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Comparative Study of the Sustainability Transport Business Systems: German and Indonesia

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ABSTRACT

Purpose: Compare of the sustainability transportation systems between Indonesia and Germany. Learning implements some lessons learned from the German experience to the development of transportation planning in Indonesia to support sustainable land use and transportation by comparing and analyzing the probability of converting and adopting reducing private transportation, landscape, financing mechanisms, and transport mechanism between Germany and Indonesia.

Design/methodology/approach: Analyzing obtained data based on the comparison's parameters framework.

Findings: Potentially, a parameter that can be set to develop a better transportation system for environmental and people safety, or even to reduce the congestion that occurs in most of Indonesia's metropolitan areas.

Research limitations/implications: Since the study location is in fact somewhat distant, the information that is gathered to analyze the comparison is only chosen from each country's broad outline and is not otherwise specified.

Practical implications: Finding solution for a better sustainable transportation in Indonesia that can be implemented.

Originality/value: The analytical framework that is implemented in this comparative study is a methodically innovative approach form of developing an Innovative Transport System that is to aim a better use of transport network.

Paper type: Literature Review

Keyword: *German, Indonesia, Public transportation, Sustainable, Transportation systems.*
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I. INTRODUCTION

The cross-section of a transportation system can be numerous. The variety of transportation systems is based on many justifications, such as location, public demand, and even based on the local road system that is given. A transportation system can be defined as the combination of elements and their interactions. As in, producing the demand for travel within a given area and the supply of transportation services to satisfy this demand. This definition is general and flexible enough to be applied to different contexts. The specific structure of the system is defined by the problem itself (or class of problems) for which it is employed.

This study will be focusing on the contrast of the transportation systems between two different countries, that is, Indonesia and Germany. By briefly analyzing the differences in the transportation systems, Indonesia is more practical and individual, while in Germany, the main target is health and environmental benefits. An assessment of the effects of different population and environmental risk profiles on health outcomes of active transportation is presented for the first time in this study that compares health impacts across different regions in Germany and Indonesia. Economic growth depends on the transportation system. Today, as cities grow and

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develop, the need for public facilities and services has grown as well. Transportation systems have developed in parallel to economic growth due to their dependence on evolution.

In Europe, Germany and Switzerland have developed urban and transport planning in urban areas to increase cycling. The European Union's (EU) public health and sustainable development strategies do not place a significant premium on active transportation. By lowering urban air pollution, the prevalence of physical inactivity, and the burden of chronic non-communicable diseases that go along with it, reducing the use of vehicles and increasing the distances traveled by walking and cycling could have significant additional health advantages enhancing environmental and public health. It confirms earlier studies on the health effects of the built environment that highlight the significance of neighborhood design elements in promoting the use of active transportation. Evidence to support this includes claims that constructing bike and pedestrian routes may help save costs for public health (Fraser & Lock, 2011).

A 2008 study by the Rails-to-Trails Conservancy found that to boost the percentage of supporters, the government should enhance funding for bicycle and foot transit. Because rates of bicycle use are positively correlated with government-issued funds for investments in bicycle transportation. Europe, and particularly the city of Amsterdam, has seen a rise in the use of bicycles as a form of transportation since the early 1800s. In terms of cultural cycling, this city unquestionably has become a world leader. An attractive substitute for driving a car in urban areas is riding a bicycle. Cycling is linked to several personal and societal health advantages, including enhanced physical and emotional well-being, lower obesity, and a decreased risk of cardiovascular and other diseases (Reynolds et al., 2009).

An area's development and transportation play a crucial role within each other; the more developed a place is, the easier it is to utilize public transit. The area's development will be able to enhance and increase with the provision of suitable public transit, which will additionally increase the economic sector and improve population mobility. Due to the dominance of private vehicles, primarily cars and motorcycles, in the Indonesian transport modal mix, there is a significant energy demand, with fuel having an annual consumption growth rate of roughly 4.5%. Ineffective spatial planning, insufficient infrastructure, and limited market access limit business expansion and lower standards of living. Especially in large cities, road transportation has been the primary user of fossil fuel and the primary source of greenhouse gas emissions (Warsono et al., 2020).

