

UNDERGRADUATE THESIS

**PEDESTRIAN FACILITIES AND ROUTE CHOICE
AROUND MRT JAKARTA SETIABUDI STATION USING
STATED PREFERENCE**



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BACHELOR PROGRAM

(Accredited Based on SK BAN-PT Nomor:11370/SK/BAN-PT/AK-ISK/S/X/2021)

BANDUNG
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PEDESTRIAN FACILITIES AND ROUTE CHOICE AROUND MRT JAKARTA SETIABUDI STATION USING STATED PREFERENCE

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ABSTRAK

Kondisi pejalan kaki di Jalan Jenderal Sudirman penting untuk dilengkapi dengan utilitas yang mendukung pergerakan pejalan kaki yang merupakan para pekerja yang bekerja di gedung-gedung di sekitar stasiun MRT. Untuk menyempurnakan fungsi fasilitas pejalan kaki maka perlu diketahui atribut yang dapat menarik pejalan kaki untuk semakin banyak menggunakannya dan menarik pejalan kaki baru. Hipotesis yang ingin diuji adalah apakah atribut fasilitas pejalan kaki akan menarik pejalan kaki untuk memilih rute pejalan kaki dengan fasilitas tersebut. Studi ini bertujuan untuk mengidentifikasi atribut yang penting yang akan menarik pejalan kaki untuk memilih rute dengan fasilitas yang tersedia. Data dikumpulkan dengan menyebarkan kuesioner berisikan skenario pemilihan rute menggunakan metode *stated preference*. Data dianalisis menggunakan regresi logistik binomial. Analisis menunjukkan bahwa ketersediaan fasilitas tempat makan, toko kopi, dan toko serba ada merupakan atribut yang menarik pejalan kaki untuk memilih rute pejalan kaki yang meningkatkan aktivitas berjalan kaki mereka.

Kata Kunci: Atribut, Pejalan Kaki, Regresi Logistik Binomial, *Route Choice*, *Stated Preference*

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ABSTRACT

It is important for pedestrians on Jalan Jenderal Sudirman to be equipped with utilities that support the movement of pedestrians who are workers working in buildings around the MRT station. To improve the function of pedestrian facilities, it is necessary to know the attributes that can attract pedestrians to use them more and attract new pedestrians. The hypothesis to be tested is whether the attributes of pedestrian facilities will attract pedestrians to choose pedestrian routes with these facilities. This study aims to identify the important attributes that will attract pedestrians to choose routes with available facilities. Data was collected by distributing questionnaires containing route selection scenarios using stated preference methods. Data were analyzed using binomial logistic regression. The analysis shows that the availability of dining facilities, coffee shops and convenience stores are attributes that attract pedestrians to choose pedestrian routes that increase their walking activity.

Keywords: Attributes, Binomial Logistic Regression, Pedestrian, Route Choice, Stated Preference

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The author realizes that this thesis still is a far reach from perfect. However, this study is dedicated for the improvement and progress in transportation facility in Indonesia which the author loves and is passionate about.

The author hopes that with the implementation inspired by this research, could contribute to the progress of public transport development, pedestrian environment, and development in Indonesia. The author welcomes any suggestions for improvement in the future.

