

## Accessing the Tourist Demand for Non-Motorized Transportation Usage in World Heritage City of Malacca, Malaysia

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### Abstract

Non-motorized transportation is commonly known as human-powered transportation which includes walking, cycling and small-wheeled such as skateboard, push scooters and roller blades. Due to the globalization of transportation, non-motorized transportation has starting to receive remarkable attention especially in urban areas, but the usage of non-motorized transportation is depending on several factors and demand that encourage people towards the usage rate. The objectives of this study are to investigate the demand of tourists towards the non-motorized transportation facilities around the cities and analyze the existing demand from tourists for non-motorized transportation. The study was conducted in World Heritage City of Malacca, Malaysia. The factors that have been found which influencing non-motorized transportation usage are demographic and sociology, recreational, accessibility, compact environment, geographical and travel time. The objective has been achieved by analyzing it using descriptive and correlation analysis. In this study, result findings shown that there are three out of four factors are significant. This preliminary study is important in extending the future recommendation regarding non-motorized transportation needs and tourist mobility management framework especially in tourism area.

**Keywords:** Non-Motorized Transportation (NMT), Tourist Mobility Management, World Heritage City, Compact Environment, Sustainable Transportation, Livable

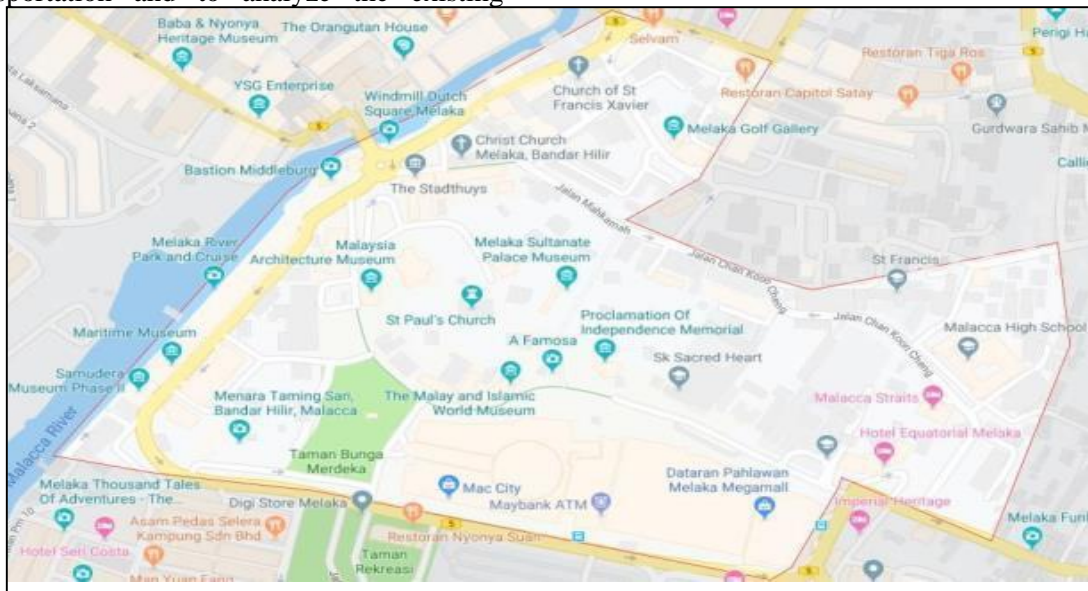
### 1. Introduction

Nowadays, people starts to have an awareness about environment and self-health. People starts to look at the possible ways to taking care of our planet earth and their own health. There are a lot of campaign on green planet, recycling, reduce the usage of plastics bag and green transportation. In green transportation area, people start to aware and choose a non-motorized transportation such as walking, jogging, and cycling in day-to-day activities due to health conscious. Transportation is an important element for

tourist in making decision for their holiday trip. Given that it is important and unique roles in an efficient and equitable transportation system. Non-motorized transportation provides basic mobility, affordable transport, access to motorized modes, physical fitness, and enjoyment. (Litman, 2016). Thus, Non-motorized transportation is also known as human-powered transportation includes walking, cycling and small-wheeled such as skateboard, push scooters and roller blades which do not used machinery energy resources. According to (Mat Yazid et al., 2011) non-motorized transportation means a movement do

