

Phenomena of Transportation to Work Mode Choice, Due to The Increase of Oil Prices in Indonesia: A Case Light Rail Transit Depot Project Office-Jakarta

¹Andreas Novi Kurniawan, ²Andri Irfan Rifai, ³Muhammad Rizal S.

¹Faculty of Engineering, Universitas Mercu Buana, Indonesia

²Faculty of Civil Engineering & Planning, Universitas Internasional Batam, Indonesia

³Directorate General of Highway, Ministry of Public Works & Housing, Indonesia

E-correspondence: andreasnovi811@gmail.com

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Abstract

Fluctuations in world oil prices and subsidy reduction programs have increased the price of fuel oil in Indonesia. Such conditions affect the decision on transportation mode choice for everyone, and company employees are no exception. This paper aims to analyze the phenomenon of changes in transportation choices due to fuel increases. The method used is a questionnaire distributed to 100 respondents at the Jabodebek Light Rail Transit (LRT) Depo Project office. Data processing is done by using radar chart analysis with Microsoft Excel tools. The results of this study showed ten variables that had different levels of influence. There are three primary parameters: travel time, punctuality, and travel distance for men; travel distance, number of trips, and travel companions for women. So, the travel time parameter has the most significant influence on transportation mode choices for men, and the travel distance parameter has the most significant influence on transportation mode choices for women.

Keywords: Increase fuel price, Transportation mode choice, Employees

1. Introduction

Humans use transportation to move places or goods from their origin to their destination and vice versa. The transportation system is the foundation of any country's industrial and socio-economic development and is dependent primarily on fossil fuels (Khan & Rahman, 2021). The demand for energy to supply transportation around the world is enormous, with approximately 11 billion liters per day coming from gasoline, diesel, heavy fuel oil, and jet fuel (Kalghatgi, Levinsky, & Colket, 2018). Due to the increasing number of human populations, the need for transportation and fuel oil will increase. Currently, fuel oil is still the most used fuel for various forms of transportation.

In Indonesia, private vehicles such as motorbikes and cars are in great demand by the public because they are more efficient and comfortable. The increasing use of private vehicles has resulted in an increasing amount of fuel oil consumption every year in Indonesia. Indonesian people's lack of interest in public transportation is one factor that influences this. There is a reason why people have low interest in public transportation, namely because public transportation facilities and infrastructure are considered less comfortable and less efficient in terms of time. The characteristics of public transportation needs are determined by internal factors such as ease of reach, reliability, regularity, punctuality, travel time, cost, and information systems (Jahidin, Daulay, & Saladin, 2020). As a result, time is spent unproductively on the road, leading to higher operational costs, road maintenance costs, and driver and passenger fatigue (Farda & Lubis, 2018).

Urban transport is the center of urban mobility in the developed world, and even in other developing countries, the role of urban transport must be considered (Prayudyanto, 2021). Jakarta, a metropolitan city,

is where the economic and government centers are. Jakarta has various transportation choices, such as online transport, LRT, Mass Rapid Transit (MRT), and Bus Rapid Transit (BRT). However, even though there are many public transportation choices, more Jakarta residents prefer private vehicles. This causes traffic jams on the roads in Jakarta.

The price of fuel oil in Indonesia has increased, even though the price of world crude oil has decreased. As a result, pros and cons began to appear in the government's decision to increase the price of fuel oil. Despite the pros and cons of rising fuel oil prices, we also have to be aware of the use of fuel oil, which is depleting the supply of petroleum in the world (Silbaqolbina & Najicha, 2022). Many people objected to this decision, but some think it is fair to compare the price of fuel oil in Indonesia with another country. As a result of this price increase, it can trigger people's desire to use public transportation.

That way, the increase in fuel oil prices in Indonesia significantly impacts all sectors and people in Indonesia. Especially in Jakarta, where there are so many office areas, all employees need transportation to take them to the office. With the rise in fuel prices, some employees will likely shift from using private vehicles to taking public transportation. However, some still use private vehicles for several reasons that make them more comfortable using them. As a result, this paper aims to analyze or learn about the transportation mode choice of Jabodebek LRT Depot Project Office employees due to the increase in fuel oil prices. As a result, this paper aims to analyze or learn about the transportation mode choice of Jabodebek LRT Depot Project Office employees because of the increase in fuel oil prices. As a result, this paper aims to analyze or learn about the transportation mode choice of Jabodebek LRT Depot Project Office employees due to the increase in fuel oil prices.

