PLANO MADANI
VOLUME 11 NOMOR 2 OKTOBER 2022
© 2022 P ISSN 2301-878X - E ISSN 2541-2973

EXPERIMENTAL STUDY ON PREDICTIONS OF CYCLING AS AN OPTION FOR URBAN MOBILITY IN INDONESIAN CITIES: A CASE STUDY OF MAKASSAR.

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Sengaja dikosongkan

ABSTRAK

As one of the nations with high number of populations, Indonesia should concern the best practice and way to design their cities' urban form and mobility lanes. Covid 19 pandemic has changed many aspects of human activities. During the pandemic, the number of bicycles sold increased more than 1.000 percent. The situation could be a momentum for Indonesians which highly known so depends on motorized vehicle as the main option for mobility, even on a short distance trip. This study aims to inspect the changing of behaviour of Indonesians related to cycling during pandemic and its future. By spreading the questionnaire on earlier stage of the pandemic, and a brief comparison of heatmap on cycling activities, this research revealed that Makassar potentially could provide cycling lanes equally on its land, with almost half of the respondents reveals that they probably choosing cycling as their vehicle to accessing office/services.

Kata Kunci : *Cycling transport, urban form, cycling lanes, main road, mobility.*

A. INTRODUCTION

1. Background of the study

One of the aspects that targeted by sustainable development goals (SDGs) is environment friendly and sustainable transportation (Stankov et al., 2020). Several policies should be implemented especially focused on active mobility. Some of the examples are walking and cycling. Moreover, active mobility contributed on lower pollution effects, including noise. However, SDGs implementation on developing countries such as Indonesia is more even challenging since most of the people were absolutely depends on private motorized vehicles to accessing daily services. This condition is caused by a lower travel time and flexibility options performance that could achieved by bicycle compared to motorized vehicles, including a low level of comfort and safety. Those factors decrease the effort and habit of bicycle usage in daily activities (Irawan, 2012).

Because of the nation's regulations and efforts to encourage cycling, as well as its culture of reliance on motorized vehicles, it is important to understand the demand for bicycles in Indonesian cities. Yogyakarta's municipal administration has promoted cycling to work and school since 2008 as an effort to spur demand for bicycles. In addition to segregated bicycle lanes, bicycle boxes at signalized crossroads, and bicycle parking racks in core business districts, this campaign is followed by measures for cycling infrastructure. The demand for bicycles hasn't

increased despite these efforts. Only 7.97% of students in Yogyakarta rode to school, according to research, while 62.76% used automobiles (Irawan, 2011). Motorized vehicles could park their vehicles in the striped bicycle lanes as well. A bike-sharing program with four docking stations connecting tourist destinations was introduced by the local administration in 2018. This system has been successful in convincing tourists to ride bicycles (Kurniadhini and Roychansyah, 2020). Similar initiatives have been made by the local administration in Bandung, although even the bicycle infrastructure there is not as good as it is in Yogyakarta. Compared to Yogyakarta, Bandung has a substantially lower demand for bicycles (Warlina and Hermawan, 2020).

Additionally, little is known about how frequently people cycle in developing nations and the effects of this activity. only basic characteristics like gender, age, income, and cycling barriers (Handayani,2020). On the other hand, number of people that come to the urban areas were increased and one of the factors is higher education such as university that attract people to moving and live in the city. Some universities in Indonesia even have students that originated not in the city where the university belong, such as Malang more than 69% students, Padang more than 72% students, and Yogyakarta which has more than 75% students that were not coming from that area. This could be produced multiple poor impacts to urban environment which more people come to the city but they are not supported by great and sustainable way to support their mobility such as less active transportation and high amount of motorized vehicle users.

Hierarchy of Walking Needs (Alfonso, 2005) has explained several basic principles of walking needs, which are pleasurability, comfort, safety, accessibility, and feasibility. Pleasurability and feasibility strongly related with personal reason from pedestrian point of view, so that to find out the level of walkability index that based on the walking platform or physical environment, then comfort, safety and accebility being a based to developing the walkability evaluation tool (Ikram, 2018).

Based on this condition, this study aims to inspect the changing of behaviour of Indonesians related to cycling during pandemic and its future. Case study located in Makassar as one of the cities in Indonesia with increased bicycle users during pandemic.

B. METHODS

1.Sampling

Sampling for case study of this research will be set as follows:

a. Samples are Makassarian that actively cycling during pandemic until this paper written, then filling the questionnaire that spread by the author.
b. Several questions trying to find some data including the willingness of choosing active mobility, travel distance from samples' house and office, and so on.
c. Cycling heatmap on Makassar then collected to find out how well the spread of streets and roads were passed by cyclist.
d. Heatmap data could used as an early reference to plan the future of cyling routes in Makassar.

