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Accessibility Factor of the Elderly in Achieve Mobility Requirements: Case Study in Kota Kinabalu, Sabah

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Abstract

The Ageing Population is a phenomenon that arises in global countries due to modernization and globalization. The elderly will be marginalized when travelling less due to the inaccessibility to the essential need later in life. This research examines the accessibility factor related to the travel pattern of the elderly. Factor Analysis is used to analyze 29 parameters of the element implemented accessibility towards their living requirements. This study developed four main factors: personal, land use, transportation facilities, and temporal. The research findings can assist the government and various agencies in implementing policies and strategies to fulfil the mobility needs of the elderly.

Keywords: Accessibility; the elderly; land use; mobility

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1.0 Introduction

The elderly population has grown significantly, unknowingly shifting the structure of the country's population pyramid, whether in a foreign context or within Malaysia. On a global scale, the number of people over 60 is expected to grow from 841 million in 2013 to more than 2 billion by 2050 (United Nations Population Division 2013). Malaysia's Elderly Population is expected to reach 9.5 per cent or 3.2 million of the total population by 2020, compared to 2.1 million or 7.3 per cent in 2011 (Department of Statistics Malaysia, 2018). Ageing has become a phenomenon in developed countries such as Japan, the United States, Europe, China, Hong Kong, and others. The increasing aging in developing countries such as Malaysia serves as a timely reminder for the government or community to make early preparations to improve public transportation facilities to be more friendly to the elderly.

According to Moses and Oluwole (2014), population aging is caused by several factors, including an increase in the elderly population at a rapid rate, which challenges unprepared countries and the elderly do not have access to social support structures and public health, particularly in developing countries. The increase in the number of the elderly in Malaysia is due to increased life expectancy, decreased birth rates and mortality, as well as increased medical facilities and health care. Increased life expectancy and low fertility rates are due to the living environment, better dietary practices, and advances in medical technology (World Health Organization, 2008). Life expectancy in Malaysia is expected to increase from 72.1 years old in 2011 to 73.2 years old by 2021 for men and from 76.8 years to 78.3 years for women over the same period (Department of Statistics Malaysia, 2021). The causes of the decline in the birth rate include the rising cost

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of living, early family planning, and the role of women in various economic activities of the country. Statistics from the Ministry of Women, Family and Community Development (2017) show that the female labour force participation rate recorded was 49.5 percent in 2012 and increased to 53.9 percent in 2016. In the 11th Malaysia Plan, the government has improved access to services quality health care by upgrading health infrastructure, increasing the capacity of health officers or staff, promoting healthy lifestyle practices, and expanding disease prevention treatment programs nationwide Ministry of Health Malaysia (2017). The establishment of Klinik 1 Malaysia is another government initiative in increasing community access to health infrastructure. The establishment of Klinik 1 Malaysia and Klinik Bergerak 1 Malaysia have been added to increase access to affordable healthcare services for low-income household. As of 2014, a total of 307 of 1 Malaysia Clinics have been established in urban areas and 16 1 Malaysia Mobile Clinics have operated using buses and boats in rural areas (Ministry of Health Malaysia, 2017).

The elderly's travel patterns and mobility needs differ from those of adolescents and adults. The elderly still require mobility to be able to engage in various activities in their local community so as not to be marginalized and remain active as they age. According to Mazdi et al. (2016), one of the important indicators in measuring a society's quality of life and prosperity is transportation, which sustains and improves population mobility. However, various factors affect the accessibility of seniors in their daily commute, causing the travel of seniors to be affected, and they are less interested in getting out of the house. The elderly are a national treasure consisting of people with all kinds of professionals, expertise, and experience that can help the country develop. As such, the accessibility of the elderly is important so that their welfare is protected, and they are more actively mobile in reaching various travel destinations that can benefit themselves or the country's socio-economic development. The objectives of this study were to (1) identify the travel patterns of the elderly and (2) examine the accessibility factors that influence the accessibility of the elderly's ability to achieve well-being after aging. The significance of this study is that it inspires governments and policymakers to research strategies or initiatives that could enable seniors to accomplish their mobility demands once they retire. This study also contributes to the rising public awareness that while the senior population is expanding, their welfare must also be preserved so that they are not marginalized by other communities. The elderly in the countries are the contributor of experiences, knowledge, practices, and more valuable professional in a related field that can be contributed to the growth of development in Malaysia. Therefore, the mobility requirements of the elderly must be enhanced to ensure they are emphasized in national plans.

