Designing Sustainable Transportation Strategy in Covid-19: Jabodetabek Commuter Community Movement in Indonesia

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Abstract
Sustainable transportation systems, especially environmentally friendly transportation systems, play an important role in improving quality of life in urban areas. Urban communities in many developing countries experienced air pollution that has exceeded the national ambient air quality standard threshold. This is due to the increase of motorized vehicles. In Indonesia, the high movement of the Jabodetabek urban community poses a high risk to the increased air pollution in urban areas. This research aims to analyse and respond to the phenomenon of climate change in the transport sector, in particular by developing strategies for sustainable urban transportation systems. Using qualitative research, data is collected from in-depth interviews with transport experts and practitioners and NGOs activities in the transport sector. The findings of this research highlight the key elements for developing an environmentally friendly transportation system and its strategies in the Jabodetabek urban area that is appropriate and following the needs of the regional commuting community. Urban Jabodetabek. By using the CA analysis method and SWOT analysis, the development of an environmentally friendly transportation system for the Jabodetabek urban area is the current urgency at least for all stakeholders and all elements of society to build commitment, and a common vision and mission in building a fully integrated and perfect national transportation system, and monitoring and evaluating the order of the transportation system and public services to date.

Keywords: environmentally friendly transportation, sustainable transportation, transportation systems.
1. Introduction

The commuter movement of the people of the capital city has moved people occurring in the city of Jakarta increasingly complex. This also applies to movements between regions and international movements that occur within them. Commuter movement occurs as a result of the daily activity of the capital city and its surrounding communities on land use that occurs in the Jabodetabek urban area, and this became one of the faces of the city of Jakarta. In Tamin 2008 this is illustrated in the four-step model of transportation planning, which states that “a system is a set of objects that are related to one another. The land use and transportation system has three main components, namely: land use; transportation infrastructure system; and traffic” (Tamin, 2008). According to Khisty and Lall in their book entitled Basics of Transportation Engineering, it is stated that "The location where activities are carried out will affect humans, and human activities will affect the location where activities take place" (Khisty & Lall, 2003). The movement carried out by the Jakarta commuter community shows the need for the demand for transportation facilities to meet the needs of the movement.

The high rate of ownership and use of motorized vehicles in the Jabodetabek urban area has made urban problems increasingly complex. Problems of congestion, quality of health and the environment, and the resulting psychological impact have become negative externalities that must be borne by the people of the Capital City who live in it. This is a picture that has become a specific type of behavior in the capital city, this behavior is present in the form of growth, change or decline which will be influenced by several mechanisms that underlie its shape and determine the pattern of changes that will occur (Khisty & Lall, 2003). Based on research conducted by Sitanggang, Rohana and Saribanon, Euis (2018), it is known that the factors that most influence congestion that occurs in DKI Jakarta are the high use of private vehicles; high use of two-wheeled motorized vehicles; and vehicle volume that is not directly proportional to road capacity (Sitanggang & Saribanon, 2018).

It is known that the number of movements of people in the Jabodetabek area in 2018 reached 49.5 million person-trips per day, and this figure continues to grow from year to year (Jabodetabek Transportation Management Agency, 2018). From the number of movements of people, it is known that 23.4 million of them are moving within the city of Jakarta, while 20.02 million other movements of people are movements of the Bodetabek commuter community who travel across Bodetabek and Jakarta cities. The number of movements that occur in the Jakarta City area is the reason for the need for transportation facilities for the needs of the movement of the people who live in it, especially sustainable transportation facilities, a need that should be considered in meeting the needs of transportation facilities in the future. Based on the data selected by the Central Bureau of Statistics of DKI Jakarta Province 2018, it is known that the average growth of motorized vehicles reached 5.35% per year from 2012 to 2016. From the average growth rate of motorized vehicles, 5.3% is the average growth rate for motorbikes; 6.48% growth rate of passenger cars; 5.25% average growth of load cars; -1.44% average growth of buses; and 2.32% growth rate of special vehicles. The growth of motorized vehicles that
occurs in the city of Jakarta is dominated by vehicles with motorbikes and passenger cars, this is strong information following the research mentioned in Sitanggang & Saribanon 2018 where the use of private vehicles and two-wheeled motorized vehicles is a factor that causes congestion in the city of Jakarta happened.

Look at Fig. 1, the current condition of air pollution in Jakarta has exceeded the National Ambient Air Quality Standard. This condition can harm the environment and ecosystem which in turn will affect the welfare of the people who live in it. The concentration of particulate matter (PM2.5) during the last 8 months has been fluctuating and is above the national ambient air quality standard threshold set in Permen LH number 12 of 2010. Sources of air pollution can come from natural activities and/or anthropogenic activities. Anthropogenic activities (human activities) produce air pollution that is greater than natural activities, air pollution that comes from anthropogenic activities, for example, emissions from mobile sources, namely transportation, and emissions from immovable sources, namely industrial activities; burning garbage; household activities; and so forth. Anthropogenic activities that cause emissions from mobile sources need special attention to reduce the number of airborne particulate concentrations in the City of Jakarta, this is done to reduce the negative impact on the environment and other ecosystems that can have an impact on the welfare of the people who live in it.

Responding to this that happened in the urban area of Jabodetabek, there is a research result from the Department of economic and social affairs, United Nations entitled Developing Practical Tools for Evaluation in the Context of the CSD (UN Commission for Sustainable Development) Process which states "that it has proven The past 20 years have shown that the phenomenon of climate change can be associated with addressing adverse health impacts on the world community, and health professionals have an important role to play in understanding and communicating the dire potential health losses caused by climate change, and managing the co-benefits of reduction in consumption of fossil fuel combustion "(Bongardt, Schmid, & et al., 2011). So that with the problems that occur in the Jabodetabek urban area, special and long-term handling is needed to be able to overcome the high travel rates of the capital, the growth of motorized vehicles, congestion, and the air quality of the city of Jakarta, thus it is hoped that the creation of an Environmentally Friendly and Sustainable Transportation System.

In this study, the authors will answer the problem of commuter movement that occurs in the capital, by using qualitative analysis techniques to obtain the development of an environmentally friendly transportation system strategy that suits the transportation needs of the Jabodetabek urban community. Based on the formulation of the problems previously described, this research aims to find out "The strategy for developing an environmentally friendly transportation system for the commuting community in the Jabodetabek urban area". The objectives that will be carried out in answering the objectives of this study are to: identify the variables that are of urgency in the development of an environmentally friendly transportation system in the Jabodetabek urban area; and identify an
appropriate environmentally friendly transportation system strategy that suits the needs of the commuting community in the Jabodetabek urban area.