Over the past few years, Indonesia's steady economic growth has fueled rapid urbanization. The World Bank estimates that Indonesia's cities are growing at an annual rate of 4.1%, faster than many other Asian countries. By 2025, 68 percent of Indonesia's population will reside in cities. In Indonesia, there are ferries in addition to buses, trams, light rail, metros, and rapid transit. Metropolitan rail-based transportation mass rapid transit (MRT) and light rail, offers access to urban areas as well as mobility for people and commodities. The first MRT system in Indonesia was inaugurated by Mr. Joko Widodo, the country's president, on March 24 (Farda & Lubis, 2018).

High travel demand in Indonesia mostly comes from private transportation, and slow road expansion causes severe congestion. There are still many Indonesian people out there that still prefer using private or individual transportation rather than public transportation. The rise in private vehicle ownership and journeys that are not matched with infrastructure expansion on the road network result in traffic jams (congestion), delays, energy, and financial waste, as well as air and noise pollution. Additionally, the availability of insufficient public transportation, which is far from efficient due to its limited capacity, results in capital costs and an excess of energy resources. Even though the mass public transportation system is crucial for cities with considerable population mobility (Brotodewo, 2010).

In conclusion, the fundamental goal of this study is to compare the transportation systems in Indonesia and Germany, two diverse regions of Asia and Europe. Indonesia's transportation system is substantially different from that of Germany, depending on the major methods of travel that the local population uses.

A. Based Comparison Study of Germany and Indonesia Transportation System

This study will analyze the sustainability metrics for Indonesia and Germany's transportation systems and transportation planning process. Germany has been selected as the role model due to its outstanding track record of adopting sustainable land use and transportation. Despite the numerous differences between Indonesia and Germany, this study could absorb some lessons from the German experience to establish transportation planning in Indonesia to encourage sustainable transportation and land use by comparing and analyzing the opportunities to transfer and adopt innovative transportation, land-use, financing mechanisms, and transport policies between Germany and Indonesia.

There have been some research studies carried out, the primary topic of which was a comparative study based on the transportation systems of Germany and Indonesia. One of Angelina's research has studied how developing an enabling environment to promote safe cycling and walking, high-quality public transportation, and coordinating land-use and transportation planning at the right institutional levels are all parts of an effective plan with a long-term vision (Angelina & Vallée, 2015). Urban transportation in Indonesia is being hampered by

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the unsustainable effects of transportation, including bad traffic congestion, traffic accidents, air and noise pollution, urban stress, resource depletion, and economic loss (Pucher & Buehler, 2009).

The most significant variables shared by Indonesia and other emerging countries are fast population expansion and rapid motorization. This circumstance indicates that developing-country transportation networks are already in a long-term catastrophe. Over the last four decades, Indonesia's population has grown from 119 million in 1971 to about 240 million in 2010. Java Island is home to more than 58 percent of Indonesia's population (Angelina & Vallée, 2015). The largest cities have grown at a fast pace. By 2013, Jakarta the 18th FSTPT International Symposium, Unila, Bandar Lampung, August 28, 2015, 2 had more than 10 million inhabitants (Angelina & Vallée, 2015).

The primary cause of Jakarta's rapidly expanding population is a tremendous increase in urban migration during the last twenty years. Surabaya, Bandung, and Medan are the next largest cities, each with a population of over 2 million people (BPS, 2014). These research studies have begun to provide insight into the major objectives of these comparison studies that will be used in the future. There are several major points to consider when comparing the transport systems of these two countries, including the landscape structure, population, safety, and mobility or majority.

B. Sustainable Transportation

The present study aims to analyze the significance of sustainable German transportation that can be adaptable for Indonesia. As for the established cause of the numerous environmental harms caused by the number of transportation emissions produced daily in Indonesia, it will be better to adopt sustainable transportation. In recent studies and practice, sustainable transportation is gaining a lot of attention. Transportation activities significantly rise because of economic development and international commercial links. Transportation is involved in several harmful external impacts including noise, air pollution, and accidents (Sims, 2014). It also plays a significant role in climate change that is caused by human activities. In addition to improving the environment, it may also improve the daily traffic system such as from a congestion and a traffic jam.

Traffic congestion is currently a major source of many issues. Apart from the potential delays, traffic congestion can have negative psychological (stress) and physical (fatigue, accidents, noise pollution, and breathing issues due to air pollution) effects on people. The apparent reason of traffic congestion involves excessive vehicle traffic at peak hours or at special events, accidents, slow vehicles blocking quick lanes, etc. However, there additionally less visible causes, such as the ripple effect, which generates phantom traffic jams (Hardjono, 2011).

