal and traditional transport modes in their previous locations. Post-relocation, however, there was a noticeable increase in walking and longer walking times to the nearest waiting shed, suggesting a decrease in physical accessibility to public utility vehicles (PUVs). This shift could be attributed to spatial changes and infrastructure adjustments at the resettlement site. Furthermore, the data shows that many respondents were newly relocated, which likely influences their perceptions of transport accessibility due to limited familiarity with the new environment.

Table 4. Reliability of the Constructs

Construct	Cronbach's Alpha	
	Before	After
Geographical (GE)	0.890	0.895
Availability (AV)	0.934	0.945
Affordability (AF)	0.870	0.868
Acceptability (AX)	0.955	0.947
Accommodation (AC)	0.966	0.971
Awareness (AW)	0.933	0.936
Overall (OA)	0.943	0.961

Table 5. Model Summary

Model Summary									
R	R ²	Adjusted R ²	Std. Error of Estimate	Change Statistics					
				R ²	F	df1	df2	Sig. F	
<i>Pre-relocation</i>									
.984 ^f	0.967	0.959	0.06418	0.021	14.999	1	23	0.001	
<i>Post-relocation</i>									
.983 ^h	0.966	0.953	0.06146	0.014	8.814	1	21	0.007	

f. Predictors: (Constant), B-GE5, B-AW2, B-AW4, B-AV9, B-AF2, B-GE1

h. Predictors: (Constant), A-AF2, A-OA6, A-GE6, A-GE3, A-AV8, A-OA3, A-GE1, A-AV1

The reliability analysis of the accessibility constructs, presented in Table 4, demonstrates strong internal consistency across all six dimensions—availability, affordability, accommodation, acceptability, awareness, and geographical factors. The Cronbach's alpha values ranged from 0.868 to 0.971, with

the accommodation dimension achieving the highest reliability ($\alpha = 0.971$). Affordability had the lowest alpha value ($\alpha = 0.868$), though still within an acceptable

range. These results affirm the robustness of the measurement framework, suggesting that the survey tool effectively captured respondents' perceptions of transport accessibility. However, the minor variability in reliability scores suggests areas for refinement in future iterations of the instrument, particularly concerning the clarity of certain constructs.

Table 6. Model Fit

	ANOVA				
	Sum of Squares	df	Mean Square	F	Sig.
<i>Pre-relocation</i>					
Regression	2.805	6	0.468	113.50	< .001 ^g
Residual	0.095	23	0.004		
Total	2.900	29			
<i>Post-relocation</i>					
Regression	2.241	8	0.280	74.150	< .001 ⁱ
Residual	0.079	21	0.004		
Total	2.320	29			

g. Predictors: (Constant), B-GE5, B-AW2, B-AW4, B-AV9, B-AF2, B-GE1

i. Predictors: (Constant), A-AF2, A-OA6, A-GE6, A-GE3, A-AV8, A-OA3, A-GE1, A-AV1

Prior to relocation, the accessibility model identified ten principal components, with the first component explaining 50.997% of the variance. The regression model (Table 5) yielded a high R² of 0.984 and adjusted R² of 0.967, indicating a strong model fit (Table 6). Significant predictors included proximity to government services (B-GE5, $\beta = 0.469$, $p < 0.001$) and access to alternative transport options (B-AV9, $\beta = 0.307$, $p < 0.001$), both positively associated with perceived accessibility. In contrast, awareness-related factors (e.g., B-AW2, $\beta = -0.690$, $p < 0.001$) showed a strong negative effect, suggesting that uncertainty or lack of transport information reduced perceived accessibility. Affordability (B-AF2) and additional geographical and awareness factors also showed statistically significant associations, highlighting the multidimensional nature of perceived PUV accessibility prior to relocation.

In the new location (LRB-Manggahan), PCA revealed a streamlined set of eight principal components, with the first accounting for 56.662% of the variance. The regression model continued to demonstrate strong explanatory power (R² = 0.966, adjusted R² = 0.953), supported by statistically significant ANOVA results (Table 6). Key predictors shifted: affordability (A-AF2, $\beta = 0.685$, $p < 0.001$) and

awareness (A-OA6, $\beta = 0.644$, $p < 0.001$) became dominant positive influences. However, transport availability-related factors such as PUV frequency (A-AV8, $\beta = -0.431$, $p < 0.001$) and the presence of waiting areas (A-AV1, $\beta = -0.273$, $p = 0.007$) were negatively associated with perceived accessibility, possibly reflecting gaps in service quality or unmet expectations in the new environment. Geographical factors (A-GE3, A-GE1) remained significant, though their roles appear to have changed.

Table 7. Accessibility Changes

	Pre-relocation	Post-relocation
Geographical	GE1	GE1
	GE2	GE3
		GE6
Awareness	AW2	No awareness-related predictors
	AW4	
Availability	AV9	AV1
		AV8
Affordability	AF2	AF2
Overall Accessibility	Not a significant predictor	OA6 OA3

Table 6 shows that the importance of proximity to schools, hospitals, and government offices (GE5) decreased following relocation. In contrast, access to commercial areas (GE3) and the presence of pedestrian infrastructure (GE6) became more significant, pointing to a shift in priorities toward daily convenience and walkability in the new environment.

In addition, awareness-related factors (AW2, AW4), which were relevant before relocation, were no longer significant afterward. This suggests a decline in residents' knowledge of or engagement with transport policies and available options in the new area. A change was also observed in transport availability concerns: before relocation, commuters considered alternative transport options (AV9), but afterward, factors such as the presence of waiting areas (AV1) and the frequency of public utility vehicles (AV8) became more important. This shift suggests a stronger reliance on public transport services after relocation.

The number of available vehicle stops and

waiting sheds near the community (AV1) and the frequency of PUV trips during peak hours (AV9) became more significant after relocation, whereas

commuters' emphasis on the availability of backup transportation options during emergencies or vehicle shortages (AV8) shifted. This suggests that the resettlement environment is becoming increasingly dependent on consistent and reliable public transportation services.

Affordability (AF2) remained a consistent and significant factor before and after relocation, emphasizing that cost continues to play a major role in transport decision-making.

The consistency and explanatory power of the models indicate that the variables used effectively reflect key aspects of accessibility. However, the differences observed before and after relocation suggest the need to improve the availability of transport-related information for relocated communities and to strengthen the reliability and coverage of public transport services.

4. CONCLUSIONS

The study identified key shifts in how residents perceive access to public utility vehicles before and after relocation. Notably, Affordability (AF2) remained a consistently significant factor, underscoring cost as a continuing concern. Awareness-related predictors (AW2, AW4), which were significant prior to relocation, lost influence post-relocation, possibly due to reduced familiarity with transport services in the new environment. Meanwhile, Availability-related variables, such as PUV frequency (AV8) and presence of waiting areas (AV1), emerged as negatively associated with accessibility, pointing to service quality concerns in the resettlement area. In addition, Geographical factors (GE3, GE6) related to walkability and proximity to commercial areas gained prominence, reflecting evolving commuter priorities.

Despite the strong performance of the statistical models (adjusted $R^2=0.959$ pre-relocation and R^2 post-relocation), the shift in predictors and the decline in the F-statistic suggest increased complexity in accessibility dynamics after relocation. These results validate the applied framework and provide early insights into transport-related challenges in relocated communities. However, given the limited sample size, the findings are exploratory in nature and not intended to support definitive conclusions or recommendations. Future research should employ larger, more representative samples, utilize mixed-methods, and consider longitudinal tracking to capture the evolving experiences and mobility needs of relocated populations. Such efforts will be essential in designing inclusive, context-sensitive, and equitable transport systems.

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