1.2. Literature Review

Khisty & Lall said the land use and transportation cycle is a cycle of supply and demand for land to travel demand, this defines that “a plot of land with a certain type of land use produces a certain number of trips, then this trip shows the need for transportation facilities to meet travel demand. In the cycle, new or more advanced transportation facilities will provide better accessibility, this in itself will make the demand to develop land increase and cause land value to increase, so that the cycle repeats itself and reflects the land use and transportation cycle” (Khisty & Lall, 2003).

The need for a sustainable transportation system should have become a special concern in the implementation of the paradigm of sustainable development of big cities in Indonesia, by taking into account three areas of sustainable development including: social, environmental, and economic. These three fields must pay attention not only to the present, but also to pay attention to the future / future, in other words that development must be sustainable (Risdiyanto, 2014). According to Cheba and Saniuk (2016) the transportation system is an organized system of interrelated transportation infrastructure components, a system that is structured in a functional, spatial, and technical-technological system which consists of the following elements: trains; Highway; air; inland and sea waterways with their port subsystem (Cheba & Saniuk, 2016). Sustainable transportation system according to Ogryzek et al. focusing on planning, politics, and the use of technology, the main objective of a sustainable transportation system is to ensure efficient freight transport and high quality transportation services.

Also, the development of a sustainable transportation system is based on urban planning that will create urban areas that are free of cars and friendly for pedestrians and cyclists (Ogryzek, Adamska-Kmieć, & Klimach, 2020). To achieve a sustainable transportation system, individual modal choice decision making plays a key role. Mode choice decisions made by travelers are based on economic criteria; travel time; convenience; convenience; and security, of all the factors that influence this decision-making, the safety factor is the most difficult factor for travelers (Mohan & Tiwari, 2000).

According to The Center for Sustainable Transportation in Risdiyanto 2014, what is meant by a sustainable transportation system is a transportation system that has at least three criteria, namely a transportation system that:

a. enabling the very basic access needs of individuals and communities to be met safely and in a manner consistent with human and ecosystem health, and with equality within and between generations;

b. affordable, operates efficiently, provides a choice of modes of transportation and supports economic development;
c. limit emissions and waste that are within the earth's ability to absorb them, minimize consumption of non-renewable sources, use and recycle their components, and minimize land use and noise production.

Another indicator of a sustainable transportation system according to the World Bank in Ridiyanto 2014 is a transportation system that focuses on:

a. reduction in private car use per capita;

b. increased public transport, walking, cycling and carpooling;

c. reduction in average commuting to and from work;

d. increase in speed of public transport relative to private cars;

e. increase in km of public transport services relative to provision

f. Street;

g. increase in the rate of return of public transport costs from the tariff;

h. reduction in parking space per 1,000 workers at central business locations;

i. increase in km of separate bicycle lanes.

Indicators of a sustainable transportation system according to the Ministry of Transportation (2008) are directed at meeting economic targets, social targets, and ecological targets including:

a. Economic targets

1. Employment development;
2. Providing large capacity, fast, and inexpensive transportation;
3. Provide transportation options;
4. Strengthening rural and urban relations;
5. Provision of funds for the construction, operation, and maintenance of transportation infrastructure and facilities.

b. Ecological targets

1. Improve transportation health and safety;
2. Reducing pollution;
3. Reducing land use;
4. Develop an environmentally sensitive strategic framework.

c. Social targets

1. Guarantee of transportation services and accessibility for all levels of society;
2. Focus on transport for the urban poor;
3. Improve methods of handling transportation problems for the poor;
4. Ensure democratic participation in transportation policy decision making
1.3. Study Scope Review

The problem of climate change that occurs in the world and especially in Indonesia has become a serious common problem that needs attention. According to a study of low-carbon urban mobility, systems states that cities currently consume more than 80% of the world's energy and are responsible for 75% of total greenhouse gas emissions, the mobility system that is at the heart of urban activities is responsible for the movement of people; goods; and services and has an important role in attracting investment to the city (Venkat, 2016).

According to Riedy in his journal entitled Climate Change, it is stated that “Climate is the average weather conditions at a certain point on earth, expressed in expected temperature, rainfall and wind conditions based on historical observations. Climate change is a change in the average climate or climate variability that lasts for a long time” (Riedy, 2016). Meanwhile, Climate, according to the Ministry of Environment and Forestry of the Republic of Indonesia that "Climate is a unit of average measure and the relevant quantity variability of certain variables (such as temperature, rainfall or wind), in a specific time period unit which is a time series in monthly to years and/or millions of years. Climate changes continuously due to the interaction between its components and external factors such as volcanic eruptions, variations in sunlight, and factors caused by human activities such as changes in land use and use of fossil fuels” (Ministry of Environment and Forestry of the Republic of Indonesia, nd). At the United Nations Framework Convention on Climate Change (UNFCCC) in the Ministry of Environment, the Republic of Indonesia defines “Climate change is climate change that is caused either directly or indirectly by human activities. changing the composition of the global atmosphere and natural climate variability over comparable time periods” (Ministry of Environment and Forestry, Republic of Indonesia, n.d.).

As previously mentioned, the land use and transportation cycle is a cycle of supply and demand for land to travel demand. This explains the location where activities are carried out that will affect humans, and human activities will affect the location where the activity takes place. Likewise, what is stated in the Ministry of Environment and Forestry of the Republic of Indonesia, where one of the two factors that cause climate change occurs an interaction between its components and external factors from land-use change and the use of motorized fossil fuel for travel/movement. The use of fossil fuels can cause air pollution in space so that the resulting air pollution can result in a decrease in the quality of the environment and become a problem of climate change. Look at Fig. 1 regarding the information on PM2.5 concentration and CO concentration in Jakarta City.
Based on Fig. 1, it is known that the PM2.5 concentration rate that occurred in Jakarta during the last 8 months was fluctuating and was above the national ambient air quality standard threshold. Particulates (PM2.5) are airborne particles smaller than 2.5 microns (micrometers) (BMKG, 2020). Based on the Regulation of the State Minister for the Environment Number 12 of 2010 concerning the Implementation of Air Pollution Control in the Regions, it is stated that the National Ambient Air Quality Standard (BMUA) for Particulates is below 2.5 μm with a 24-hour measurement time of 66 μg / Nm3. By paying attention to Figure 1, it is known that the concentration of PM2.5 particulates in the City of Jakarta from March to October 6 2020 air quality exceeds or exceeds the national BMUA threshold. According to the Ministry of Health of the Republic of Indonesia in Aulia, Z and Azizah, R (2015), the impact of particulate matter on health, both solid and liquid, depends on its size, the size of the particulates that are harmful to health generally ranges from 0.1 microns to 10 microns. Particulates smaller than 5 microns can enter the lungs and settle into the alveoli, while particulates larger than 5 microns can irritate the upper respiratory tract and cause irritation, and the irritation often attacks the eyes and this can block penetration. eye view (Aulia & Azizah, 2015).