2.0 Literature Review

2.1 Definition of elderly

Tinker (1997) states that the elderly refers to those who are older than the retirement age for which a person is normally eligible for a post-retirement pension. In the context of the United Kingdom, the retirement age is 65 years old, while the European Union uses the age of 60 years old, and in the United States, it is 55 years old. Hajimi Orimo et al. (2006) have divided the elderly into two categories, namely the early elderly and the late elderly. Early elderly refers to senior citizens aged 65 to 74 years old, while late elderly is 75 years old and above. The definition of elderly in the context of Malaysia is different from other developed countries because Malaysia follows the terms issued by the United Nations (UN), where the elderly are people aged 60 years old and above. This definition is based on the "World Assembly on Aging 1982" in Vienna, Austria (Department of Welfare Malaysia, 2020).

2.2 The Concept of Accessibility

According to Hansen (1959), accessibility is the opportunity for an individual in a particular location to participate in something or a group of certain activities. He also stated that land use and transportation networks are key elements to improving the degree of accessibility if the two elements can interact more efficiently. According to him, more systematic land use has reduced the distance between nodes and improved telecommunications and transmission services within space. Helen (2000) argues that in the discipline of geography, accessibility is an opportunity for individuals to engage in required activities or explore new activities based on their ability to arrive at the right place at the right time at a reasonable expenditure of resources. In addition, it is stated that accessibility in the discipline of geography refers to the opportunity for an individual to engage in daily activities such as employment, services and other activities that rely on the individual's ability to reach the intended destination within a specified time at a reasonable expense using a particular mode of transportation (Helen, 2000).

The concept of accessibility carries different views and meanings from different scholarly perspectives. It can be concluded that accessibility refers to the opportunity of an individual or a group of individuals to access social and economic activities that involve interaction between land use and transportation network systems through the medium of the transportation mode chosen to lead to an attractive destination that has a function for certain individuals or groups. This study investigates the accessibility factors of the elderly in Kota Kinabalu City, Sabah, using the Geurs and Wee (2004) model as a guide. According to Geurs & Wee (2004), accessibility factors can be divided into four components, namely: personality, land use, transportation facilities and temporal.

2.3 Accessibility of the elderly

Aging is a challenge at the same time also as a opportunities. If the senior citizen is active and able to enjoy his life without considering himself old, more activities in daily life can be done to take advantage of his free time (Smita Pandey, 2018). The elderly face a variety of accessibility issues, particularly the elderly aged 70 and up being less inclined to go out due to age being a factor in determining the elderly's mobility capacity (Olufemi, 2006). Hearing, eyesight, memory loss, urine incontinence, and impact significantly all cause the elderly to travel less because of physical and mental deterioration (De Luca et al., 2019; Saraswat et al.,2020). As a consequence of health-related concerns, more of the elderly are giving up driving (Bob & Sara, 2016). According to Ipingbemi, (2010), limited access to public transportation also has an impact on travel patterns and highlights the issue of mobility accessibility among the elderly, as not all

the elderly own private vehicles and live with children and family members, and some are disabled due to health issues. Saravanan (2019), stated that public transport in Kota Kinabalu City does not cover the entire area causing most city dwellers to use private vehicles. This is consistent with the findings of Kaniz and Sara (2019) in Melbourne, where seniors are more likely to drive privately. The elderly show dependence on children and family members in achieving accessibility, especially for those who no longer drive and for long-distance travel periods. Lack of companionship of children on the side will result in seniors not being interested in traveling because they find it difficult to plan trips privately (Kazeminia et al., 2013; Bob & Sara, 2016). The aims of the study are more depth on the issue of accessibility among the elderly in order to examine the mobility needs of the elderly so that the mobility facilities of the elderly in the future are not neglected. Therefore, the objectives of the study examine the factors that influence the accessibility of the elderly.