The EST (Environmentally Sustainable Transport) is one of a case study that aiming an environmentally safe transportation system (Wiederkehr et al., 2004). The EST research found that there is a more effective path to a future of sustainable transportation. It means defining what is meant by environmentally friendly transportation, creating a vision with specific goals, standards, and standards, and then figuring out how to achieve those goals.

The EST project defined six criteria for the transportation industry as the very minimum needed to account for the vast variety of health and environmental effects of transportation. These requirements were chosen to address challenges which are local, regional, and global, including land use, local noise and air pollution, regional acidification and eutrophication, atmosphere-wide ozone, and global climate change (Wiederkehr et al., 2004). Sustainability requires a consideration of environmental, social, and economic factors. The environmental component must ultimately take precedence, though, as environmental forces set the boundaries for other activity.

C. Public Transportation

Investment in public transportation is commonly served as an implicants of lowering demand on personal vehicles, decreasing the impacts of transportation systems on both society and the environment, and preserving the vital role that transportation serves in sustainable development (Miller et al., 2016). Germany's public transportation systems are distinguished by their longer history and more effective use of government subsidies, higher levels and good quality of supply, better regional integration of public transportation services, more multimodal coordination, and more favorable land use and restrictive automobile policies discouraging car use (Pucher & Buehler, 2009).

Apart from energy production and industrial processing, transportation is the main cause of contamination, which is particularly responsible for air pollution. Congestion is a major problem in auto-dependent cities that negatively affects their sustainability. Congestion is a significant problem related to auto dependence and is characterized by poor traffic flow rates and excessive vehicle densities (Sinha, 2003). Air pollution and traffic congestion, which normally hamper economic growth, are currently on the rise because of the increased use of private automobiles globally. By utilizing more public transportation, the dependency on private automobiles

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must be reduced to ensure sustainable mobility and ongoing economic growth. Nevertheless, it is hard to devise tactics that significantly increase the use of public transportation without understanding the important variables that influence this behavior (Chiou et al., 2015). Public transportation has the benefit of being far more accessible and convenient than public transit, which has led to a fast increase in the number of private automobiles, causing both traffic congestion and environmental pollution.

Travelers often choose several modes of transportation, but private transportation offers certain advantages over public transportation. Expanding alternatives for public transportation while limiting private automobile ownership and use are two priorities for many governments throughout the world. Despite the number of developed countries with good public transportation networks, however, there is still a low level of use of public transit. So far, there hasn't been a lot of research on whether governments should expand their public transportation systems.

The demand for public transportation is greatly influenced by the standard of such modes of transportation. The effectiveness and quality of public transportation systems can be measured based on several variables that relate to the performance of the service that is provided and hence the performance of firms and organizations in charge of it. Due in part to longer distances and an unstable road system, public transportation which is intended to operate in densely populated areas, offers a lesser frequency and quality service (Sampaio et al., 2008). The accessibility of the system is based on the distances between the user's starting point and the first station as well as the last station and the end destination. As a result, geographical coverage expands and route availability rises, making it easier and more convenient for people to go from one location to another.

II. METHODS

This comparison study will be executed by using existing data that will be collected and organized based on the parameter. This research can also be classified as review literature because it was conducted by collecting data that had already been obtained through a variety of sources. This comparative study's conceptual framework aims to characterize how the traffic systems in Germany and Indonesia differ from one another and how Indonesia may adopt a system that is more effective and sustainable for the environment and traffic flow. This study continues by providing a framework that is thorough and makes use of four keywords as the parameter to analyze the comparison for this study, but it also clearly recognizes transportation efficiency as a crucial component of sustainability.