Particulate matter with a size of fewer than 2.5 microns (PM2.5) that occurs in the city of Jakarta shows unsanitary conditions for people who live and have activities in the city of Jakarta. Although in Figure 1 the concentration of Carbon Monoxide (CO) for the last 8 months did not exceed the national BMUA, the PM2.5 concentration which takes into account other air pollution parameters such as sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, hydrocarbons, chlorine, lead, and the dust particles have surpassed the national BMUA and are not good for the health of the people who live in them.

2. Method

In this study, to be able to answer the research objectives and objectives, two methods of analysis were used, to be able to answer the first objective in this study, a content analysis (CA) technique was used using data from interviews with the in-depth interview method and conducting a
transcript of the results of the ITDP Indonesia webinar discussion with the title of the activity. "Fiscal Policy for Air Pollution in Cities" on Monday, December 7th, 2020. Meanwhile, to be able to answer the second goal, a SWOT analysis is used, to obtain an environmentally friendly transportation system strategy that is appropriate and following the needs of the commuter community in the Jabodetabek urban area.

Content analysis is a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use (Krippendorff, 2004, p. 18) in (White & Marsh, 2006).

By using the content analysis method in this study, we will find the conclusion that what variables are appropriate for the formulation of a strategy for developing an environmentally friendly urban transportation system for the Jabodetabek urban area. The results released from the content analysis in this study are evidence of predetermined variables through a desk study using transcripts of results from interviews with experts/practitioners in urban transportation system planning and transcripts of webinars on air pollution issues organized by ITDP Indonesia. What also needs to be known is that ITDP Indonesia is a non-profit organization that has pioneered transportation policies and projects in Indonesia that have a concentration on environmental, sustainability, and equality aspects.

SWOT analysis technique which stands for strengths, weaknesses, opportunities, and threats is an analysis technique used to determine the strengths, weaknesses, opportunities, and threats of a business or project goal determination by involving internal and external factors to achieve these goals. (Setyawan, 2015). According to Stacey (1993) in Pickton & Wright (1998) states that

SWOT analysis is a list of an organization’s strengths and weaknesses as indicated by an analysis of its resources and capabilities, plus a list of the threats and opportunities that an analysis of its environment identifies. Strategic logic obviously requires that the future pattern of actions to be taken should match strengths with opportunities, ward off threats, and seek to overcome weaknesses. (p103) (Pickton & Wright, 1998)

Figure 2 the main component of a SWOT analysis
Source: (Sammut-Bonnici & Galea, 2015)

According to Emet GÜREL and TAT, SWOT analysis is a tool used to carry out strategic planning and management in organizations, this analysis can be used effectively to build organizational strategies and competitive strategies (GÜREL & TAT, 2017). SWOT analysis is carried out by a process involving four quadrants which are divided into two dimensions, where strengths and weaknesses are
internal factors of organizational attributes, opportunities and threats are external factors of organizational attributes and divided into a 2x2 matrix (GÜREL & TAT, 2017).

**Sustainable Transportation**

Sustainable development is an action to meet the needs of the people in it, both in personal life and in economic activities, while respecting the ability of future generations to meet their needs (United Nations, 2016). The sustainable transportation system according to various Department of Transportation (DOTs) in the United States is shown in their mission, of the 51 selected DOTs, they show that a sustainable transportation system has the attributes of an effective and efficient transportation system, also has a good impact on the economic system, the quality of social life, and ecology (Jeon & Amekudzi, 2005). In this research, to find out what variables can affect the sustainability of a sustainable transportation system, a desk study method was carried out which was taken from several sources including UNESCAP (2012), Sustainable Urban Transportation System; García, Omar A.L. Understanding and Measuring Sustainable Transportation: Melbourne as Case of Study; European Commission (2009), A sustainable future for transport: Towards an integrated, technology-led and user-friendly system; and United Nations (2016), Mobilizing sustainable transport for development: Analysis and policy recommendations from the United Nations secretary-general’s high-level advisory group on sustainable transport. See Table 1 for the results of the desk study that has been conducted on indicators of progress on sustainable transportation.

| Tabel 1 Sustainable Transport Progress Indicator |
|-----------------------------------------------|
| Source | UNESCAP (2012), Sustainable Urban Transportation System | García, Omar A.L. Understanding and Measuring Sustainable Transportation: Melbourne as Case of Study | European Commision (2009), A sustainable future for transport: Towards an integrated, technology-led and user-friendly system | United Nations (2016), Mobilizing sustainable transport for development: Analysis and policy recommendations from the United Nations secretary-general’s high-level advisory group on sustainable transport |
| (1) | (2) | (3) | (4) |
| 1. Transportation planning and governance | 1. Public Transportation | 1. Infrastructure: Maintenance, development, and integration of modal networks | 1. Policy Development and Implementation |
| a. Transportation planning and comprehensive planning | a. Bus Rapid Transit (BRT) is relatively fast and cheap and has a large capacity for passengers | a. optimizing the function of the transportation system with full integration and interoperability of each part of the network, as well as network interconnection between different modes. | a. an integrated approach to transport policy |
| b. transport authority capacity | b. subway and light rail systems that are fast and cost-effective, although they are expensive to build and maintain but provide significant long-term economic, social and environmental benefits | b. expansion of infrastructure with a focus on reducing congestion, time loss, and environmental pollution. | b. building capacity, especially in developing countries, to improve security and accessibility |
|---------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| c. public participation in the planning process | 2. **non-motorized transport** | 2. **Funding: finding resources for sustainable transport** | c. stakeholder engagement and public awareness |
| d. financing for the transportation system | a. walk | a. transition to a low-carbon economy with a substantial overhaul of the transport system and well-coordinated management of funds | d. monitoring and evaluation |
| e. affordability of the transportation system | b. cycling | b. Transport infrastructure investment is mostly financed by public funds, and also often from about 50% of the operating costs of public transport services. | |
| **2. Urban space organization and the substitution of travel needs in other ways.** | 3. **Transportation demand management** | 3. **Technology: How to accelerate the transition to a low-carbon society and lead global innovation** | |
| a. dense and mixed-use development | a. measures to reduce travel demand: fuel policy; road charging; and parking prices | a. solving solutions to transportation safety, dependence on non-renewable fuels, vehicle emissions, and congestion. | a. government funding |
| b. road hierarchy system | 4. **Transit Oriented Development (TOD)** | b. low emission and zero-emission vehicle technology | b. engagement with the private sector |
| c. school locations and other facilities | a. promotion of urban development with higher density along public transport corridors | c. enactment of promising sustainable transportation technology policies, one example is the establishment of standard regulations. | c. fiscal and market-based measures |
| d. sidewalks, pedestrian paths, and bicycle paths | 4. Legislative framework: further promote market opening and promote competition | d. finance from international financial institutions | |
| e. substitution of travel needs by other means | 5. **Behavior to educate, inform and involve** | 3. **Technological innovation** | |