2. Cycling trends

The identification of cycling trends will taken from the answer of cyclists that filling the questionnaire, which contain some data such as types of bike, distance from their home to their office/school, their average time to ride their bikes every week, their activity related to cycling before and after pandemics, preferred time to riding bikes, and their reason for ride or not to ride the bicycle on post pandemic time.

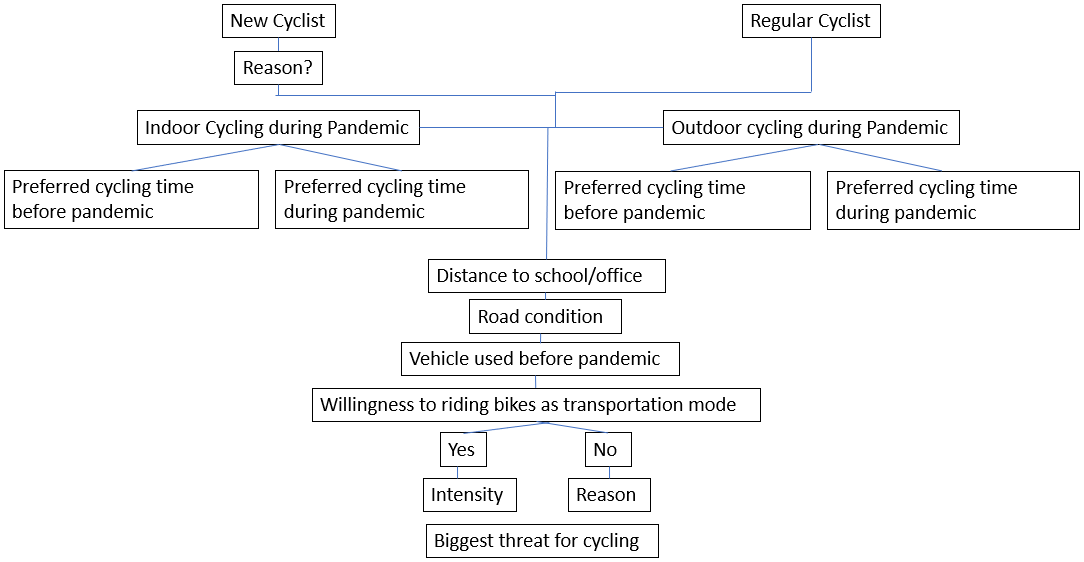

Figure 1. Questions for Cycling Trends
Source: Author's Analysis

3. Route Identification

One of key aspect of the resilience in transport is the connectivity of street network and good quality of road material in urban area. City with high number of intersections could create many possible routes that making movement inside the urban area easier, where a good road condition could reduce uncomfort that feel by cyclist.

After the cycling trends in Makassar were identified, route that chosen by cyclists in Makassar will also identified by using Strava as data provider of tracked cycling activity that famously used.

Data provided by Strava then identified and compared with the city plan (RTRW) of Makassar to create a possible cycling route based on the trends that cyclists have already created.

C. ANALYSIS AND DISCUSSIONS

1. Cycling Trends in Makassar

84 samples categorized as cyclist filling the questionnaire in 11 days. Data collected from June 13th to June 24th, 2022. As counted, 35 percent of samples were 26-30 years old, 18-25 years old 14 percent, 31-35 years old 14 percent. However, 13 percent of samples were more than 50 years old, which are categorized as active on that kind of age.

64 percent of samples were regular officers (civil servant, police, company workers and so on), 15 percent were merchant or salesman, 11 percent were university student.

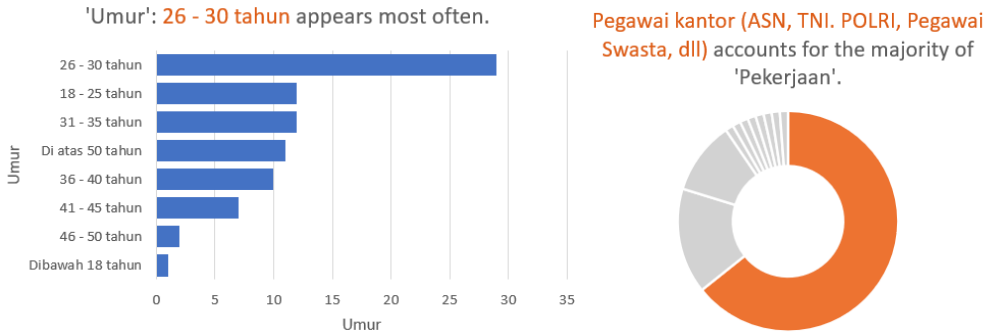

Figure 2. Samples' age and profession
Source: Author's Questionnaire

More than 60 percents of respondents were 700c type of bike users, followed by minivelo and folding bike users on 27 percents, and others were mountain bike users. Almost 40 percents of respondents cycle up to 3 until 5 hours a week. The details were presented as follows:

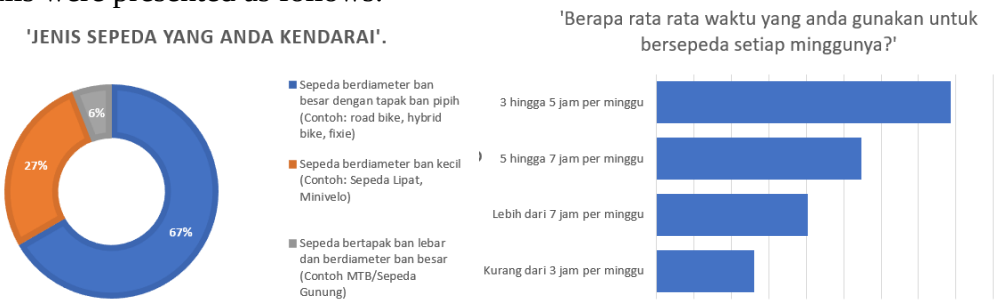

Figure 3. Samples' type of bikes and riding duration during a week.
Source: Author's Questionnaire

Table 1. Tool Scoring
Source: Author's Analysis (2018)

68 respondents out of 84 were categorized as outdoor cyclist during pandemic time. This information shows that even during pandemic most of cyclists in Makassar still prefer rode their bikes outside rather than indoor cycling. 76 percents of them chose to ride their bikes in the morning and only 7 percents choose to ride their bikes at night.

Related to distance from respondents' house to their office/school, 1/3 of the respondents lived in a range of more than 10 km, followed by 5-8 km on 20 percents. The distribution of distance to office/school shown on figure 4.

Figure 5 shows the percentage of willingness of cyclists to ride their bike to their working place. 31 percents said that they will ride their bikes, 55 percents said they probably will ride their bike, and 14 percent won't ride their bike to their working place.

Figure 4. Respondents' Living-Service Distance
Source: Author's

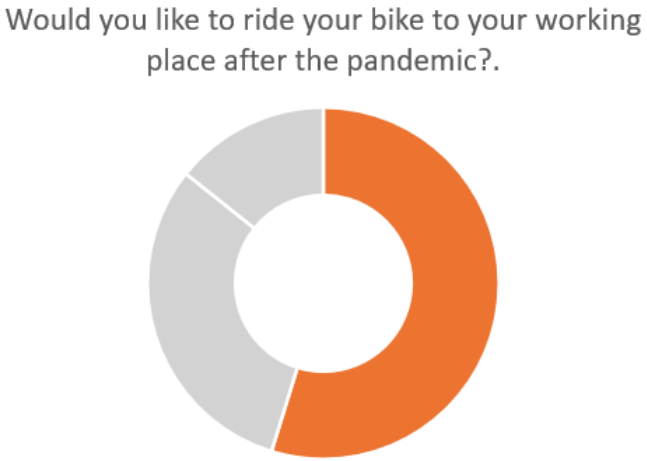

Figure 5. Willingness to ride bike to working place after pandemic
Source: Author's

2. Route Identification

Routes were identified by heatmap of Strava, which provided by recorded by cycling computers. The more cyclists pass a road, the brighter it shown on the map. By provided heatmap data, preferred road result shown on table 2 below (order by highest score to lowest):

Table 2. Preferred Arterial Road in Study Area

Road Corridor	**Total Distance (in km)**
Perintis Kemerdekaan	12,1
Metro Tanjung Bunga	6,6
Veteran	5,3
Urip Sumohardjo	5,1
A.P. Pettarani	4,2
Ratulangi-Sudirman	3,8
Sultan Alauddin	3,8
Penghibur-Nusantara	3,2

Source: Author's Analysis (2022)