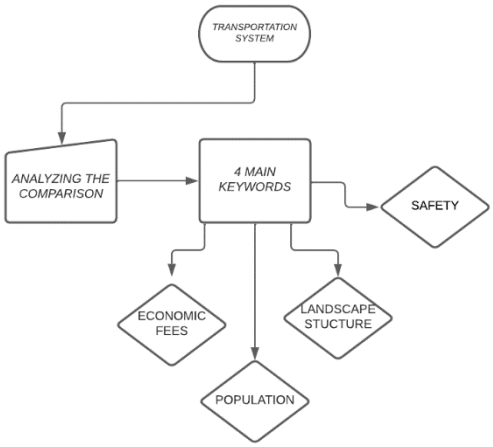

Figure 1 - Framework of the comparison study

According to the concept, those four keywords will be used as the key of this comparison study **Error! Reference source not found.**, which includes the safety (equity), population (mobility), landscape structure, and economic expenses. These four keywords are an important instrument for actively incorporating sustainability analysis into the transportation system. This study analyzes the comparison of sustainable transportation that provides for safe, economically viable, and socially acceptable access to people, places, goods, and services. The foundation and systems used to operate each road network in Germany and Indonesia

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are rather different, hence the variety parameter that will be used in the comparison is crucial in each of their various aspects.

Since one of the driving factors of scientific modeling and research is data (Rifai et al., 2015), data mining was applied for the prediction of highway roughness due to overloaded trucks. Prior to examining the research's data, the parameter must be highlighted for each definition, thereby identifying the primary problems that require analysis. Identifying the appropriate problem is the first step in a systematic scientific research process (Rifai et al., 2016). The data for this study will be gathered from several different completed studies and research projects. The data measurements of this comparison study will be executed based on number and conditions that will extracted from data mining results. Each data result will be analyzed in comparison to certain other aspects of the same condition in this comparative study's analysis processes, and the contrast will be highlighted as the outline of the research results. The comparative analysis can be defined as a set of analytical techniques that allow making comparisons between different objects and their sets, including conditions when the comparison is impossible to make by efforts of human intelligence.

III. RESULTS AND DISCUSSION

A. General Discussion

The following 4 parameters will serve as the starting point for this review literature's analysis of the differences. German and Indonesia are very different from one another, both in terms of their historical backgrounds and in terms of how their legal systems operate. However, Germany has good methods to handle that aspect of their own in terms of environmental sustainability and safety. In western Germany, several measures in the transportation industry have assisted in containing its harmful environmental consequences. OECD study revealed, the implementation of motor vehicle standards and incentives to hasten the replacement of older, noisier vehicles with cleaner ones; improved fuel quality, including tax differential incentives to increase unleaded gasoline sales; efficient inspection and maintenance programs for vehicles in use; improved transport system management; and improvements to urban public transportation.

B. Population

Worldometer estimates that as of today, Indonesia has 280 million people, compared to 84 million people in Germany (Worldometer, 2022). Consider the fact that population has a significant impact on congestion. According to the most recent data, there are currently almost 125 million vehicles on Indonesian roads, an increase of about 300 percent from the 30 million registered vehicles in 2004; approximately 85%–90% of Indonesians' personal automobiles are motorized two-wheelers (Highway & Network Management, 2018). Road fatalities have also increased in line with growing traffic congestion and vehicle density. Germany has 48,5 million registered passenger automobiles as of January 1, 2022, which is a considerable rise from the 48,2 million registered at the start of 2021 and the greatest number ever (Carter, 2022). Germany is one of the European nations that promotes environmentally friendly transportation, and because of the record-high cost of fuel, there are not as many personal vehicles in Germany as there are in Indonesia.

The total length of the roads in Indonesia is approximately 538,000 km, of which 47,000 km are national roads and 1,000 km are expressways. Travel times are excessively long because of heavy congestion and slow traffic speeds. A 100-kilometer travel can take something between 2.5 and 4 hours. The use of public transportation is highly needed to reduce congestion in both countries. Even though both appear to be aiming for the same public transportation system, the impact that is shown has a significant contrast. This may occur because of a variety of circumstances that determine how efficiently passengers can access public transportation. Regarding the case, one of the main issues was the population's desensitization in both cities of each country.

The train capacity of each nation will be the subject of the first comparison in public transportation. Indonesia has a metro system called the Jakarta MRT, which operates at a top speed of 110 kph. The MRT is shaped like a line of trains, each with an average of 6 wagons. Each railway wagon has 50 seats available for passengers and 150 standing people can then occupy the carriage's empty space (Kompas.com, 2018). Once the MRT is fully operational, it will be able to transport up to 1,800 people, with a daily goal of 173,400 people for passengers who can travel independently. With a track length of 16 kilometers, MRT Jakarta will include 13 stations (Hanifah, 2019). As for the departure intervals between trains every 5 minutes during rush hours at 07.00-09.00 and 17.00-19.00 WIB, every 10 minutes outside peak hours and weekends (Hanifah, 2019). As for the population in Jakarta there are 11,074,811 and the city's population density was 14,464 inhabitants per km^2.