3.0 Methodology

This research was conducted to examine the accessibility factors of the elderly in achieving well-being after aging. A total of 400 elderly were purposefully selected, involving those aged 60 years and above to be the respondents for this study. The questionnaire employed a four-point Likert scale, with 1 (Strongly Disagree), 2 (Disagree), 3 (Agree), and 4 (Strongly Agree). This research took around 6 months to data collection progress which is from April to October 2021. The location of this research is focus on Kota Kinabalu district in Kota Kinabalu, Sabah. This study only involved the elderly who were aged 60 years old and above. A quantitative approach was used to determine the travel patterns and accessibility factors of the elderly in Kota Kinabalu City, which included descriptive analysis such as percentage values, mean scores, and Multiple Choice Responses. In addition, Factor Analysis was used to reconstruct 30 accessibility factor parameters based on the same categories in this study. According to Chua (2016), factor analysis is a procedure commonly used by researchers to identify, reduce and organize a large number of questionnaire items into specific constructs under a dependent variable in the study. Based on the result of the factor analysis, only 29 variables were acceptable for further analysis. Mean values were used to analyze the dominant accessibility factors among the elderly.

Table 1: Interpretation of Mean Scores

Mean score	Interpretation
1.00-1.75	Low
1.76-2.50	Moderate
2.51-3.25	High
3.26-4.00	Very high

Source: Sahatsathatsana (2014).

4.0 Findings

4.1 Demographic profile of respondents

Table 2: Socio-demographic profiles of respondents

Characteristics	Percentage (%)	
Age (years)	60-64	43.6
	65-70	31.9
	71-74	10.2
	75-80	9.0
	81-84	4.2
	85 & above	1.1
Sex	Male	56.4
	Female	43.6
Marital status	Married	73.3
	Divorced/Widowed	18.2
	Single	8.5
Household status	Living Alone	10.2
	Living with a Spouse only	12.4
	Living with children/caretaker/family	72.4
	Living with relatives/friends	2.4
	Elderly Care Center	2.6

Table 2 shows the demographic profile of the respondents, with the majority of respondents aged 60 to 64 years old, recorded at 43.6 percent, 65 to 70 years old (31.9 percent), and 85 years and older (1.1 percent). The gender breakdown of respondents shows a nearly balanced number, with male respondents (56.4 percent) just outnumbering female respondents (43.6 percent) by 12.8 percent. The marital status of the respondents revealed that the majority, which is more than half of the respondents (73.3 percent) are married, followed by the widowed/divorced category (18.2 percent). The results of the analysis showed the household status of the respondents, where the majority of the elderly live with family members (children or guardians), which is 72.4 percent. The elderly living with a partner accounts for 12.4 percent, while those living as a single person account for 10.2 percent. This has shown dependence on children because of the

belief that the old age life of the elderly will be taken over by children (Nur Syakiran et al., 2017). Strong family ties are a contributor to old age planning for the elderly, especially for those with health problems (Siti Norehan et al., 2016).

4.2 Travel patterns of the elderly

The elderly travel less frequently and for shorter distances after retirement (Liu et al., 2017). Table 2 depicts the current travel patterns of the elderly in Kota Kinabalu City, Sabah. The findings indicate that most of the respondents nowadays go out of the house rarely (53.7%), followed by often (23.4%). The main destinations of choice for the elderly are grocery stores (30.2%), followed by markets (28.9%), places of worship (17.6%), hospitals/health clinics (12.4%) and social activities such as dining out with family members or friends (10.9%). Overall, it can be seen that the majority of elderly mobility is within the range of 1 to 5 kilometers (36.5%), less than 1 kilometer (36.0%), 3 to 5 kilometers (18.9%), and the fewest respondents traveled beyond the 10-kilometer range (8.6%). Respondents' travel time revealed a tendency to leave home at any time if necessary (54.2%) because their free time was more flexible as most of them were not working. The majority of respondents went out in the morning (24.8%) and avoided going out of the house during peak hours such as noon (8.4%), evening (8.7%) and most rarely went out at night (4.0%). Respondents were more dominant in using private vehicles as passengers (29.1%) and as drivers (26.5%). Respondents who used public buses were 16.1 percent, followed by walking (11.8%) and other modes of transportation such as taxis, Grab and Maxim as well as rental cars (16.5%).