not rely on an engine or motor to move from point A to point B. In Malaysia, the government has been made a campaign about an awareness of non-motorized transportation usage where they come out with a 'green' idea such as bike sharing operation which getting bigger and bigger especially in urban area. Given that it is known that tourist must travel to and from their chosen destination. Good pedestrian traffics and non-motorized transportation contribute towards the safe and pleasant environment and positively enhance visitor's experience, attract tourism attention, increase the economic growth helps in contributing to the local economy by supporting tourism and quality development. The research objectives of this paper to analyze the factor that influence tourist's demand for non-motorized transportation and to analyze the existing

demand from tourist for non-motorized transportation. The world heritage city of Malacca has been chosen as the study location because of the compact urban area that also one of the tourist's attraction in Malaysia. The concern is to preserved Malacca world heritage elements of built heritage (above-ground archeology) and below ground archeology (Tim William, 2010). Therefore, it is important for researcher to see the factors that influenced the demand and needs of non-motorized transportation usage as the basis of non-motorized transportation development framework to assist the transportation and tourism planning in Malacca. Figure 1, shows the area of Bandar Hilir Malacca that has been added to UNESCO's World Heritage List in 7<sup>th</sup> July 2020 (Williams, 2014)



**Figure 1:** Maps of Bandar Hilir Melaka, Melaka (Source: Google Maps)

There are mixed development area has a healthy mixture of residential and commercial properties consisting of semidetached and terrace houses, apartment, condominium as well as shop-offices scattered primarily in the cities.

## 2. Literature Review

### 2.1. Types of Non-Motorized Transportation in Malaysia

Reference made by (Kumar Jain Principal & Kumar Jain, 2015a), non-motorized transportation is a form of transportation operated by human energy includes walking, bicycling, and variants such as small-wheeled and wheelchair to travel. Non-motorized

transportation provides and serves recreation and commuting options where the user can consider using both to serve the objectives. Non-motorized transportation usage is subject to the user's will according to the circumstances and the desire of user when and where to use it. Non-motorized transportation can be classified into several types; pedestrian, cyclist, animal moved vehicles, man moved vehicle and skater/rollerblade.

### 2.2. Factors relate to tourist demands towards of Non-Motorized Transportation Facilities

Based on the past studies about the factor that influence non-motorized transportation

usage, a broad of range have been collectively identified. Some of the factors identified related with the non-motorized transportation usage are demographic and socioeconomic characteristics, trip characteristics, environment factors, and attitude and perception.

Refer to 1<sup>st</sup> factor, demographic and socioeconomic characteristics, according to (Handy & Mokhtarian, 2012), the elements that have been found in the studies that correlate with non-motorized transportation are gender, age and income level of individuals. Young people are more likely prefer the bicycle usage, while elderly is choose walking than other age groups. Supported by (Wey & Huang, 2018), men are found more consistently towards the bicycle usage for both recreation and transportation purpose more than women. Supporting by (Bedadala & Mallikarjuna, 2016), less females prefer cycling compared to males. Moreover, socioeconomic characteristics also influence the decision of mode choice. Evidence shown by (Cerin et al., 2009), household income level plays an important role for transportation choice. Low-income individuals may be more likely choose walking for a transport purposes than higher income individuals. Low-income individual is unable to afford to hand and use private or public transportation which low-income individual have choose used non-motorized transportation which is walking and cycling. Meanwhile, for higher income individual, private transportation is assessable to use and own. Supported by (Rahul & Verma, 2013), individuals owning at least a private motor vehicle had less probability of using walk and cycle compared with individuals not owning any private motor vehicle. This trend is very common in developing countries.