2. Literature Review

2.1 Public Transport

To support the economy of an area, public transportation is something that cannot be taken for granted. Even public transportation can be one of the drivers of a region's economic activity. Public transport also plays a role in the development of an area. A good public transportation system will create a good urban planning system and vice versa. Public transportation must be developed sustainably. Sustainability is a key policy driver for cities, and public transport is said to be a more sustainable mode of travel than others (Currie & De Gruyter, 2018).

Public transport remains a challenge in urban areas due to the increasing and varied demand for trips by users (Prathyusha, Singh, & Shivananda, 2021). The trip demand will certainly increase for Jakarta and several other cities where public transportation is better. This is because taking public transportation is considered less tiring, more comfortable, and easier than taking a private vehicle, which causes traffic jams. If stuck in a traffic jam while using a private vehicle, it will be very tiring for the driver. That reason is often given by people who use public transportation.

In a big city like Jakarta, public transportation is in great demand by its citizens. This is because the facilities offered are practically comfortable. In terms of the system, it is pretty good, so people are clear when they want to move from their place of origin to their destination. Understanding citizens and public transport is a key factor in increasing mobility in a city (Massobrio & Nesmachnow, 2020). If the understanding between citizens and public transportation is good, it will increase mobility in the city.

2.2 Oil Increase and Tariff Determination

Pros and cons appear when the government increases the price of fuel oil. This increase is unavoidable due to the increase in world crude oil and the threat of recession in each country. The increase and volatility of world crude oil prices since 2000 have raised concerns over their impact on the rate of inflation (Widarjono, 2019). Fuel oil can be said to be the most vital factor in every aspect of life. If the price of fuel oil increases, the price of essential commodities and public transportation will also automatically increase. Many people have objected to this. Their spending in one day may increase as the price of various essential commodities rises. Remarkably, the world has recently experienced the COVID-19 disaster, which has rendered the world's economies, including Indonesia's, unstable.

In the world of transportation, the increase in fuel oil prices is something that is very feared because it results in losses from various aspects. One of them is that it can increase the operating price of public transport, which can result in decreased passenger interest in it. However, if the fuel oil price is not increased, the government will continue the subsidies consumers feel are not on target (Rakhmanto, 2022).

To set the tariff, the owner of public transport must think hard. They must think in terms of profits as entrepreneurs and in terms of passengers. If they increase the prices without taking passengers into account, then passengers might leave public transportation. Regulated prices will reduce the consumer price index (CPI) and make the government adjust the inflation rate (Harun, Mat, Fadzim, Khan, & Noor, 2018).