Table 3: Travel patterns of the elderly

Travel patterns		Percentage (%)
Frequency of leaving the house (weekly)	Rarely (1-3 times)	53.7
	When necessary (3-6 times)	13.0
	Frequently (>6 times)	23.4
Frequently visited destination	Grocery store	30.2
	Market	28.9
	Place of worship	17.6
	Hospital/health clinic	12.4
	Social activities (dining out)	10.9
Estimated travel distance	>1KM	36.0
	1-5KM	36.5
	5-10KM	18.9
	>10KM	8.6
Travel time	When necessary	54.2
	Morning	24.8
	Afternoon	8.4
	Evening	8.7
	Night	4.0
Transportation mode used	Private car (driver)	26.5
	Private car (passenger)	29.1
	Public bus	16.1
	Walking	11.8
	Others	16.5

4.3 Factors of elderly accessibility

Table 3 shows the results of factor analysis for elderly accessibility factors in Kota Kinabalu City, Sabah. Respondents were given 30 accessibility parameters on a 4-point scale based on accessibility facilities to ease the mobility of traveling elderly people, and items such as 'public facilities should be close to houses or residences' and 'provision of escalators in stair buildings' were excluded from the 30 items because exploratory factor item loadings were less than 0.50. Accessibility factor items were generated through scientific studies and pilot studies that describe the needs of the elderly in order to improve their accessibility in daily life (Hayes, 2002).

The result of Bartlett's Test of Sphericity for the items included was 0.000, which is a significant test result with a value of $p < 0.05$ for all items of accessibility factors included, and is suitable for conducting factor analysis. Data validity was also tested, with a result (KMO) of 0.874 for all items tested, indicating that the data did not have serious multicollinearity problems, thus those items were suitable for factor analysis. Multicollinearity allows researchers to test similar correlation values while also identifying whether the items provided are appropriate for factor analysis. Cronbach's alpha values greater than 0.60 are frequently used in the reliability index and acceptable validity values, and Cronbach's alpha values greater than 0.80 are considered good. However, Cronbach's alpha value is considered low and unacceptable if it is less than 0.60. EFA analysis showed that the personality factor recorded a variance value of 25.416 percent in addition

to an eigenvalue of 7.879 with seven (7) items, followed by the land-use factor, which had an eigenvalue of 3.866 with nine (9) items and 15.404 percent in variance contributor. The transportation convenience factor recorded an eigenvalue of 2.742 (8 items) with a variance contributor of 8.844 percent. The last factor was the temporal factor, which contained four items and had an eigenvalue of 1.714, in addition to the variance contributor equivalent to 5.529 percent.

Table 4 : Factor analysis for accessibility factors on elderly travel

Item	Factor			
	1	2	3	4
Personality				
Discounted bus fares for the elderly	0.797			
Affordable transportation costs	0.772			
Need good health to move/travel	0.761			
Require a lot of free time to get anywhere	0.727			
Need companion when traveling	0.717			
Can drive myself to all destinations	0.636			
Need to have a strong financial position	0.580			
Land use				
Leisure/recreation facilities should be close to the residence		0.743		
CCTV cameras in public places		0.719		
Wheelchair access at stairways		0.716		
Handle/shade for pedestrians		0.675		
Resting benches along pedestrian walkways and recreation areas		0.669		
Signboards that are clear and easy to be seen		0.655		
Provision of elevators/escalators in stairwell buildings		0.653		
Police huts in crime-prone places		0.643		
Paved and safe road conditions		0.630		
Transportation facilities				
Special seats are provided for the elderly			0.832	
Can store wheelchairs in the bus			0.818	
The bus comes on time			0.737	
The bus design is suitable for the elderly			0.686	
Drivers/conductors are friendly toward the elderly			0.635	
The driver drops off passengers at a safe place			0.630	
Public buses are safe from crime and accidents			0.610	
Easy to get public bus			0.532	
Temporal				
Comprehensive bus/taxi/grab travel coverage				0.636
Continuous driver's license renewal facilitates travel				0.629
License ownership increases mobility				0.611
The ability to drive makes traveling more flexible				0.602

Cronbach's Alpha	0.716	0.824	0.794	0.629
Total Variance Explained	5.630	4.775	3.842	0.954
Percentage Variance Explained	18.161	15.404	12.393	6.303
Notes: Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.874; $\chi^2 = 8138.708$; Bartlett's Test of Sphericity Significance = 0.000; df = 465				

The factor analysis successfully reconstructed the items into four main factors, which are personality, land use, transportation facilities and temporal. The interpretation of the mean value (Figure 2) will reveal the factors that are dominant and regarded as significant by the elderly in achieving their travel accessibility.