- **2. Financing**
- **a. government funding**
- **b. engagement with the private sector**
- **c. fiscal and market-based measures**
- **d. finance from international financial institutions**
- **e. climate funds**
### 3. Public transportation

| a. public transport services that are diverse, integrated, balanced, and well closed |
| b. accessibility of public transportation |
| c. reliability of public transportation |

### 4. Private vehicles

| a. use of private vehicles |

### 5. Security and safety

| a. transportation system security |
| b. safety of the transportation system |

### 6. Urban freight transport

| a. freight operation |

### 7. Environment

| a. emissions by the transport system |

### 8. Governance: effective and coordinated action

| a. The transportation system involves the interaction between political, economic, social, and technical factors. |
| b. public participation in transportation planning |
| c. vehicle |
| d. system |

### 7. External dimension: the need for Europeans to talk to each other

Source: (UNESCAP, 2012); (García); (European Commission, 2009); and (United Nations, 2016)
3. Results and Discussion

Content Analysis Results According to Practitioner Experts

This analysis aims to find out how the right strategy according to expert practitioners in urban transportation system management, an analysis is carried out using CA analysis techniques or content analysis. In this study, interviews were conducted by 1 respondent and 1 webinar activity conducted by ITDP Indonesia on December 7th, 2020, with the topic of "Urban Transport Discussion # 14: Fiscal Policy for Air Pollution in Cities". Every idea/input/practice conveyed by respondents/expert practitioners becomes an input in formulating the right strategy in creating an environmentally friendly urban transportation system. In analyzing content analysis, this study uses code assistance for each variable according to the indicators that have been carried out. Consider the following table:

| Indicators and Variables                                                                 | Code |
|-----------------------------------------------------------------------------------------|------|
| Planning and Governance of Transportation Policy                                       | A    |
| A comprehensive transportation planning document                                      | A.1  |
| Transport authority capacity                                                             | A.2  |
| Public participation is involved in the planning process                                 | A.3  |
| Stakeholder engagement and public awareness                                              | A.4  |
| Increasing security, safety and accessibility, and reliability of transportation modes   | A.5  |
| Policy on sustainable transportation technology, with the establishment of standard regulations | A.6  |
| Environmental emission reduction policies                                                | A.7  |
| Policies to reduce travel demand: policies on fuel, road charging, and parking prices   | A.8  |
| Urban freight transport policy                                                           | A.9  |
| Monitoring and evaluation                                                               | A.10 |
| Environmentally Friendly Infrastructure for Commuter Travel Players                      | B    |
| The affordability of the transportation system                                          | B.1  |
| The urban transportation system is fully integrated, balanced and well closed | B.2 |
| --- | --- |
| Diverse urban transportation modes | B.3 |
| Bus Rapid Transit (BRT) is relatively fast, cheap, and has a large capacity | B.4 |
| Subway and fast light rail system | B.5 |
| Infrastructure with a focus on reducing congestion, fuel dependence, time loss, and environmental pollution | B.6 |
| Pedestrian facilities in the transit service area | B.7 |
| Bicycle lane facilities, and bicycle parking in the transit service area | B.8 |
| Zero-emission vehicle technology | B.9 |
| **Sustainable Financing** | C |
| Transition to a low carbon economy | C.1 |
| Climate funds | C.2 |
| Infrastructure investment is funded by government funds | C.3 |
| Transportation infrastructure investment is funded by public funds, and 50% of operational costs | C.4 |
| International funding | C.5 |
| Financing with a fiscal and market policy approach | C.6 |
| Engagement with the private sector | C.7 |
| **Urban space organization and the substitution of travel needs** | D |
| dense and mixed used development | D.1 |
| Promotion of transit-oriented development (TOD) | D.2 |
| setting up school locations and other facilities | D.3 |
Using the code from table 2, a manual content analysis was performed using the interview transcripts and previous webinars. Consider table 3 regarding the results of content analysis that has been carried out, to find out how the right strategy is in realizing an environmentally friendly urban transportation system in the Jabodetabek commuter area.

Table 3 Results of Coding Interviews for Respondents and ITDP Indonesia Series 14 Webinar Activities[1]

| Colour | Variabel | Transcript Citations | Code | Confirmation Keywords | Coding Results | Number of Citations |
|--------|----------|----------------------|------|-----------------------|----------------|---------------------|
| A      | comprehensive transportation planning document (A.1) | So all the transportation system arrangements must be arranged nationally, which we do not yet have a complete national transportation order, so they are intermittent. Yes, those who make tools, make them themselves. The one who makes the train makes the train itself what makes the ferry itself like that, nothing is integrated, don't think about the details like Jabodetabek, our nationality doesn't have that, we don't have it yet so we grope, | PLA.1.1 | Integration of national transportation arrangements | It takes integration of the national transportation system, be it land, water and air transportation systems. | 1 |
where do we want to take this our country's transportation.

So we still have many problems and actually, these problems still lead to a national policy that is not yet perfect, yes, automatically if the national policy is not yet perfect, the local policy will certainly not be perfect either regarding the national transportation system. So, the way is environmentally friendly and so on

| PLA.1 | Incomplete national policies |
|-------|-------------------------------|

To make a policy for a good urban transportation system, a perfect national transportation system policy is needed.
To realize national connectivity and in the context of Jabodetabek, yes Jabodetabek connectivity. For example, one of us cannot deny that we have the name Jabodetabek Transportation Management Agency (BPTJ). Now, Mrs. Polana, maybe now that she has gone home to be her head, maybe I think maybe it’s stressful too, this is a risk when someone becomes the leader. I don’t even know, I was shocked when Mrs. Polana became the head of BPTJ, because she was the Directorate General of Civil Aviation, so that’s how life in our bureaucracy has a lot of oddities, not awkwardness. There are many surprises that we never expected, and that is what may show that the political content of a public office is thicker than the technical constraints. The position of Head of BPTJ is filled by a person who has competence in the field of land relations, but not from an expert or expert practitioner of urban transportation.
than the technical constraints.