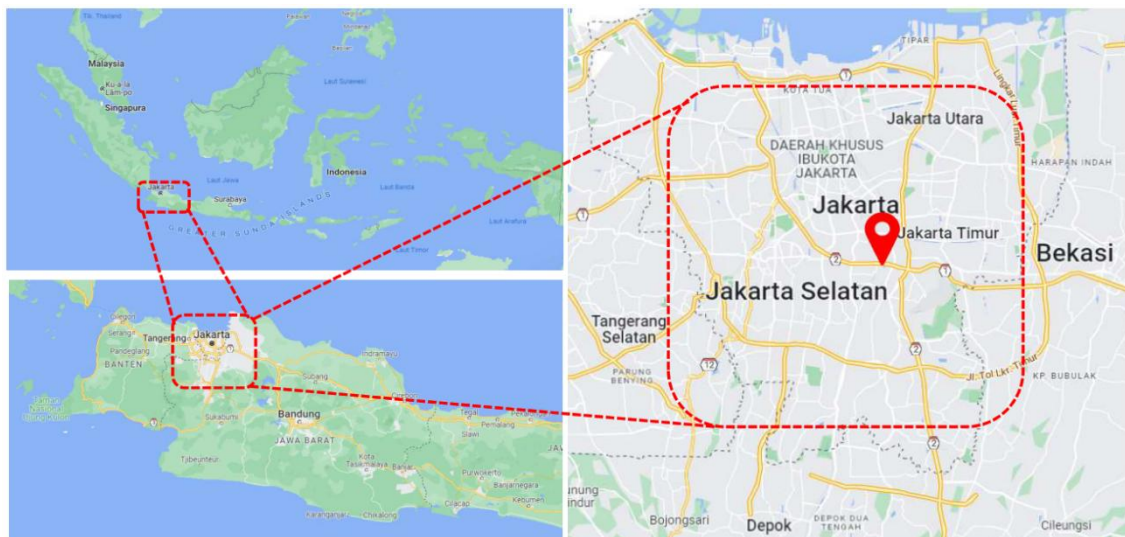
2.3 Transportation mode Choice

Choosing a mode of transportation is relatively easy because it only consists of public and private vehicles. What makes it difficult are the parameters that influence someone's choice of mode of transportation. Every human being has specific considerations or reasons when choosing a mode of transportation. The most essential thing about choosing a mode of transportation is the ease with which it can be reached. We can say that humans will choose the easiest option.

Transportation planning, decision-making, and travel route recommendations depend on accurate modes of transportation prediction models (Sun & Wandelt, 2021). People have the habit of taking various modes of public transportation to reach their destination to achieve a specific life goal (Yang, Zhang, & Guo, 2021). Individual characteristics relate to all factors that are related to transportation, for example, people's behavior, ability to use modes of transport, and ownership or availability of transportation modes (Ton, Duives, Cats, Hoogendoorn-Lanser, & Hoogendoorn, 2019). In urban areas such as Jakarta and other major cities, there are numerous modes of transportation available, including cars, motorcycles, BRT, local transport, trains, and online transportation.

3. Methodology

The research was conducted in October 2022, with the study location at the Jabodebek LRT Depo Project Office, to be precise, in the MTH 27 Office Suites building, East Jakarta. This research was



attended by 100 respondents who were employees of the Jabodebek LRT Depo Project office.

Figure 1. Research Location

The process of systematic scientific research must begin with the identification of the right problem (Rifai, Hadiwardoyo, Correia, & Pereira, 2016). Therefore, in-depth observations need to be made from this study (Dermawan, Rifai, Ramadhan, & Isradi, 2021). In the basic theory of transportation system planning,

it was mentioned that the quality and quantity of service are essential parts of the development of public transport (Rifai, 2021). Respondents are influenced by several factors in determining their choice of transportation mode. These factors are the respondent's characteristics and travel characteristics. Respondent's characteristics include gender, age, educational background, monthly income, and vehicle ownership (Chen & Li, 2017). See table 1 for parameters based on travel characteristics.

Table 1. Parameters of travel characteristics

Parameter	Source					
	(Liu, Bansal, Daziano, & Samaranyake, 2019)	(Anderson, Nielsen, & Prato, 2017)	(Li, Wang, Wu, Chen, & Zhou, 2021)	(Guo, Wang, Peeta, & Anastasopoulos, 2018)	(Tsami & Nathanail, 2017)	(Böcker, Van Amen, & Helbich, 2017)
Waiting Time	✓	✓	-	-	-	-
Travel Time	✓	✓	-	✓	-	-
Access Time	✓	✓	-	✓	✓	-
Travel Cost	-	-	✓	-	-	-
Travel Distance	-	-	✓	-	-	✓
Number of trips made	-	-	-	✓	✓	✓
Travel Mode Choice	-	-	-	✓	✓	✓
Punctuality	-	-	✓	-	✓	-
Congestion	-	-	-	-	✓	-
Travel Companion	-	-	-	-	-	✓

In this analysis, the method used in data collection is by distributing questionnaires to respondents. When giving an assessment, respondents are given a rating range from 1 to 10, with 1 being the remarkably unaffected parameter and 10 being the very affected parameter.



Figure 2. Rating Range

Data is one of the main strengths of research and scientific modeling (Rifai, Hadiwardoyo, Correia, Pereira, & Cortez, 2015). After the required data is collected, data processing is carried out. After processing the data, the results are presented in a radar chart. With the radar chart, it will be seen which parameter has the most significant impact on the employee's choice of transportation mode at the Jabodebek LRT Depot Project Office due to the increase in fuel oil price.