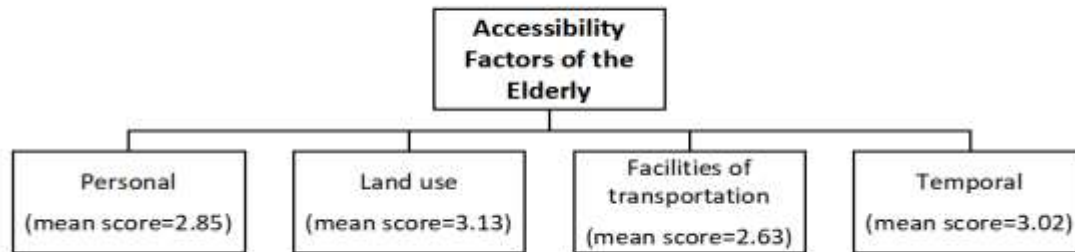


Figure 2: Mean value of elderly accessibility factors

Table 5 shows the mean score values for the elderly accessibility factor that can influence the travel accessibility of the elderly. All factors recorded an average mean value ranging from 2.63 to 3.13 at a high level. Land use is the most dominant accessibility factor with the highest average mean value (3.13). This has proven that the location of infrastructure facilities is important in ensuring elderly accessibility. According to Mohamed Yusoff and Masran (2009), improving public infrastructure allows for the creation of a healthier aging environment for the elderly. Elderly people are said to have lost their autonomy, rarely engage in activities, and have no meaningful social relationships (Maramingsan & Syamsul, 2014). Thus, accessibility has the potential to establish affinity or connection in social and economic interactions (Handy & Niemeier, 1997). According to Geurs and Wee (2004), temporal refers to the availability of opportunities at a particular time for an individual to access a particular activity. The temporal factor recorded the second highest mean value (3.02), where owning a driver's license and driving ability among the elderly is an opportunity to achieve accessibility without relying on others. Re-participation in activities in the community can maintain the health and well-being of the elderly (Nurzaharah et al., 2016).

The transportation facilities factor recorded the lowest average mean value (2.63) because the elderly in Kota Kinabalu City are more likely to use private vehicles compared to public transportation as in other countries (Mao, 2005; Kaniz & Sara, 2019). Health issues and declining cognitive ability are major factors why the elderly stop driving as they age. According to Tengku et al. (2016), the deterioration of physical function causes the elderly to become dependent or interdependent on others to engage in daily activities. Therefore, seniors are more likely to be passengers in private cars or switch to public transportation and walk for access to their desired destinations.

Table 5: Mean values for elderly accessibility factors

Item	Mean value	Average mean value	Level
Personality			
Discounted bus fares for the elderly	2.09	2.85	High
Affordable transportation costs	3.07		
Need good health to move/travel	3.22		
Require a lot of free time to get anywhere	3.03		
Need companion when travelling	2.92		
Can drive myself to all destinations	2.51		
Need to have a strong financial position	3.08		
Land use			
Leisure/recreation facilities should be close to the residence	3.18	3.13	High
CCTV cameras in public places	3.15		

Wheelchair access at stairways	2.95		
Handle/shade for pedestrians	3.00		
Resting benches along pedestrian walkways and recreation areas	3.17		
Signboards that are clear and easy to be seen	3.34		
Provision of elevators/escalators in stairwell buildings	2.96		
Police huts in crime-prone places	3.06		
Paved and safe road conditions	3.35		
Transportation facilities			
Special seats are provided for the elderly	2.19	2.63	High
Can store wheelchairs in the bus	2.08		
The bus comes on time	2.47		
The bus design is suitable for the elderly	2.44		
Drivers/conductors are friendly toward the elderly	2.64		
The driver drops off passengers at a safe place	3.32		
Public buses are safe from crime and accidents	3.10		
Easy to get public bus	2.82		
Temporal			
Comprehensive bus/taxi/grab travel coverage	2.86	3.02	High
Continuous driver's license renewal facilitates travel	2.97		
License ownership increases mobility	2.95		
The ability to drive makes travelling more flexible	3.29		

5.0 Discussion

In Kota Kinabalu City, Sabah, elderly people travel less frequently and for shorter distances, which are usually in the range of less than one to five kilometers. This is supported by Rosenbloom (2001), who stated that the average daily commute and distance travelled by the elderly have been decreased significantly. Overall, the elderly are more likely to travel for non-work trips and this is similar to the situation of the elderly in the United Kingdom. Typically, the elderly have a tendency to use private vehicles (passengers). This is consistent with the global trend, as Mao (2005) reports that in some European countries, the elderly rely heavily on private vehicles compared to other modes of transportation. Furthermore, 89 percent of the elderly in the United States travel by private car, according to a monograph study on the travel characteristics of elderly people in the United States (Collia et al., 2003).