Bandung, January 2023



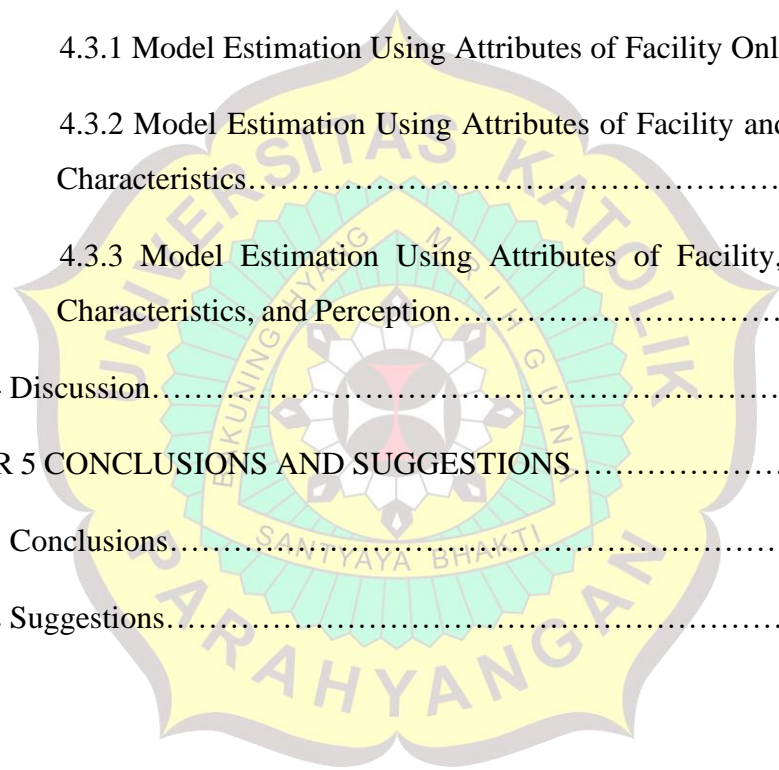
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LIST OF NOTATIONS

β_0 = *constant effect on the model*

β_k = *effect of variable k*

X_k = *variable – k*

k = *k number of variable used*



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CHAPTER 1

INTRODUCTION

1.1. Background

Travel is an important part of an individuals' daily use of time as a consequence of spatially separated activities (Joewono, Rizki, & Belgiawan, 2019). Many of these trips are made by car which has led to a number of problems with, for example, congestion and pollution. In turn, these problems have a negative impact on the environment and on peoples' wellbeing. Which is why, in order to decrease the negative impact of travel it is essential to first understand travel behavior (Frejinger, 2008).

Most people do not realize that walking is the main and basic mode of transportation and travel for almost all humans (Joewono & Setianto, 2016), but the ease of walking must also be supported by supporting infrastructure and can make it easy to walk (walkable). While congestion and pollution may have a negative impact on peoples' wellbeing, communities with good pedestrian facilities will enhance the quality of life (Hewawasam, 2013). The poor quality of these walking attributes and facilities makes Indonesian people prefer to use vehicles when reaching destinations which are only 300 meters away. In fact, half of the urban population prefers to use private vehicles as a daily mode of transportation (Susantono, 2014). Therefore, public transportation must be supported by easy access for users at stops and stations by providing good walking routes.

To provide good walking routes, travel behavior pattern of the people of an urban area can be used in the planning process of urban transportation (Ansusanto, 2011). One way of determining the pattern to furtherly plan urban transportation is by using Route Choice Model. Route choice models can assess travelers' perceptions of various route characteristics such as distance, travel time, cost, number of traffic lights and road types, and relate the results to the individuals' characteristics (e.g. gender, age, income and trip purpose). Route choice models are also a powerful tool for predicting behavior under different scenarios (Frejinger, 2008). A study of Pedestrian route choice and activity scheduling theory and models

conducted by Bovy et al (2004) show a result that Pedestrians' decision towards utility reflects a trade-off between the utility of completing an activity, and the cost of walking towards the activity areas.

Another study conducted comparing environment and route choice based on evidence in New York and Hong Kong conducted by Guo et al. (2013) stated that the pedestrian environment in HK also seems to be more challenging, reflected by the canyon-type streetscape many areas, protruding buildings, little open space, and the prevalence of guardrails or fences on arterials. This environment seems to affect the perception and utilization of the streets resulting in pedestrians preferring less hilly routes with more evenly slopes.

Furthermore, the condition of these research is much different than the condition found in Jalan Jenderal Sudirman. The pedestrian area is far more leveled between each route and located between offices, like for example just around MRT Jakarta Setiabudi Station only. There are many office building such as by Wisma KEIAI, Prince Center Building, Menara Astra, Wisma Nugraha Santana, where office workers spending most of their time in these office building. It is important that these offices have a reachable utility. The limited study of route choice for workers in Jalan Jenderal Sudirman who walk from the station to the office makes it important to conduct a study that discusses this matter.