4. Result and Analysis

Questionnaires are distributed digitally to respondents who worked as employees at the Jabodebek LRT Depot project. From the distributed questionnaires, one hundred and two respondents returned the response, but only one hundred respondents' answers have been processed. The questionnaire results are

processed and divided into two parts: the first is the respondent's characteristics, and the second is travel characteristics that affected the respondent's choice of transportation mode due to increased fuel oil prices.

4.1 Respondent's Characteristics

Each respondent must have different characteristics, including habits, when determining the transportation mode. Certainly, respondents have their reasons for choosing their transportation choices. Therefore, this difference will affect the respondents' choice of transportation mode. The results of the questionnaire can be seen in table 2. As for gender, out of 100 respondents, 73% are men, and 27% are women. Next, most respondents are aged 20–35 years, with a percentage of 56% of all respondents. The majority of employees at the LRT Depo project office, 60%, have a bachelor's degree. She has the highest percentage of income at 39% and earns Rp 2,000,000, - ~ Rp 5,000,000, - per month. Finally, all respondents own private vehicles, with 56% owning motorcycles and 46% owning cars.

Table 2. Respondent Characteristics

Variable	Category	Frequency	Relative Frequency
Gender	Male	73	73 %
	Female	27	27 %
Age	Under 20	5	5 %
	20 ~ 35	56	56 %
	35 ~ 50	28	28 %
	Over 50	11	11 %
Education background	High School	19	19 %
	Bachelor's degree (S1)	60	60 %
	Master's Degree (S2)	21	21 %
Income/month	< Rp 2.000.000, -	8	8 %
	Rp 2.000.000, - ~ Rp 5.000.000, -	39	39 %
	Rp 5.000.000, - ~ Rp 7.000.000, -	25	25 %
	> Rp 7.000.000, -	28	28 %
Vehicle ownership	Motorcycle	56	56 %
	Car	44	44 %

4.2 Travel Characteristics

Every choice of transportation mode is not only affected by the characteristics of each person. However, it is also affected by other factors that come from outside. These external factors are called travel characteristics. Travel characteristics consist of 10 parameters, including waiting time, access time, travel cost, travel distance, number of trips, transportation mode choice, punctuality, congestion, and travel companions. The results of the respondents' choice of transportation mode, which is affected by travel characteristics, are divided into men and women. The result can be seen in figure 3.

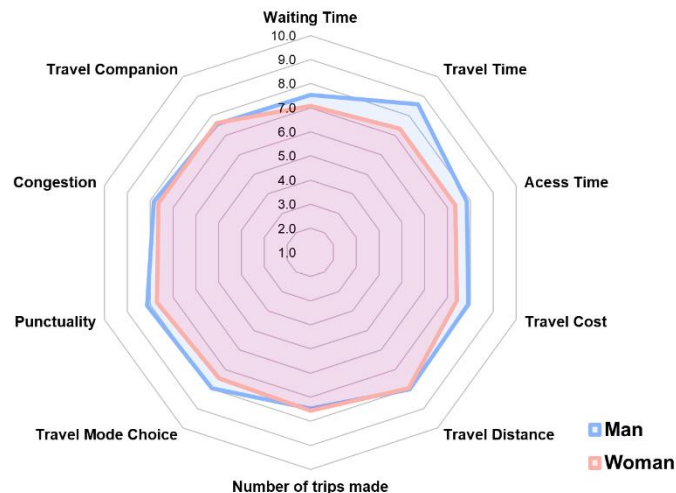


Figure 3. Radar Chart

From figure 3, the first thing that becomes a parameter is the waiting time. Waiting is an activity that, according to respondents, is undesirable but needs to be involved in getting the service provided. From 1 to 10, the average male gives a rating of 7,5, and the average female gives a rating of 7,1. So the waiting time affects the transportation mode choice due to the increase in fuel prices. This condition is in line with a lot of research that has been carried out, one of which states that waiting time greatly affects the comfort of respondents in general, especially those who use public transportation (Shelat, Cats, & Van Lint, 2021).