So historically the human resources of the ministry of transportation are no better than that of the ministry of public works. So that there is indeed a problem of human imbalance among sectors that are related to transportation, yes, so things like this become an obstacle in developing.

| PLA.2 .2 | HR imbalances | There is a need for the development of Human Resources (HR) within the Ministry of Transportation, especially those related to the transportation sectors. | 2 |
| Public participation in the planning process (A.3) | So and back earlier, the willingness of each party to unite a common vision and mission to develop national transportation skills and a commitment to make it happen is very political. So, what is the name, it is not easy to want which government, Jokowi, wants. This is not an easy problem. Because many interests are playing there. So that we, as elements of society, we try to provide the best possible input. |
| PL.A.3.1 | As elements of society, we try to provide the best possible input. |
| Here, the respondent (Prof. Leksmono) said that he as an element of society had tried to give his best input. |

| How can we collaborate so that the public and the government also know that the pattern is related to the environment, what kind of impact on pollution is there, and how can there be practical or infusing things so that we can do it so that it can benefit the good of our environment (A.3) |
| J.A.3.1 | Collaborate |
| Collaboration between agencies and every element of society is needed so that the government and society are aware of patterns related to the environment. |
| Stakeholder engagement and public awareness (A.4) | So we appreciate what the Jakarta government has done and we have to admit, this is something that has been built over the years so that we also do not forgive our predecessors in the transportation sector, including the governor, his governor, and other agencies. Those are all standing found that have been built slowly and then what has happened now is happening or for example, someone claims that Anies Baswedan just keeps on going, that's okay but continue in the right way, maybe that's the way (A.4). | PL.A.4.1 | Standing found that has been built slowly by responsible stakeholders. | The current city of Jakarta's urban transportation system has been built many years ago by involving all stakeholders and has continued well until now. | 1 |
And I think that international awards are also no joke, I quote some of my friends whom I heard interviewed about this, they also acknowledge the appreciation of all the institutions that conducted the survey. It is not an institution that is playing games and we know that the success of Jakarta to date, one of which is the international institution that oversaw Jakarta's public transportation, is ITDP Indonesia which is chaired by Ms. Faela Sufa, I happen to be my junior in class ... Yes, for me the award is something that inspires but we also don’t have to stop there, because usually the award is accompanied by responsibility, I think so. (A.4)

| PL.A.4 .2 | The international institution that monitors Jakarta's public transportation is ITDP Indonesia | All parties appreciate the achievements of the City of Jakarta in receiving the STA 2021 award, and the international institution that monitors Jakarta's public transportation is ITDP Indonesia. | 1 |
The strategy is very easy to say but very difficult to do, yes, because a lot of it involves the commitments of various parties (A.4). One of them is that all parties have to give up their sectoral identity to accept what is called development of a national transportation system that is not based on sectoral interests. This means that this is purely based on the idealism of transportation supported by other interests related to spatial planning, the environment, and others.

| PL.A.4.3 | Regarding the commitment of various parties | In realizing a sustainable urban transportation system, commitment from various parties is required, and where all parties must give up their sectoral identity. So that this system is built through idealistic transportation experts supported by other interests related to spatial planning, the environment, and others. |
| --- | --- | --- |

So and back earlier, the willingness of each party to unite a common vision and mission to develop national transportation skills and a commitment to immediately (A.4) make it happen is very political. So it is not.

| PL.A.4.4 | Unite the vision and mission together to develop national transportation skills | It takes commitment and unifying the vision and mission of all parties and elements of society to develop a national transportation system. |
| --- | --- | --- |

| 1 | 1 | 1 |
easy to want whose government is grandfather, whether Jokowi or anyone else this is not an easy matter. Because there are many interests at play there.

| J.A.4. | Cooperate Stakeholders cooperate in the preparation of regional strategic activity plans |
|--------|--------------------------------------------------------------------------------------------|
| 1      | J.A.4. 2  
| Cooperate  
| Jakarta smart city collaborates with various teams or experts in sharpening the results of analysts, programs, and policies that will be taken. |
and how we work with various kinds of teams of experts in the context of the City of Jakarta.

So, this is just a little picture from me about how Jakarta is a smart city, we are working with various agencies, agencies, other institutions to make various kinds of dashboards, analyzes, and products and services in the data sector, so that we hope there will be better decisions, which can be taken regarding the environment.
When I went to college, I had a friend in the truck business circle, and I joined their group, the truck city group. Just now there was another accident in Central Java if I'm not mistaken. Eh in North Sumatra. They told me that life in normal times was difficult, especially during this pandemic, and they also told me that many government policies were not pro-industry, not pro-transportation system (A.9). Yes, on the other hand, we talk about the environment, we talk about industrial progress, right? Because we also need income from inputs from the industrial body, this balance is very important. So, they said it would interfere with the trips of other people who wanted to use the car and so on. From the industrial side, there are still policies that are not in favor of the transportation system of goods transportation. Logistical movements during a long weekend are limited for the reason that it will hinder the movement of people using private transportation. So a commitment is needed to be able to unite the vision and mission of the Jabodetabek Transportation System. They told me that many, many people in normal times, during the long weekend, were prohibited from traveling because they complained about why during the long weekend. They also mentioned about industrial policies that are not pro, not pro-industry, not pro-transportation system (A.9).
So there is a disagreement in being pro towards industry or logistics, and not being pro towards the environment, it is still not balanced so all of us need to commit to be able to unite together the vision and mission of Jabodetabek.

| Affordability of the transportation system (B.1) | I feel what I am like to get new toys there, so everything is easy to access, at that time I was a student who was quite old and not young anymore, yes, in the nineties, it means that at that time I was almost 40 years old too and That, you can use student tickets, student tickets that reduce pay, the cost reduction is quite significant, after all, we | PL.B.1 | Ease of access | The ease of access for users in traveling can be said to be good, especially the ease of access given to users in terms of transactions/ticketing systems. | 1 |
| The urban transportation system is fully integrated, balanced, and well closed (B.2) |
|---|
| In a context, for example, what anyone, including, in particular, covets, is the integration between transportation modes, so it means that in seamless mobility smooth movement means that it doesn't break, it's not difficult to connect, the ticketing is also integrated, the schedule is integrated, the route is integrated. integrated, all completely integrated. So it seems that there is no difference between people, there is no significant difference between people taking public transportation and people taking PL.B.2.1[Intégration 5]
| What public transportation users want is an uninterrupted integration between transportation modes, an integrated schedule, an integrated route, and everything is integrated. |
private transportation that can be door to door. (B.2)

| Infrastructure with a focus on reducing congestion, fuel dependence, time loss, and environmental pollution. (B.6) | Even if people don't have money to buy it all at once a month or a semester they can get pretty good adjustments, for example, if we buy one free pass, it feels like public transportation users are spoiled for facilities that make us love public transportation, while we are still far away. (B.6). | Facilities that make users comfortable in all conditions, especially in payment methods, will make users feel in love with public transportation with the facilities provided. |
| | Facilities that make us in love with public transportation. |