Second factor is trip characteristics. Trip characteristics are also influencing the non-motorized transportation usage. As stated, non-motorized transportation is primary used for short distance travel (Kumar Jain Principal & Kumar Jain, 2015b). The farther the distance, the lower of the percentage of non-motorized transportation usage will be. According to (Pucher et al., 2010), trip purpose could be related to the choice of transportation mode as well as the measured travel distance. Although the distance can be measured, the usage of non-motorized transportation is also depending on

the user's objective, physical condition and trip purpose. As an example, bicycling is commonly used for recreational purpose or sport activities where the distance is farther than usual compared to other trip purposes. Besides that, distance, and purpose such as work, shopping, and recreation are also important factors that are probably to have influence on people mode selection decision on a daily life. Trip purposes play a vital role in mode selection decision of people. In Asia, bicycle is used mainly as primary transport mode especially at India and China. It is also used for recreational purposes in some countries such as United States, Peru and Brazil. While in Netherlands and Denmark used non-motorized transportation for both primary transport and recreational (Bedadala & Mallikarjuna, 2016).

Third factors is environment factor. According to (Cervero et al., 2009), environment influences non-motorized transportation usage. It can be divided into categories such as land development, topography and connectivity, micro-scale urban design and weather. A statement by Non-Motorized Transportation Policy and Strategy in 2009, integrated land use development appropriately suited for non-motorized transport. Urban sprawl can be referred to the mitigation of people from the cities to the low-density residential development where directly cause the negative impacts towards non-motorized transportation usage since the distance between trip from one place to another place is lengthened. Land use favoring compact development can shrink trip distances and thereby make bicycling a viable option (Types et al., 2001). The compact environment such as at the economic area in the cities can help make walking and bicycling available and suitable option as it is reduced the distance between point of interest. According to (Litman, 2013a), the compactness design of land development will attract more people for walking and cycling because there are so many destinations are within convenient distance of each other, connected with streets that allow direct travel, have attractive sidewalks and paths. This scenario will improve accessibility, affordability, and community livability. However, compactness also results in higher volume of traffic on the streets which makes the roadways unsafe especially for pedestrians and bicyclist. Hence, compact land use must be

suitable and accompanied by appropriate walk or bicycle facilities that address traffic safety concerns. Besides, the factor that can relate with compactness is high density development. Higher density will attract more cycling trips since the destination between one place to another place becomes short distance. Reference made by (Plaut, 2005), the primary differences identified the factor attributes to the disparity of non-motorized transportation in United State are rooted in land use. Higher density development directly helps in increasing the development economic area to bring the population closer to their workplace and making the individuals to bicycle or walk to work. Topography is the physical feature of an area also directly affects the non-motorized transportation usage. Evidence shown by (Kumar Jain Principal & Kumar Jain, 2015a), pedestrian, cycling and rickshaws activity tend to be at a higher level in flat areas than in hilly ones. Local Topography is directly related to the propensity of walking and cycling according (Rodriguez et al., 2010). The place with sloping and hilly terrain will discourage people to walking and bicycling at that area. Similarly, the street network with low connectivity such as culled-sac and curvilinear street design where typically found in modern suburbs are also discouraging the non-transportation usage. Supported by (Litman, 2013b), one of the principles of pedestrian design is that the pedestrian network should be well connected with the destinations. Thus, to solve the problems, the development of grid street networks or conventional grid pattern will maximize direct access and making it easy for non-motorized transportation user such as pedestrians and cyclist to move from one place to another place by using the existing streets and sidewalks. Micro-scale urban design factors such as sidewalks, bike lanes with proper street lighting will help in encouraging the non-transportation usage. The infrastructure should be designed and integrated with the environment which the user will enjoy the walk and cycling while side seeing the design. It is because the tourist and the user feel safer and more comfortable to travel from one place to another place. The attractiveness and aesthetic quality of neighborhood such as the scenery, park, landscaping, recreational sites, and shopping opportunities positively helps in increasing the propensity of non-motorized transportation usage in the neighborhood area

especially for recreational purposes. The local physical environment tends to be a function of the location and regional connectivity of the development with respect to other activity centers in the area. Planners often identify neighborhoods as pedestrian-oriented if there have a high density of development that includes a variety of land uses, a street network with high connectivity and human-scale streets(Wey & Huang, 2018).