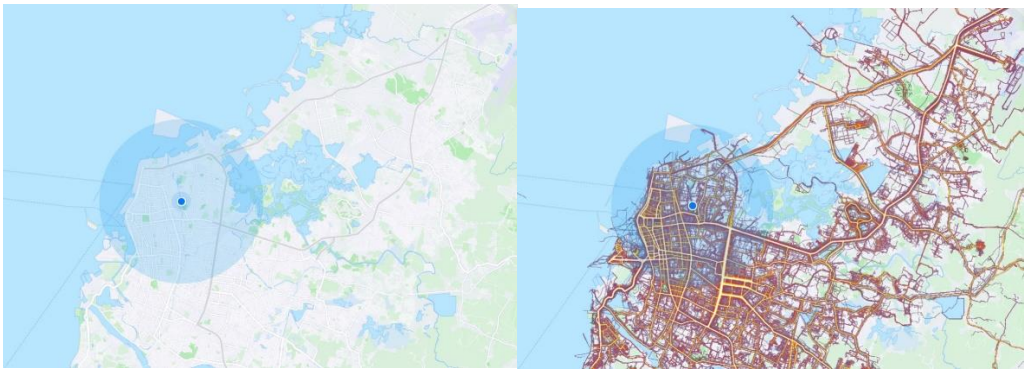

Figure 6. Heatmap comparison on city scale
Source: Author's

It could be seen that almost all street and road in Makassar already passed by cyclist which were recorded on strava heatmap. Arterial road seems to be choice of majority cyclist in Makassar. The author hypothesizes that the condition of the road playing an important role since arterial road in Makassar already have a better surface and more lanes compared to secondary road itself. Moreover, those condition could be a factor that reduce the probability for cyclist to stuck on traffic during rush hour.

D. RESULT

Figure 7. Heatmap on Study Area
Source: Strava

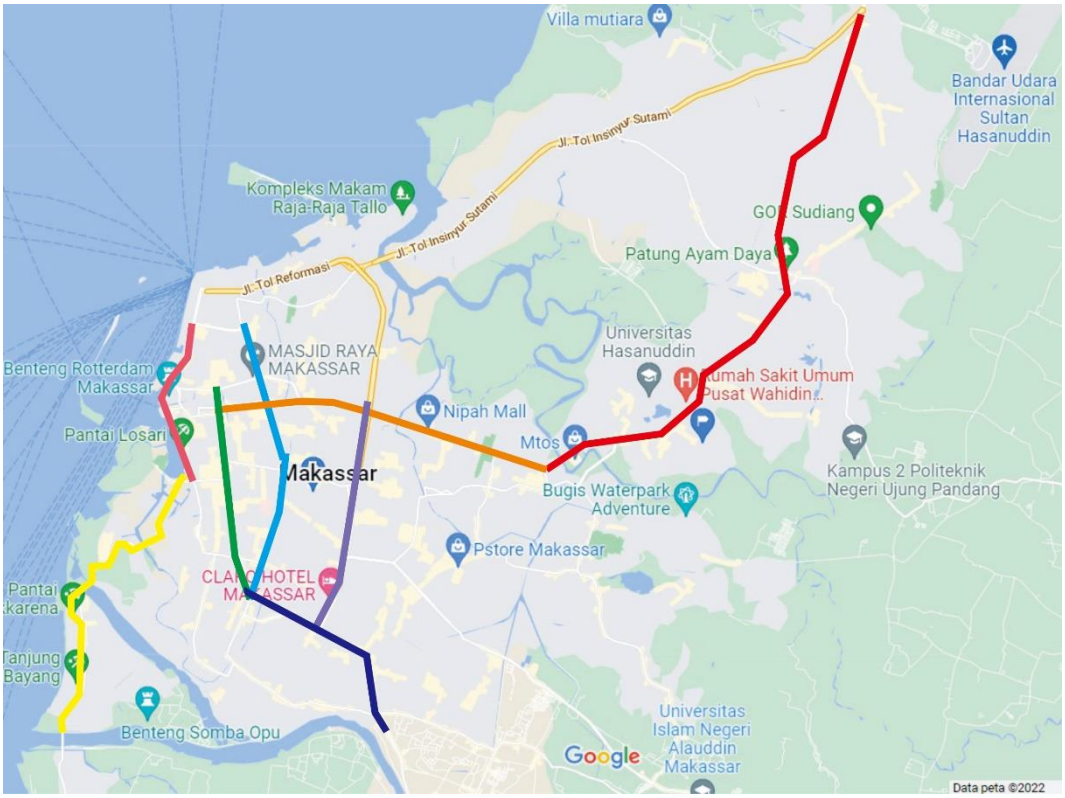

Figure 8. Preferred Arterial Road chosen by Cyclist
Source: Author's

E. CONCLUSIONS

The study reveals that most cyclists in Makassar prefer to choose arterial road rather than secondary road. As shown in figure 7, the brighter mark on the heatmap showing high number of cyclists that passed on those road segments by using those reference, author mapped arterial road specifically and divided it into several segments.

The result is then shown on figure 8 where the arterial road could provided much higher possibility for earlier stage of further cycling path in Makassar. Almost all of Makassar area can accessed by bicycle from the arterial roads. With a good maintenance and developing more streets in good surface conditions and more lanes (separated with motorized vehicle lane) could increase the possibility for cyclist, whether they are new or a regular cyclist to ride their bike to their working place.

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