Personality factors can influence a person's ability to achieve their needs. A good health condition can have an impact on a person's convenience in accessing his daily activities. According to Rosenbloom (2001), health issues have made it difficult for the elderly to use vehicles such as public buses, which creates barriers for the elderly who want to take transit. This is supported by Khadijah Alavi et al. (2011) who found that the elderly are highly affected by aging, causing them to reduce travel. The physical disabilities faced by the elderly could reduce their social involvement, which provides them with a sense of well-being in life (Sitinur et al., 2016).

The use of transportation facilities was low among the elderly as they tended to use private vehicles, and public bus services were less satisfactory for the elderly. This is because private vehicles are more comfortable for the elderly to use because, according to Kaniz and Sara (2019), the elderly in Melbourne who use the service must stand for a certain period of time during their travels by bus due to a lack of seats. Temporal factor includes possession of a driver's license and current driving ability that provide a person with opportunities to access goods and services as well as the desired destination.

The land use factor is the most important factor influencing the mobility access of the elderly. The placement of facilities or destinations close to the residence is a major demand of the elderly as they get to access them at any time if necessary. The sustainable distribution of facilities and infrastructure that is strategic and close to their residences can help the elderly maintain their mobility (Goulias et al., 2007; Schmöcker et al., 2008). The installation of closed-circuit television (CCTV) cameras in hot spots can generate confidence for the elderly when travelling. According to Berita Ehwat Semasa Radio Televisyen Malaysia, Sabah (2016), the installation of 24 closed circuit television (CCTV) cameras in several hot spots around Kota Kinabalu City since 2014 is now fully operational to lower crime rates in urban areas.

6.0 Conclusion

Elderly accessibility factors have a direct impact on the elderly because these factors can influence their decisions on traveling. The distribution of the most important facilities and destinations should be within proximity to increase the mobility of the elderly because they will be able to access them without relying on others. Other accessibility factors such as personality, transportation facilities, and temporal are also elements that can provide challenges or opportunities for the elderly to remain active after they reach senior age.

Among the limitations of this study is the difficulty of identifying respondents who are the target group set, namely aged 60 years and above. This is such that the age of the respondents cannot be filtered using only the researcher's observations. Researchers also had difficulty in obtaining respondents as the study sample because most of the elderly were reluctant to cooperate due to the phobia of personal information leakage. However, researchers need to respect the respondents' decisions as this is one of the ethics when collecting data. The period for data collection is taking a long time due to the sensitivity of the elderly because a majority of them can't fill the questionnaires by themselves due to blurry vision and lower literacy among the elderly.

This study contributes to the knowledge of transportation geography itself, which is still less discussed among past scholars, but the researcher of a transportation geography scholar can explain the issues related to accessibility to the mobility of the elderly in Kota Kinabalu, Sabah. The findings of this study cannot be denied that it can provide the implications for all parties including Local Authorities (PBT) such as the Social Welfare Department, Road Transport Department, and Kota Kinabalu City Hall, Sabah in formulating productive policies and policies on the mobility needs of the elderly as well as submitting a comprehensive plan to overcome the problem of accessibility among the elderly so that they can actively age after retiring from the world of career. Incomplete coverage of public bus service routes in all areas of the city especially in the main corridors. This proposal is made because some senior citizens have difficulty accessing public transport because there are no terminals or public bus stops provided near their homes. If this situation is allowed, senior citizens will take other alternative transportation such as vehicles without a permit because they can stop anywhere as long as there is demand, but comfort and safety are a big challenge for senior citizens in using this model due to physical weakness. To address or monitor the operation of vehicles without permits, authorities such as the Traffic Transport Department (DBKK), the authorities need to control the issuance of permits to overcome unhealthy competition among operators to ensure universal well-being while generating revenue. Researchers in the future could measure the level of accessibility between other age groups and the elderly to see differences in mobility needs more clearly because there are significant differences. In particular, it is suggested to look at it from the aspect of differences in health levels and choice of mode of transport used.

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