Fourth factor is weather. Weather also one of the important roles that affecting the non-transportation usage. Weather is one of the factors that affecting the demand of non-motorized transportation usage such as bicycle in which bicyclist choose to ride, shifts with seasonality. The harsh environments such as raining and snowy weather are possessing safety risk for non-motorized transportation user. Malaysia features a tropical rainforest climate which Malaysia will experience heavier rainfall from August until January. Non-motorized transportation usually is not covered, so that the surrounding area will be affect its use. The harshness weather conditions reluctance the usage of non-motorized transportation usage (Salleh et al., 2014).

Lastly, the researcher look at attitudes and perception. Attitudes and perceptions of people towards transportation especially non-motorized transportation modes are important to understand. People's attitude is based on his beliefs and consequences of adopting his behavior. Having a positive attitude towards the bike increases the likelihood of using this mode of transport for commuting (Mehta, 2008). Nowadays, people are started to aware of healthcare. Awareness of physical activity concern in using non-motorized transportation, safety aspects, enjoyment and else plays a significant role in individual's mode choice decisions according to (Bedadala & Mallikarjuna, 2016), the raised awareness of individuals in using non-motorized transportation modes and the advantages it gets from these modes individually and communally makes the difference between developing and developed countries. A health benefit is one of the reasons why people started to walk or bicycle for recreation as well as commuting. Physical activity is an essential lifestyle component of improving long-term health (Grabow, 2013). Health is an important thing that needs to be taking care of by every

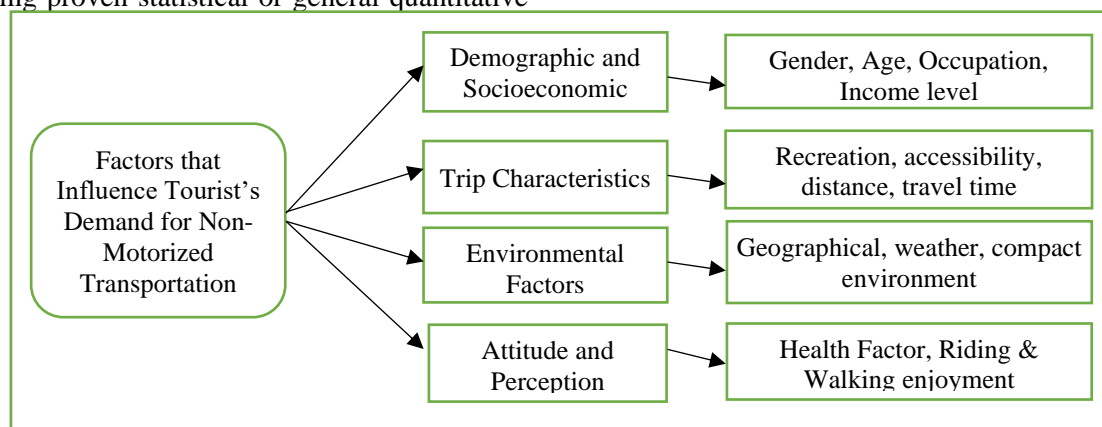
individual because the level of health affects various aspects of daily life. Besides, the safe environment is also an important issue that should be overlooked to make sure it can be perceived as safe for non-motorized transportation user. Busy traffic and no pedestrian crossings need to be considered towards the usage of non-transportation to ensure the priority of safety. In certain country such as United States, safety is a special concern because their non-motorized fatality rates are much higher than countries like Netherlands and Germany. Supported by (Pucher et al., 2010), many European cities provide compulsory training on traffic safety in their schools to teach safe walking and cycling skills and require much stricter training and licensing than in the United States. Appropriate actions are needed to create safe environments for non-motorized transportation user such as providing deliberately circuitous routing for cars and direct routing for cyclists to improve cycling safety by reducing both the volume and speed of motor vehicle traffic in residential neighborhoods. Therefore, the users will feel safer and more comfortable to use non-motorized transportation such as walking and cycling which directly will give a good impression and experience towards the users and society.