Why, because it is possible because we know he has a shinkansen so let's say for example our Jakarta Bandung fast train will materialize like that, the forerunner of the shinkansen will not

| Jakarta Bandung fast train | The Jakarta Bandung fast train will make the City of Jakarta and the City of Bandung be super megapolitan, and the areas between them will be areas that are developing in a positive direction or not. |
| | 1 | 1 |
| J.B.6.1 | Technology and Innovation | Technology and information can be applied to solve urban problems. | 1 |
|---------|---------------------------|----------------------------------------------------------------|----|
| PL.L.1.1 | Serving the Public | In achieving the STA 2021 award, the DKI Jakarta provincial government needs to conduct an introspection on the extent to which it has served the public because it is possible for users of public transportation services that their expectations have not yet been achieved. | 1 |

Take long, meaning Bandung and Jakarta have become a super megapolitan that is extraordinarily powerful with regions - the area in the middle becomes a developing area which we don't know is developing in a positive direction or not, huh. (B.6)

So, a little introduction, of course, about Jakarta smart city in concept, maybe in simple terms, how technology, innovation is applied to solve city problems (B.6)

Yes, I know. So yes, we are grateful for that award. From the other side, we have to introspect the extent to which we have served the public. Yes, because maybe for users of public transportation services, the expectations have not been achieved. (L.1)
Consider Table 3. Of the 31 variables identified according to the desk study in this study, it is known that the results of the analysis using content analysis are 10 indicator variables which are of urgency in developing an environmentally friendly transportation system in the commuter movement of the Jabodetabek urban area, namely: Comprehensive transportation planning documents (A.1); Transport authority capacity (A.2); Public participation in the planning process (A.3); Stakeholder engagement and public awareness (A.4); Urban freight transport policy (A.9); Affordability of the transportation system (B.1); The urban transportation system is fully integrated, balanced and well closed (B.2); Infrastructure with a focus on reducing congestion, fuel dependence, time loss, and environmental pollution (B.6); Public service (L.1); and the application of technology in making policy decisions (L.2).

In realizing the planning and governance of transportation policies on environmentally friendly transportation systems in the Jabodetabek urban area at this time and in the future, it is necessary to have a good urban transportation system policy through the integration of a perfect national transportation system order.

6.2. Jabodetabek Environmentally Friendly Transportation System Development Strategy

Determination of an environmentally friendly transportation system strategy that is appropriate and following the needs of the commuter community in the Jabodetabek urban area here is carried out by conducting a SWOT analysis based on the results of the previous analysis, see Table 4 and Table 5.
| Variable                                                                 | Coding Results                                                                                                                                                                                                 | S | W | O | T |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|
| A comprehensive transportation planning document (A.1)                 | It takes the integration of the national transportation system, be it land, water, and air transportation systems.                                                                                           |   |   |   | √ |
|                                                                         | To make a policy for a good urban transportation system, a perfect national transportation system policy is needed.                                                                                          |   |   |   | √ |
| Transport authority capacity (A.2)                                      | The position of Head of BPTJ is filled by a person who has competence in the field of land relations, but not from an expert or expert practitioner of urban transportation.                                              |   |   |   | √ |
|                                                                         | There is a need for the development of Human Resources (HR) within the Ministry of Transportation, especially those related to the transportation sectors.                                                       |   |   |   | √ |
| Public participation in the planning process (A.3)                      | Here, the respondent said that he as an element of society had tried to give his best input.                                                                                                                   |   |   |   | √ |
|                                                                         | Collaboration between agencies and every element of society is needed so that the government and society are aware of patterns related to the environment.                                                           |   |   |   | √ |
| Stakeholder engagement and public awareness (A.4)                       | The current city of Jakarta's urban transportation system has been built many years ago by involving all stakeholders and has continued well until now.                                                             |   |   |   | √ |
|                                                                         | All parties appreciate the achievements of the City of Jakarta in receiving the STA 2021 award, and the international institution that monitors Jakarta's public transportation is ITDP Indonesia.                       |   |   |   | √ |
In realizing a sustainable urban transportation system, commitment from various parties is required, and where all parties must give up their sectoral identity. So that this system is built through idealistic transportation experts supported by other interests related to spatial planning, the environment, and others.

| Stakeholder Action | Details |
|--------------------|---------|
| It takes commitment and unifying the vision and mission of all parties and elements of society to develop a national transportation system. | ✓ |
| Stakeholders cooperate in the preparation of regional strategic activity plans | ✓ |
| Jakarta smart city collaborates with various teams or experts in sharpening the results of analysts, programs, and policies that will be taken. | ✓ |
| Jakarta smart city together with other agencies, agencies, and institutions are working together to create various kinds of dashboards to make better decisions regarding the environment. | ✓ |
| Urban freight transport policy (A.9) | From the industrial side, there are still policies that are not in favor of the transportation system for goods transportation. Logistical movements during a long weekend are limited for the reason that it will hinder the movement of people using private transportation. So a commitment is needed to be able to unify the vision and mission of the Jabodetabek Transportation system. | ✓ |
| Affordability of the transportation system (B.1) | The ease of access for users in traveling can be said to be good, especially the ease of access given to users in terms of transactions/ticketing systems. | ✓ |
| The urban transportation system is fully integrated, | What public transportation users want is an uninterrupted integration between transportation | ✓ |
balanced, and well closed (B.2) modes, an integrated schedule, an integrated route, and everything is integrated.

Infrastructure with a focus on reducing congestion, fuel dependence, time loss, and environmental pollution. (B.6) Facilities that make users comfortable in all conditions, especially in payment methods, will make users feel in love with public transportation with the facilities provided.

The Jakarta Bandung fast train will make the City of Jakarta and the City of Bandung be super megapolitan, and the areas between them will be areas that are developing in a positive direction or not.

Technology and information can be applied to solve urban problems.