There are many other types of metro systems in use in Germany, but the S-Bahn train in Berlin will be the central objective of this comparison. The S-Bahn is a network of 15 lines and about 170 stations for light rail. Berlin's city center, surrounding districts, and a few stops in Brandenburg are all served by the 330 km regional

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network (Berlin.de, 2022). The S-Bahn begins operating on weekdays at approximately 4.30 AM and ends at 1.30 AM. The trains run in 5-10, or 20 intervals depending on the time of day. S-Bahn trains run in intervals of 30 minutes throughout the night on weekends (Berlin.de, 2023). The 484 S-Bahn features 4 wagons, each measuring 73.6 meters in length. There are 438 standing room only spaces and 90 seats total, including 40 folding seats (Berlin.de, 2023). The 484 S-Bahn can reach the top speed of 100 kph (Berlin.de, 2023). On average, 1 million people travel on the S-Bahn each week, and 16 lines link the city to the surrounding area over the 257-kilometer route network In Berlin (Berlin.de, 2023). As for the population in Berlin there are 3,769,495 and the city's population density was 4,227 inhabitants per km^2.

Figure 1- The comparative of MRT Jakarta and Bahn Berlin velocity

Each of the two train's velocities will be compared in order to assess which is more efficient. Regarding their calculations, each train will have one stop, considering the range that is specified as well as the potential arrival times of each train at each stop. For MRT Jakarta the range is from Bundaran HI stop to Dukun Atas BNI with range of 2.5 KM and with Approximately 3 minutes reach destination which produce the velocity of 50 Km/h. As for S-Bahn S3 Berlin the range is from Wilhelmshagen stop to S Rahnsdorf with Approximately 3 minutes reach destination which produce the velocity of 84 Km/h.

According to the velocity calculation, S-Bahn Berlin is more efficient in reaching the destination. However, the S-Bahn appears to have a longer interval, with each train taking an average of 10-15 minutes, compared to the MRT Jakarta's average of 5 minutes. Additionally, the number of passengers each train is capable of carrying is variable. Regarding MRT Jakarta, which states that each train can accommodate 1800 passengers, while an S-Bahn Berlin train can accommodate 628 passengers, However, it is more equitable to examine the train capacity based on the population density of each area. Furthermore, the density population and capacity comparison ratio will be added to the calculation.

$\frac{Population\ Density}{Train\ Capacity}$ {Jakarta:Berlin} = (8:7) Ratio of effectiveness the train's carrying capacity.

It may be argued that the fairness of the capacity to hold each passenger of the train is effectively adjusted with the ratio of 8:7. Since Jakarta has a larger population than Berlin, it is only fair that its train has more room and capacity to accommodate its passengers.

Table 1 - of comparison on both train system between Jakarta and Berlin

Train	*Length of the track*	*Velocity*	*Interval Headway (minutes)*		*Ratio of train capacity efficiency*	*Cost Range Per-KM*	*Time Travel (Minutes)*
			weekday	*weekend*			
MRT Jakarta	*16 Km*	*50 Km/h*	*5*	*10*	*8*	*Rp 1.050*	*30*
S3 Berlin	*45.5 Km*	*84 Km/h*	*10*	*30*	*7*	*14 cents*	*72*

From analysing the result, it is clear that Jakarta MRT is affordable enough to be used as the same by the people in Berlin daily. But unfortunately, this type of train like MRT and S-Bahn is not spread enough around Indonesia cities with a big population such as Batam, Medan, Pekan Baru, and Bali. Since Indonesia just has

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started to develop this type of electric train. The use of public transportation can be encouraged if MRT is provided in other major cities in Indonesia. Furthermore, it can reduce on the use of private vehicles.

C. Landscape Structure

There are various ways to define a transportation system, and one of them is to consider the way the landscape is built and how it affects the way that transportation is conducted on the roads. Due to the significant difference in most of the transportation demand, the traffic landscapes of Germany and Indonesia have a huge gap of differences.

Based on its purpose, Indonesia's road system is divided into four groups (Nissan, 2022).