### 3. Methodology

In this research, the researcher conducted quantitative research design to determine the needs and demand of tourist on non-motorized transportation for their travel purpose. Quantitative research is a method that focused on derivation of conclusion from existing data using proven statistical or general quantitative

methods (JIA et al., 2008). The questionnaires has been distributed among tourist local and international in Malacca World Heritage City. The structure of questionnaire is in closed ended questions which allows respondents to tick or circle the related statement based on the preferences and judgement. For the first section of the questionnaires, Section A, the questions consist of 5 items which explore on demographic and socioeconomic profile of the respondents. The questions consist of gender, age, occupation and mode of transportation used and monthly income level of the respondents. The next section is set out in 5 points Likert Scale. The scale is coded range from 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree. In short, Section B describes factors that influence tourists demands towards the non- motorized transportation and section C describes about existing demand from tourists for non-motorized transportation. Then the pilot test has been conducted to ensure the reliability index which can be shown through Cronbach Alpha value. According to (Li et al., 2018)suggested 10 to 30 respondents for pilot test in survey research. Later the descriptive analysis has been used to describe the basic feature of data in the study which involves the use of mean value and standard deviation. According to (Lestringant et al., 2019), data can be analyzed, and the results can be present and summarized in a form of pie chart, bar or histogram.

Below is the conceptual framework that been used in this research to evaluate the factors that influence the tourist's demand in choosing the Non-Motorized Transportation mode for their visit and travel purposes.

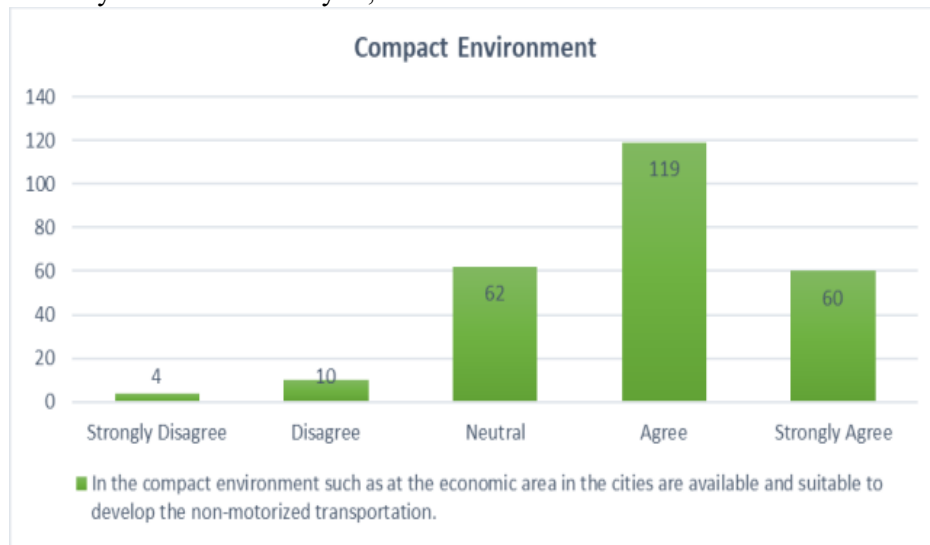


**Figure2:** Conceptual Framework - Factors that Influenced Tourist's Demand for Non-Motorized Transportation

#### 4. Results and Findings

Total of 255 respondents has complete the researcher's survey. From the analysis, the