1.2. Problems Identification

Stated Preference surveys presents the respondent with a series of hypothetical choice situations and obtain the respondents' choice responses. The advantages of using SP data are several, including the ability to obtain a large sample size due to low cost of data collection, the potential to avoid multi-collinearity among attributes, and pre-specification of the choice set (Wirasinghe et al., 2013).

Research conducted on walking access to transit stations by Tilahun et al. (2015) stated analysis of the SP data demonstrated that the decision to walk and connect to the transit system is often influenced by variables that go beyond travel time alone. Pedestrians believe that their primary consideration in choosing a route is minimizing time and distance, yet in reality it is not always the case. The patterns of passengers' flow changes even in the small scale improvement work such as, the

installment of escalators in the stations, the relocation of bus stops at the station and so on based on the research conducted by Hibino et al. (2005).

Furthermore, by identifying attributes that would stimulate pedestrians to select other routes to improve their walking activity, it will be possible to determine whether the utility contained in the hypothesis affects the walking preferences of workers on Jalan Jenderal Sudirman.

1.3. Study Objective

The objectives of this research for Pedestrians are as follows:

1. To identify facility attributes that would stimulate pedestrians to select routes with utility to improve activity while walking.
2. To identify travel characteristic attribute that would stimulate pedestrians to select route with utility to improve their activity while walking.

1.4. Study Limitation

Research is limited by the following:

1. The journey taken is MRT Jakarta Setiabudi Station to office.
2. The data analysed are primary data obtained through surveys by distributing questionnaires to workers in Jalan Jenderal Sudirman which also used secondary data in the form of hypothetical route activity that would stimulate pedestrians to select route with utility (distance, tree shades, rain cover, food stall, coffee shop, and convenience store).
3. The route choice variables refer to the attributes concluded by gathering the attributes used on research by Oppewal & Timmermans (1999). Hodgson et al. (2004). Borgers & Timmermans (2010). Page et al. (2011). Czogalla et al. (2011). Guo & Loo (2013). AL-Erath et al. (2015). Olitsky & Avineri (2017). Liu et al. (2019). Shatu et al. (2019). Saxena et al. (2020). Bellizzi et al. (2021). Zhang et al. (2021).
4. The route choice analysis taken in this study uses a Binomial Logistic Regression Model.

1.5. Study Method

The research activity begins with the making of a background that produces core problem. Regarding the factors that would stimulate pedestrians to select routes with utility to improve their walking activity. From the core of the problem, the research continued with the search for literature on the Route Choice, Stated Preference (SP) experiments, Binominal Logistic Regression Model and the activities that would stimulate pedestrians to choose another route.

The data used in this study are primary data and secondary data. Primary data was obtained by conducting a survey by distributing the case scenario with questionnaires to workers in Jalan Jenderal Sudirman as well as secondary data in the form of hypothetical route activity that would stimulate pedestrians to select the route with utility (distance, tree shades, rain cover, food stall, coffee shop, convenience store). Analysis of walking conditions and further hypothetical data on route activity options will be obtained using data from respondents' answers to questions regarding the activities which most likely stimulate them to select another route with the activity.

The SP survey conducted in this research is designed to obtain information on pedestrian route preferences, using a series of hypothetical route choice questions. The overall survey included six different attributes (distance, tree shades, rain cover, food stall, coffee shop, convenience store) which were concluded by gathering the attributes used on research by Oppewal & Timmermans (1999). Hodgson et al. (2004). Borgers & Timmermans (2010). Page et al. (2011). Czogalla et al. (2011). Guo & Loo (2013). AL-Erath et al. (2015). Olitsky & Avineri (2017). Liu et al. (2019). Shatu et al. (2019). Saxena et al. (2020). Bellizzi et al. (2021). Zhang et al. (2021).