1. Arterial Roads. A public road that functions to serve the main transportation for long-distance travel, with a speed of around > 60km/hour. The width of the road reaches > 8m. This sort of road typically has a higher capacity than the usual volume of traffic. Roadways shouldn't be affected by neighborhood activity.
2. Collector Roads. Roads used to serve vehicles with moderate travel distances and speeds > 40km/hour. The road width is >7m, with a road capacity greater than or equal to the average traffic volume. Just like arterial roads, collector roads should not be disturbed by local activities.
3. Local Roads. Public roads that are used to serve vehicles traveling short distances and traveling at speeds >40km/hour. Road width reaches >5m.
4. Neighborhood Roads. Public roads that are used to serve vehicles traveling short distances and at low speeds.

German roads are classified into 5 groups and five types based on their primary use (Ryliškė et al., 2017). The 5 types of roads are:

1. Motorways (AS). Autobahns are widely known as “no speed limit” highways, although there is an advisory posted speed limit of 130Kph but driving over and above the posted speed is not prohibited along the Autobahn.
2. Rural Roads (LS). Speed limits are 50 Km/h in built-up areas such as towns and villages.
3. Trunk Roads in non-built-up areas (VS) and in built-up areas (HS). The built-up area is a place that the government has identified as having a lot of construction. Drivers must provide additional consideration to other road users because of the higher population density. Pay particular attention at intersections, parks, and schools. The speed limit is 50 km/h in built-up areas.
4. Local Roads (ES). Local roads also cater to major pedestrian and cyclist movements, so footway and cycle tracks or cycle lanes play a very important role in the safe movement of pedestrian and cyclist.

Figure 2 - Batam road section

Local roads in each states offer the local citizen a vastly different level of efficiency when it comes to transportation. Local roads in Indonesia are primarily designed for motorbikes and cars that can be seen in Figure 2, yet there is hardly ever a clear path for pedestrians to cross or a space for cyclists to ride their bikes in. Since most of the road landscape is built for a primary mode of transportation, such cars and motorcycles. It has been proven that very few people in Indonesia enjoy walking, regarding the numerous reasons why, these include the oppressive tropical heat, air pollution, pickpockets, and other shady characters. There is once study that reveal Indonesians laziest walkers in the world, with walk an average of 3,513 steps daily (Valentina, 2017). This is indicative of the fact that Indonesians do not have a lot of environments that promote walking or cycling.

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Figure 3 - Germany road section

The local roads in Germany are primarily made accessible for walking and cycling that can be seen in Figure 3. The walking path is tightly divided into sections for cyclists and pedestrians, and each section requires rigid compliance from the citizen. And Due to the seriousness with which cycling is treated in Germany, there are rules in place to regulate it. For example, it is against the law to ride a bike while under the influence of alcohol or narcotics (Marshall, 2021). Governments in Germany have taken substantial action to promote cycling because they understand that the country is primarily a country of automobiles, and that biking is one of many possible solutions to reduce emissions. To some extent that there are the 6 categories of policies in Germany that have made walking and cycling such safe and attractive alternatives to driving: Improved infrastructure for walking and cycling, urban planning mindful of no motorists' needs, traffic calming in residential areas, bans on the use of motor vehicles in cities, comprehensive traffic education of both motorists and no motorists, and strict enforcement of traffic laws protecting pedestrians and cyclists are all necessary (Pucher & Dijkstra, 2003).

D. Economic Fees

In Indonesia, when it comes to tax rates, Car taxes will typically range between 67.79 euros for the cheapest and 303.98 euros for the most expensive for an average family car, with the price for other types of cars depending on the sale rates in that particular year. As for the average type of motorcycle, the tax range starts at 18.62 €. Every year, a car tax (Kraftfahrzeugsteuer) is levied in Germany. Autos typically cost around 100 euros per year. Motorcycles cost about 50 euros per year. The most is approximately 375 euros each year (Bouliane, 2023).

Regarding the tax rate comparison Compared to Indonesia, Germany's rate is slightly higher. There is an additional tax charge related to tax payments that is regulated by the German government. The tax of 30 euros per year will be imposed for five years, no later than December 31, 2025, on cars with CO2 emissions of up to 95 grams per kilometer that are registered for the first time between the day of the ministerial decree and December 31, 2024, to further encourage the use of vehicles with low emissions (Wappelhorst, 2020).