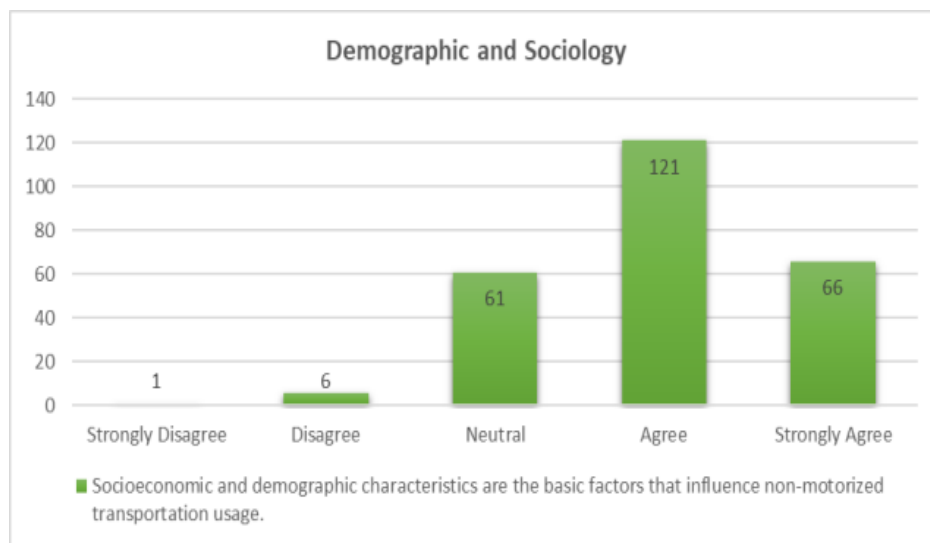
three significant factors that influenced the choice of tourist in choosing Non-Motorized Transportation as below.



**Figure 3:** Compact Environment factors

Total of 179 or 70% tourist agree that the compact environment has influence them to choose Non-Motorized Transportation as mode of travelling and visiting the World Heritage City of Malacca. Because of the compact environment they feel enjoy and happy to do their shopping and visiting the heritage area. Tourist will not stuck in traffic congestion if the choose to use non-motorize transportation mode The topography that flat also helps tourist to walk and cycle easily. Economic activities in the World Heritage City of Malacca also suitable for the Non-Motorized Transportation facilities.

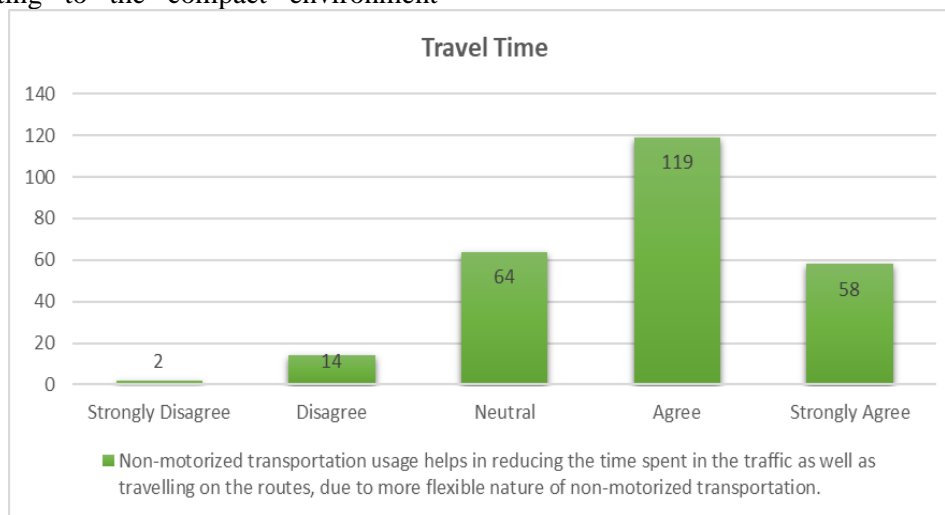
Another significant factors that influenced the choice or demand for Non-Motorized Transportation among the tourist in World Heritage of Malacca is the factor of demographic and sociology. Most of the tourist thinks that demographic and socioeconomic basic factors will influence their choice to use Non-Motorized Transportation. If they in young age, the gender, the occupation and their income will influence their decision to use Non-Motorized Transportation facilities. Total 187 tourist from 255 respondents thinks that the basic factors in demographic and socioeconomic do give impacts to the demand of Non-Motorized Transportation. Below is the charts of the results:



**Figure 3:** Demographic and socioeconomic factor

The third factors that influenced the tourist demand for Non-Motorized Transportation is travel time. According to respondent that also tourist in World Heritage City of Malacca, travel time is important and the feels that by using the Non-Motorization Transportation mode, they can move easily and faster. This is also relating to the compact environment

suitable for Non-Motorized Transportation facilities. Total Of 177 or 69% of respondents agree that travel time is factors that they think made them interested to use Non-Motorized Transportation. Below is the results that shows travel time is one of tourist demand factors for Non-Motorized Transportation.