The facility attributes used un this study is distance, tree shades, rain cover, food stall, coffee shop, and convenience store with adjustment to Jalan Jenderal Sudirman. The route distance scenarios within each instrument were generated by varying the comprehensiveness of the facilities in each case scenario. The collected data is then analyzed using Binomial Logistic Regression Model to analyze the importance of each attribute. After the analysis is done, the conclusions and

suggestions are drawn up. The research procedure is presented in the form of a flow chart as shown in Figure 1.1

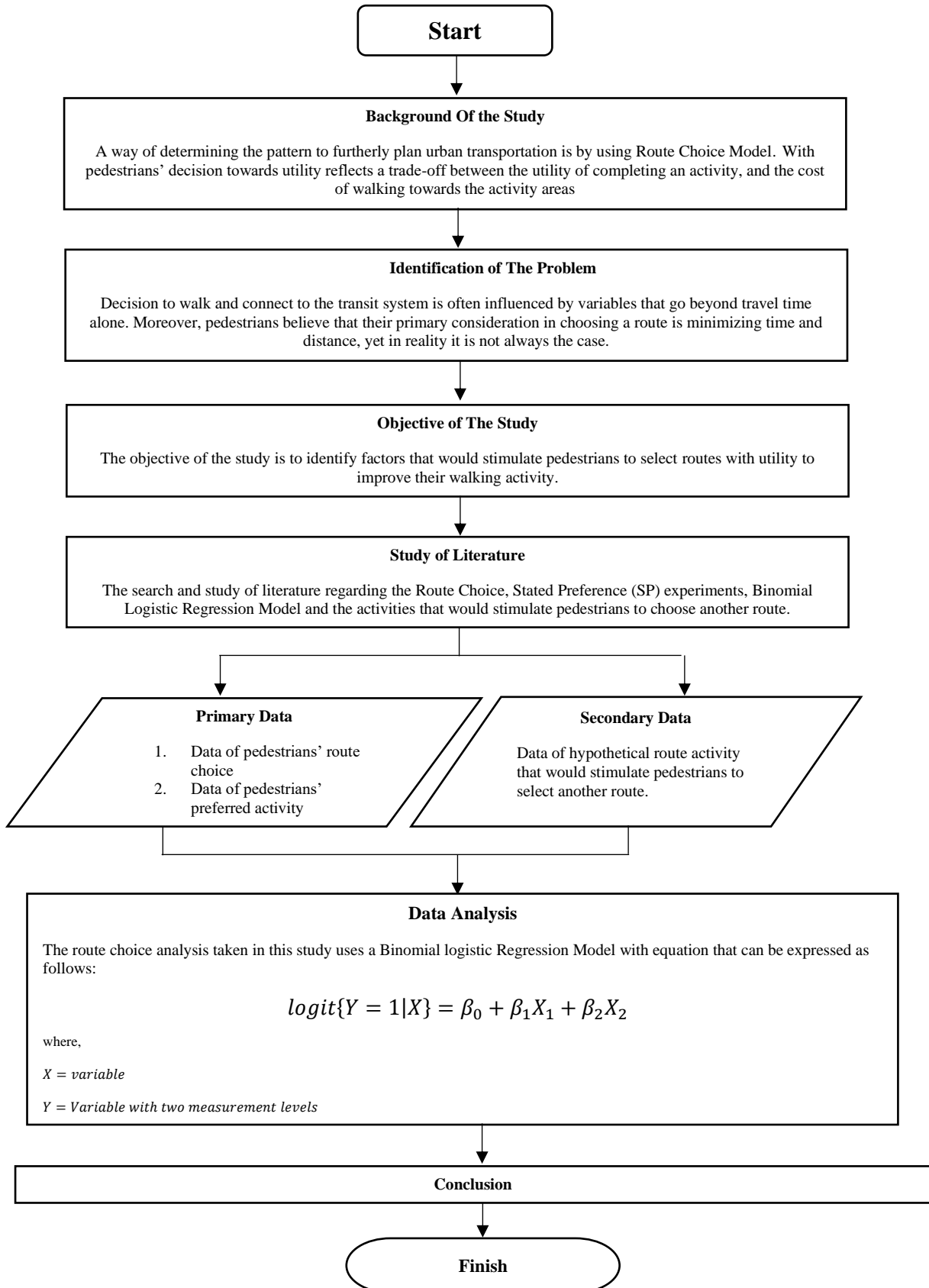


Figure 1.1 Flowchart of Study Method