The Application of Technology in Making Policy Decisions (L.2) Data management in integrated information technology is needed in policy decision making.

| Source: Analysis Results, 2020 |

### Tabel 5 SWOT Matrix for the Development Strategy for an Environmentally Friendly Transportation System for the Jabodetabek Urban Area

| | Strength (S) | Weakness (W) |
|---|---|---|
| Opportunities (O) | SO Strategy | WO Strategy |
Integration of the national transportation system;
A perfect national transport policy;
Need to develop human resources within the Ministry of Transportation;
Collaboration between agencies and every element of society;
Commitment to unite the vision and mission of all parties to develop a national transportation system;
Easy user access is required in terms of transactions in urban public transportation in Jabodetabek.
A fully integrated and closed transport system in the urban transport system is required.
The Jakarta-Bandung fast train will become a super megapolitan.

Expert practitioners as elements of society have provided the best possible input;
An urban transport system that has been built for years;
All parties have participated in guarding Jakarta’s public transportation until it is awarded the STA 2021;
Collaboration between stakeholders in developing strategic regional activity plans;
Jakarta Smart City has collaborated with various teams in making policy decisions on both transportation and environmental matters.

Build a perfectly integrated national transportation system by involving expert practitioners;
Build human resources within the ministry of transportation by involving experts or expert practitioners in the field of urban transportation planning.
Cooperating all parties among stakeholders in committing to unite the vision and mission to develop a national transportation system;
Preparing regional development that will occur as a result of the construction of the Jakarta-Bandung fast train by cooperating among stakeholders in preparing regional strategic activity plans;
Jakarta smart city can work with various teams to make transportation system policy decisions that are fully integrated, closed, and pay attention to environmental issues.

It takes a head of BPTJ who has expert competence in urban transportation planning to develop a national transportation system arrangement policy with the Ministry of Transportation;
All parties and all agencies involved in transportation and environmental affairs collaborate with all elements of society in building a perfect national transportation system policy.
Monitor and evaluate public transportation system services, especially services for easy access to users in terms of transactions.

**Threats (T)**

**ST Strategy**

**SW Strategy**

- It takes a head of BPTJ who has expert competence in urban transportation planning to develop a national transportation system arrangement policy with the Ministry of Transportation;
- All parties and all agencies involved in transportation and environmental affairs collaborate with all elements of society in building a perfect national transportation system policy.
- Monitor and evaluate public transportation system services, especially services for easy access to users in terms of transactions.
There is still a policy on the urban transportation system that does not favor the industrial goods transportation system. Improving the policy and order of the urban transportation system which should also side with the industrial sector in freight transportation by involving experts, expert practitioners, all stakeholders, and all elements of society. Monitoring and evaluating the public transportation system which is expected to provide broad benefits to the movement of people so that it can develop a transportation system arrangement policy that does not interfere with the freight transportation system.

Building commitment, releasing sectoral identities, unifying vision, and mission in building an order for the Jabodetabek urban transportation system, both for people and goods.

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Source: Analysis Results, 2020

Consider Table 4 and Table 5. Based on the results of the analysis that has been carried out previously, using the SWOT matrix obtained 11 alternative strategies for developing an environmentally friendly transportation system in the Jabodetabek urban area. So that it is known that the answer to the second objective in this study is that the appropriate environmentally friendly transportation system strategy and following the needs of the commuter community in the Jabodetabek urban area is as follows:

a. Building a perfectly integrated national transportation system by involving expert practitioners;
b. Building human resources within the ministry of transportation by involving experts or expert practitioners in the scientific field of urban transportation planning;
c. Cooperating all parties between stakeholders in committing to unite the vision and mission to develop a national transportation system;
d. Preparing regional development that will occur as a result of the construction of the Jakarta-Bandung fast train by collaborating between stakeholders in preparing regional strategic activity plans;
e. Jakarta Smart City can work with various teams to make transportation system policy decisions that are fully integrated, closed, and pay attention to environmental issues.
f. It takes a head of BPTJ who has expert competence in urban transportation planning to develop a national transportation system arrangement policy with the Ministry of Transportation;
g. All parties and all agencies involved in transportation and environmental affairs collaborate with all elements of society in building a perfect national transportation system policy.

h. Monitoring and evaluating public transportation system services, especially services for easy access to users in terms of transactions.

i. Improving the policy and order of the urban transportation system that should also side with the industrial sector in freight transportation by involving experts, expert practitioners, all stakeholders, and all elements of society.

j. Monitoring and evaluating the public transportation system, which is expected to provide broad benefits to the movement of people so that it can build a transportation system arrangement policy that does not interfere with the freight transportation system.

k. Building commitment, releasing sectoral identities, unifying vision, and mission in building the structure of the Jabodetabek urban transportation system for both people and goods transportation.

This table has many important information, but the wording is too much. Try to get the main ideas and link the content to table 2, how does the results of data collection explain the indicators and variables mentioned in table 2, thanks

4. Conclusion

Responding to the high number of trips per day in the Jabodetabek area, the growth of motorized vehicles, congestion, and air pollution problems that occur in the Jabodetabek urban area, this study seeks to solve the problem of commuter movement that occurs in the Jabodetabek area through qualitative research methods involving stakeholders and experts/practitioners. urban transportation specialist. Based on the results of an interview with Prof. Ir. Leksmono Suryo Putranto, MT, Ph.D. as Chair of the Jakarta City Transportation Council (DTKJ) Research and Development Commission and through the ITDP Indonesia Webinar with the title 'Urban Transport Discussion # 14: Fiscal Policy for Air Pollution in Cities' with guest speaker Juan Kanggrawan as head of data analyst Jakarta Smart City and Aditya Mahalana as a representative of the UN Environment Program (UNEP) who is one of the authors of a study entitled 'Fiscal policies to address air pollution from road transport'.

Based on the results of the desk study and content analysis, it is known that from 31 variables that are considered important in the development of an environmentally friendly transportation system, it is known that 10 variables are of urgency in the development of an environmentally friendly transportation system in the commuter movement of the Jabodetabek urban area, namely:
a. Comprehensive transportation planning documents;
b. Transport authority capacity;
c. Public participation in the planning process;
d. Stakeholder engagement and public awareness;
e. Urban freight transport policy;
f. Transportation system affordability;
g. The urban transportation system is fully integrated, balanced, and well closed;
h. Infrastructure with a focus on reducing congestion, fuel dependence, time loss, and environmental pollution;
i. Public service; and
j. The application of technology in making policy decisions.