**Figure 4:** Travel Time

## 5. Conclusion

The existing demand from tourists for non-motorized transportation usage factors are unpredictable and hard to be change especially when it comes from the physical features and the condition of weather of an area. Meanwhile, in other situation, environments play a significant role in non-motorized transportation usage industry for example compact environment in urban area. The non-motorized will be more available and suitable in the compactness of an area. According to Litman (2010), the people will more attract for walking and cycling with the compactness design of land development because there are many destinations were within convenient distance with each other that connected with the streets that will allow for direct travel that will directly encourage people to use the non-motorized transportation. Malacca city was a compact area where almost all the facilities were available. Authorities party that involve in non-motorized industry may together plan with town planning of Malacca city to implement the objective of bike sharing operation that can encourage the people and tourists to use non-motorized transportation. According to Zhou (2017), congestion can be reducing by bike sharing system. Bike sharing system is one of the part

in urban transportation system where it will extend the accessibility of public transportation system to finals destination (Khorasani, 2012). The traffic congestion can be reducing especially during peak hours indirectly by implement the bike sharing.

In conclusion, non-motorized transportation were integral element and important in urban transport worldwide. Besides, non-motorized transportation modes can help to create more livable cities and communities. Furthermore, non-motorized transportation are the resource-efficient travel modes where it consumes the impose minimal costs on consumers, the environment that support the sustainable development objective and consumes minimal road and parking space. Thus, government and authorities that involve have to cooperate in implementing bike lane, sidewalks, urban planning, transit oriented development and bike sharing programs with public transportation planning.

## Referencias

1. Bedadala, S. J., & Mallikarjuna, C. (2016). Factors Influencing Non- Motorized Mode Choice : *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, 4(II), 27–33.