The second is travel time, defined as how long it takes a person to move from the place of origin to the destination. Travel time can be measured mainly in two ways: directly and indirectly (Chepuri, Wagh, Arkatkar, & Joshi, 2018). In this phenomenon, the time it takes respondents to get to the office is highlighted. From the data shown in Figure 3, travel time is the most affected parameter for men with a value of 8,6; for women, it is 7,3 out of 10.

The third parameter is access time. Access time is the respondent's time to reach the selected mode of transportation. Access time is considered to play a role in the choice of transportation mode (Guo, Wang, Peeta, & Anastasopoulos, 2018). This parameter usually has more influence on public transportation users. It is because if they want to use public transportation, they need to try, such as walking first, which will increase the respondent's travel time. From Figure 3, the access time is 7.8 for men and 7.3 for women. This makes the access time affected by the respondent's choice of transportation mode.

The next parameter is travel costs. Travel cost is one of the respondents' considerations in determining their mode of transportation mining their mode of transportation. When fuel prices increase, people tend to switch from private vehicles to public transport (Cats, Susilo, & Reimal, 2017). Figure 3 shows that travel cost is a very influential parameter in determining the transportation mode, with a value of 7,9 for men and 7,4 for women. It appears that travel costs more for men than for women. Overall, it is said that travel costs are affected by the choice of transportation mode.

The distance traveled by each respondent certainly differed depending on the place of origin. In general, as travel distance increases, so does the likelihood that people will choose private vehicles (Ding, Wang, Liu, Zhang, & Yang, 2017). It makes the travel distance a parameter for respondents in determining the mode of transportation they choose to go to the office. This parameter is the most affected parameter for women, with an average value of 8.0 out of 10. Meanwhile, for men, this parameter is included in the three most affected parameters, with an average of 8.0 out of 10. The following parameter is the number of trips. Millennials have, on average, more trips than older people (Harb, Xiao, Circella, Mokhtarian, & Walker, 2018). The increase in fuel prices will certainly affect the number of trips, with an average value of 7,5 for men and 7,6 for women. The data indicates that this parameter affects the choice of transportation mode.

The seventh factor is the mode of transportation selected. Different modes of transportation are available due to differences in origin, distance to destination, traffic conditions, and travel costs (Zhou, Yu, Yuan, Wang, & Wu, 2020). Respondents can use various types of transportation to get to the LRT Depo project office. The transportation modes that can be used are private vehicles, BRT, local transport, and online transportation, and you can also use bicycles. From figure 3, the average value is 8.0 for men and 7.4 for women. Transportation mode choice is one of the three most important parameters for men. Overall, transportation mode selection is said to influence transportation mode selection.

Each respondent certainly wants punctuality when going to some destination. One of the most common problems with public transportation is punctuality (Grechi & Maggi, 2018). If the respondent receives punctual, he or she will feel more at ease. So, therefore punctuality is chosen to be one of the parameters that affect the choice of transportation mode. The data obtained is 8 for men and 7 for women. Punctuality affects both men and women equally. Congestion is something that cannot be avoided in Jakarta. As a result, congestion creates inconvenience for road users (Haywood, Koning, & Monchambert, 2017). Therefore, congestion is one of the important parameters in this paper. Figure 3 shows that the average value for men is 7,8 and for women is 7,6. The data indicates that this parameter affects the choice of transportation mode. The last parameter is the travel companion. When traveling, people rarely make their own decisions (Hamilton, Ferraro, Haws, & Mukhopadhyay, 2021). For some respondents, it is said that travel companions determine the transportation mode choice. For men and women, they give an average value of 7.6. According to the findings, the mode of transportation influences the choice of a travel companion.

5. Conclusion

From this paper, it can be concluded that each parameter affected the transportation mode choice due to the increase in fuel prices. Three main parameters are travel time, punctuality, travel distance for men and travel distance, number of trips, and travel companions for women. Due to the increase in fuel prices, one of these three parameters has the most influence on the choice of transportation mode for men, with an average value of 8.6. At the same time, the travel distance is the most affected parameter for female respondents, with an average value of 8.0.

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