Besides, through the 10 variables that were previously known through content analysis, a SWOT analysis was then carried out to determine the right strategy to overcome transportation and air quality problems that occurred in the Jabodetabek urban area. The problem of high movement of people, growth of motorized vehicles, congestion, and air pollution that occurs in the Jabodetabek urban area can be carried out through several strategies for environmentally friendly transportation systems that are appropriate and following the needs of the commuter community in the Jabodetabek urban area are as follows:

a. Building a perfectly integrated national transportation system by involving expert practitioners;
b. Building human resources within the ministry of transportation by involving experts or expert practitioners in the scientific field of urban transportation planning.
c. Cooperating all parties between stakeholders in committing to unite the vision and mission to develop a national transportation system;
d. Preparing regional development that will occur as a result of the construction of the Jakarta-Bandung fast train by collaborating between stakeholders in preparing regional strategic activity plans;
e. Jakarta Smart City can work with various teams to make transportation system policy decisions that are fully integrated, closed, and pay attention to environmental issues.
f. It takes a head of BPTJ who has expert competence in urban transportation planning to develop a national transportation system arrangement policy with the Ministry of Transportation;
g. All parties and all agencies involved in transportation and environmental affairs collaborate with all elements of society in building a perfect national transportation system policy.
h. Monitoring and evaluating public transportation system services, especially services for easy access to users in terms of transactions.

i. Improving the policy and order of the urban transportation system that should also side with the industrial sector in freight transportation by involving experts, expert practitioners, all stakeholders, and all elements of society.

j. Monitoring and evaluating the public transportation system, which is expected to provide broad benefits to the movement of people so that it can build a transportation system arrangement policy that does not interfere with the freight transportation system.

k. Building commitment, releasing sectoral identities, unifying vision, and mission in building the structure of the Jabodetabek urban transportation system for both people and goods transportation.

References

Book

BPS. (2018). Statistik Transportasi DKI Jakarta 2018. Jakarta: Badan Pusat Statistik.

European Commission. (2009). A sustainable future for transport: Towards an integrated, technology-led and user-friendly system. Luxembourg: European Communities.

Khisty, J., & Lall, K. (2003). Dasar-dasar Rekayasa Transportasi. Padang: Penerbit Airlangga.

Risdiyanto. (2014). Rekayasa & Manajemen Lalu Lintas: Teori dan Aplikasi. Yogyakarta: LuetikaPrio.

Tamin, O. (2008). Perencanaan, Permodelan, & Rekayasa Transportasi. Bandung: Penerbit ITB.

UNESCAP. (2012). Sustainable Urban Transportation System. Bangkok: United Nations Economic and Social Commission for Asia and the Pacific and CITYNET.

United Nations. (2016). Mobilizing sustainable transport for development: Analysis and policy recommendations from the United Nations secretary-general’s high-level advisory group on sustainable transport. New York: United Nations.

Venkat, K. (2016). Indicator model for benchmarking the transition to a low carbon urban mobility system: Application results from three Scandinavian cities. Lund: Lund University.

Journal Article

Aulia, Z., & Azizah, R. (2015). Karakteristik, Perilaku, Fungsi Paru Pekerja dan Kadar PM 2,5 di Industri Rumah Tangga Cekan Kabupaten Sidoarjo. Jurnal Kesehatan Lingkungan, 8(1), 128-
Bongardt, D., Schmid, D., & Et Al. (2011). Developing Practical Tools for Evaluation in the Context of the CSD Process. Sustainable Transport Evaluation.

Cheba, K., & Saniuk, S. (2016). Sustainable urban transport – the concept of measurement in the field of city logistics. Transportation Research Procedia, 16, 35-45. doi:10.1016/j.trpro.2016.11.005

García, O. (n.d.). Understanding and Measuring Sustainable Transportation: Melbourne as Case of Study. Melbourne: Victoria University Melbourne Australia.

GÜREL, E., & TAT, M. (2017). SWOT Analysis: a Theoretical Review. Journal of International Social Research, 10, 994-1006. doi:10.17719/jisr.2017.1832

Jeon, P. M., & Amekudzi, A. (2005, March). Addressing Sustainability in Transportation Systems: Definitions, Indicators, and Metrics. Journal of Infrastructure System - J INFRASTRUCT SYST, 03(01), 31-50. doi:11.10.1061/(ASCE)1076-0342(2005)11:1(31)

Mohan, D., & Tiwari, G. (2000). Sustainable Transport System: Linkages Between Environmental Issues, Public Transport, Non-Motorized Transport and Safety.

Ogryzek, M., Adamska-Kmieć, D., & Klimach, A. (2020). Sustainable Transport: An Efficient Transportation Network-Case Study. Sustainability, 12. doi:10.3390/su12198274

Pickton, D., & Wright, S. (1998, March-April). Strategic Change. Strat. Change, 7, 101-109.

Riedy, C. (2016, 08). Climate Change.

Sammut-Bonnici, T., & Galea, D. (2015, 01). SWOT Analysis. doi:10.1002/9781118785317.weom120103

Setyawan, R. (2015). Penerapan Analisis SWOT Sebagai Landasan Merumuskan Strategi Pemasaran Usaha Jasa Sewa Mobil ”AMAN-AMIN” Transport Tours and Travel Ambarketawang Sleman Yogyakarta. Yogyakarta: Universitas Negeri Yogyakarta.

Sitanggang, R., & Saribanon, E. (2018, May). Faktor-Faktor Penyebab Kemacetan di DKI Jakarta. Jurnal Manajemen Bisnis Transportasi dan Logistik (JMBTL), 4(3), 289-296.

White, M., & Marsh, E. (2006, 06). Content Analysis: A Flexible Methodology. Library Trends, 55. doi:10.1353/lib.2006.0053

**Laws and Regulations**

Pemerintah Indonesia 2010. Peraturan Menteri Negara Lingkungan Hidup Nomor 12 Tahun 2010 Tentang Pelaksanaan Pengendalian Pencemaran Udara di Daerah. Jakarta: Menteri Negara.
Lingkungan Hidup.

Web

Badan Pengelola Transportasi Jabodetabek. (2018). Rencana Induk Transportasi Jabodetabek (RITJ). Retrieved from http://bptj.dephub.go.id/rencana-induk-transportasi-jabodetabek-ritj

BMKG. (2020). Informasi Konsentrasi Partikulat (PM2.5). Retrieved from Badan Meteorologi, Klimatologi, dan Geofisika: https://www.bmkg.go.id/kualitas-udara/informasi-partikulat-pm25.bmp

Kementerian Lingkungan Hidup dan Kehutanan Republik Indonesia. (n.d.). Knowledge Centre Perubahan Iklim - Mengenai Perubahan Iklim. Retrieved from http://ditjenppi.menlhk.go.id/kcpi/index.php/info-iklim/perubahan-iklim