2. Cerin, E., Leslie, E., & Owen, N. (2009). Explaining socio-economic status differences in walking for transport: An ecological analysis of individual, social and environmental factors. *Social Science and Medicine*, 68(6), 1013–1020. <https://doi.org/10.1016/j.socscimed.2009.01.008>
3. Cervero, R., Sarmiento, O. L., Jacoby, E., Gomez, L. F., & Neiman, A. (2009). Influences of built environments on walking and cycling: Lessons from Bogotá. *International Journal of Sustainable Transportation*, 3(4), 203–226. <https://doi.org/10.1080/15568310802178314>
4. Grabow, M. L. (2013). *Active Transportation and Health: Predictors from Urban Design and Modeled Commuting Behavior*.
5. Handy, S. L., & Mokhtarian, P. L. (2012). *Contributions Of Individual, Physical, And Social Environmental Factors To Bicycling: A Structural Equations Modeling Study Of Six Small U.S. Cities*.
6. JIA, S., PENG, H., GUO, J., & CHEN, H. (2008). Quantitative Analysis of impact of Bicycles on Vehicles in Urban Mixed Traffic. *Journal of Transportation Systems Engineering and Information Technology*, 8(2), 58–63. [https://doi.org/10.1016/S1570-6672\(08\)60018-5](https://doi.org/10.1016/S1570-6672(08)60018-5)
7. Kumar Jain Principal, R., & Kumar Jain, R. (2015a). NON-MOTORIZED TRANSPORT AND SUSTAINABLE URBAN PLANNING: A CASE STUDY OF PUNE METROPOLITAN REGION. *Article ID: IJCIET\_06\_07\_009 Journal of Civil Engineering and Technology*.
8. Kumar Jain Principal, R., & Kumar Jain, R. (2015b). Non-Motorized Transport and Sustainable Urban Planning: a Case Study of Pune Metropolitan Region. *Article ID: IJCIET\_06\_07\_009 Journal of Civil Engineering and Technology*, 6(7), 69–79. <http://www.iaeme.com/IJCIET/index.asp69> <http://www.iaeme.com/IJCIET/issues.asp?JTypeIJCIET&VType=6&IType=7> <http://www.iaeme.com/IJCIET/issues.asp?JTypeIJCIET&VType=6&IType=7> <http://www.iaeme.com/IJCIET/index.asp70>
9. Lestringant, P., Delarue, J., & Heymann, H. (2019). 2010–2015: How have conventional descriptive analysis methods really been used? A systematic review of publications. *Food Quality and Preference*, 71(May 2018), 1–7. <https://doi.org/10.1016/j.foodqual.2018.05.011>
10. Li, L., Bai, Y., Song, Z., Chen, A., & Wu, B. (2018). Public transportation competitiveness analysis based on current passenger loyalty. *Transportation Research Part A*, 113(June 2017), 213–226. <https://doi.org/10.1016/j.tra.2018.04.016>
11. Litman, T. (2013a). Evaluating complete streets, the value of designing roads for diverse modes, users and activities. *Victoria Transport Policy Institute*, 1–23. <https://trid.trb.org/view.aspx?id=1225593%5Cnhttp://www.vtpi.org/compstr.pdf>
12. Litman, T. (2013b). Evaluating complete streets, the value of designing roads for diverse modes, users and activities. *Victoria Transport Policy Institute*, 1–23. <https://trid.trb.org/view.aspx?id=1225593%5Cnhttp://www.vtpi.org/compstr.pdf>
13. Litman, T. (2016). Evaluating Active Transport Benefits and Costs. *Victoria Transport Policy Institute*, 134–140.
14. Mat Yazid, M. R., Ismail, R., & Atiq, R. (2011). The use of non-motorized for sustainable transportation in Malaysia. *Procedia Engineering*, 20, 125–134. <https://doi.org/10.1016/j.proeng.2011.11.147>
15. Mehta, V. (2008). Walkable streets: Pedestrian behavior, perceptions and attitudes. *Journal of Urbanism*, 1(3), 217–245. <https://doi.org/10.1080/17549170802529480>
16. Plaut, P. O. (2005). Non-motorized commuting in the US. *Transportation Research Part D: Transport and Environment*, 10(5), 347–356. <https://doi.org/10.1016/j.trd.2005.04.002>
17. Pucher, J., Dill, J., & Handy, S. (2010). Infrastructure, programs, and policies to increase bicycling: An international review. *Preventive Medicine*, 50(SUPPL.), 8. <https://doi.org/10.1016/j.ypmed.2009.07.028>
18. Rahul, T. M., & Verma, A. (2013). Study of Impact of Various Influencing Factors on NMT Mode Choice. *Procedia - Social and Behavioral Sciences*, 104(2005), 1112–1119. <https://doi.org/10.1016/j.sbspro.2013.11.207>



19. Rodriguez, D., Ward, A., & Sciences, P. (2010). *Final report. December*, 1–43. [https://doi.org/http://www.royalcommission.vic.gov.au/finaldocuments/summary/PF/VBRC\\_Summary\\_PF.pdf](https://doi.org/http://www.royalcommission.vic.gov.au/finaldocuments/summary/PF/VBRC_Summary_PF.pdf)
20. Salleh, B. S., Rahmat, R. A. A. O. K., & Ismail, A. (2014). A study on non-motorised (NMT) activities for urban environment. *Research Journal of Applied Sciences, Engineering and Technology*, 7(2), 290–295. <https://doi.org/10.19026/rjaset.7.253>
21. Types, D. N., Development, C., & Development, C. (2001). TECHNICAL BULLETIN Street Pattern on Travel Behaviour. *Ratio*, 11, 1–4.
22. Wey, W. M., & Huang, J. Y. (2018). Urban sustainable transportation planning strategies for livable City's quality of life. *Habitat International*, 82(June), 9–27. <https://doi.org/10.1016/j.habitatint.2018.10.002>
23. Williams, T. (2014). *Melaka and World Heritage Status. August 2010*. <https://doi.org/10.1179/175355210X12838583775301>