An increasing ecological focus will be placed on the automobile ownership tax. Owners of high-CO2-emitting vehicles will face higher taxes, while owners of low-emitting vehicles will benefit from more advantageous tax breaks. According to current legislation, owners of vehicles must pay €2.00 for every 100 cm3 of displacement for gasoline engines and €9.50 for diesel engines. If the vehicle emits more than 95 g of CO2/km, a tax of 2 euros per gram of CO2 is charged. According to the HPP Law, the government of Indonesia also intended to control tax emissions with the cap and trade and tax systems at a rate of IDR 30 per kg CO2 equivalent (Assiddiq, 2022). This tax was reduced from the IDR 75 per kg of CO2 equivalent that was originally considered in the bill. Each tax subject is assigned a set quota on their carbon emissions, and they have the option to purchase more stamps from other tax subjects if they do not already own all of the stamps they need. However, it appears that Indonesia has already postponed implementing this legislation a few times and has not done so until now. To view the major comparison of both transportation costs, the parameters of the comparison will be extended to compare the same octane number and pricing for gasoline prices on both sides.

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Table 2 - Fuel Price Comparison (globalpetrolprices, 2022)

Country	*Octane-95 (Littre/Euro)*
Indonesia	*0.845*
German	*1.854*

Status: November 2022

According to the Global Petrol Prices database, Germany has higher gasoline prices than Indonesia. Indonesia has the third lowest Pertamax fuel prices in Southeast Asia when compared to several other nations. For this year's energy subsidies, the government has allocated IDR 502.4 trillion in funding (Annur, 2022). With this subsidy, Indonesia's Pertamax gasoline is more affordable than that of its neighbors, including Vietnam, where the price per liter is Rp. 15,046; Myanmar, where the price per liter is Rp. 16,207; and Singapore, where the price per liter is Rp. 30,007 (Annur, 2022). To summarize the collected data, it is apparent that Germany has higher transportation fees, which contribute significantly to promoting walking and cycling. In addition to the general contributing factor of high fees, the road's environment also promotes citizens' abilities to comfortably walk and cycle more.

E. Safety

The increasing rate of accidents from year to year is allegedly caused by several factors, including the human element, vehicle factor, and environmental factor (Irfan et al., 2018). Road traffic accident deaths in Indonesia totaled 30,668 in 2020, or 1.81 percent of all fatalities, according to the most recent WHO data. According to the most recent WHO statistics, 3,160 people died in road traffic accidents in Germany in 2020, or 0.45% of all fatalities. Based on potential impacts, such as the estimation of medical costs, production losses, human losses, property damage, settlement costs, and accident-induced congestion costs, the consequences of an accident can be calculated (Irfan et al., 2018). Unsafe road infrastructure, which should ideally be developed with the safety of all road users in mind, is one of the risk factors for traffic accidents, according to the WHO. This would entail making certain that there are sufficient facilities for pedestrians, bicyclists, and motorcycle riders. The danger of injury for these road users can be significantly decreased by strategies like sidewalks, cycling lanes, safe crossing points, and other traffic calming measures. Therefore, it may be considered that Germany has a safer transportation environment.

Due to a lack of awareness, several areas of Indonesia still do not comply with the road rules as compared to Germany. According to the South Sulawesi Regional Police Traffic Directorate, the lack of enthusiasm among the community to comply with traffic laws is reflected in the disobedience of road users. This is proven by the fact that many kids continue to drive even though they do not yet possess a valid license, and by the fact that some parents still take pride in the fact that their children can and do ride motorcycles for official purposes like attending school and other events (Ophelia, 2022). Since the government is rather strict about regulating the rules and regulations regarding driving in Germany, folks are obeying the laws while driving in German. Since there are so few people who dare break the law and risk being fined, there aren't many cases of underage driving.

IV. CONCLUSION

As a result of the considerable research that has been done with this paper, it is evident that the transport systems of Indonesia and Germany differ significantly. particularly in terms of their sustainability regarding both the environment and transportation. And based on this study, it appears that Indonesia places more emphasis on each person's efficiency in terms of the transportation demand, whereas Germany places more emphasis on the efficiency of the entire community in terms of both the transportation demand and the environment. To reduce the amount of fuel needed for transportation, it would be ideal if Indonesia's government concentrated on establishing a transportation system based on its population' mobility and one that can accommodate all the transportation demands given its enormous population. It can be used to maintain Indonesia's environment for the comfort of its residents, in addition to saving energy and lowering the economic costs that the government spent for citizen subsidies each year for the fuel fees.

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