



Building a New Future of Transforming Jakarta into Green and Sustainable Model Smart City

Danielle Kai Ying¹, Alysha Samantha Antonius², Yossy Fauziah²,
Virgie Alyka Putri², and Fuad Wahdan Muhibuddin²(✉)

¹ Graduate School of Business, Universiti Sains Malaysia (USM), George Town, Malaysia

² Institut Pertanian Bogor (IPB) University, Bogor Regency, Indonesia

fuadwahdan@apps.ipb.ac.id

Abstract. Studies have shown that the earth has taken massive damages due to unsustainable living methods humans have applied over the last decades. Hence, this study attempted to review various methods in supporting the SDGs and the possibilities in conducting them. Such modification is ought to be implemented in big cities such as Jakarta. Industrial Revolution 4.0 (IR 4.0) generates huge technology transformation which induces sustainable and efficient invention in living. This study used a literature review method, limiting our search in both English and Indonesian academic journals, full text and accessible, peer-reviewed, within the last ten years. We explored in-depth 22 journals and 11 websites related to SDGs and green innovations within the last ten years. The study found that the concept of renewable energy island, e-governance, and green mobility are feasible to be implemented in Jakarta. However, the government needs to provide resources and infrastructures, as well as raising awareness for the public.

Keywords: E-governance · Green Mobility · Smart City · Sustainable Living · Sustainable Development Goals

1 Introduction

Humans have been living and growing using unsustainable methods for a long time, which causes carbon emissions to rise to record levels. Annually, these activities that humans do release more carbon emissions into the Earth's atmosphere than natural processes can remove, causing the amount of carbon dioxide in the atmosphere to increase at an alarming rate [1]. Figure 1 shows the total amount of annual carbon emissions, and the staggering amount of carbon in our atmosphere tells us that we should be reacting to it right now. Jakarta is facing major severe issues such as public health, environmental quality degradation, and social inequality. The time has come for all to be needing to be able to live sustainably while thriving is increasingly important in this climate. Hence, goals like the Sustainable Development Goals (SDGs) are being set up to address humanity's wishes of living better, and SDGs can be working well with technological advancements, such as the incoming Industrial Revolution 4.0 (IR 4.0), which focuses on radical technological transformation that focuses on autonomous technology, may come in to assist big cities like Jakarta to move towards a sustainable and smart one.

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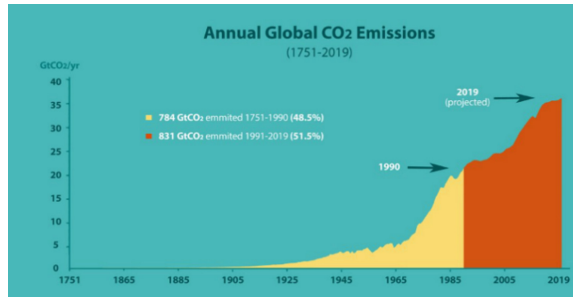


Fig. 1. Total Global Carbon Emissions since 1751. (Source: Stainforth and Brzezinski, 2020).

With IR4.0, some SDGs such as goal number 7 - affordable and clean energy that optimizes the use of energy and forces governments to move away from non-renewable energy sources; goal number 8 - decent work and economic growth may also assist Indonesia in new job allocation, with upcoming green jobs are being offered; lastly goal number 12 - responsible consumption and production will definitely look to minimize waste generation and treat waste as useful resources [2].

In this journal report, we will look into some underlying climate issues that are the main challenge and some tools to mitigate or shift away towards the over-reliance on non-renewable energy sources, while moving on we also will discuss further on some green transportation modes as Jakarta looks to becoming a model smart and sustainable city. Although transportation is just one part of forming a sustainable and smart city, it is the most vital, as having a complete package will definitely create a positive mindset on the public, and finally a healthy social life [3].

2 Method

A method using a literature review used in this study. We limit our search to search for academic journals, full text and accessible, peer-reviewed, in the last ten years in Indonesian and English which are then translated. The search itself also uses an online database that is already available, making the searches that researchers make easier to manage. However, it is possible that the search results are relevant and irrelevant to the topic that the researcher wants to research. There were many journals that were sought, so researchers had to do a screening so that they could match the criteria. This research was made with an online document folder and included it on the topic of analysis. In addition, this research involves available sources such as Scopus, online database, website, Mendeley, academia, google scholar which is used to find data related to the keywords "Climate issue and mitigation tools, Governance on climate issue, Innovative green transportation modes, and Governance on green transportations" keyword used only to emphasize that the amount of relevant literature on this topic is limited to 22 journals and 11 websites in this research screening (Table 1).

Table 1. Details of Articles based on climate change

Topics related to	Number of Articles	Article name / authors
Climate issue and mitigation tools	7	<ul style="list-style-type: none"> - Introduction to the Special Issue: ‘Governing Climate-altering Approaches’ - Janos Pasztor and Nicholas Harrison - Special Issue “Climate Change, Carbon Capture, Storage and CO2 Mineralisation Technologies” - Nikolaos Koukouzas, Pavlos Tyrologou and Petros Koutsovitis - Focus Issue: Adaptation to Climate Change and Sustainable Mountain Development—Assessing Approaches and Understanding Implications for the Future - Mapping the sustainable development goals relationships - Luis Miguel Fonseca, José Pedro Domingues, Alina Mihaela Dima - Hungarian regions and cities towards an adaptive future – analysis of climate change strategies on different spatial levels Mária Szalmáné Csete and Attila Buzási - Monitoring Climate Change in World Heritage Properties: Evaluating Landscape-Based Approach in the State of Conservation System - Paloma Guzman, Sandra Fatorić and Maya Ishizawa - A Tool for the Assessment of Urban Mobility Scenarios in Climate Change Mitigation: an Application to the Granada’s LRT Project Miguel L. Navarro-Ligero, Luis Miguel Valenzuela-Montes

(continued)

Table 1. (continued)

Topics related to	Number of Articles	Article name / authors
Governance on climate issue	9	<ul style="list-style-type: none"> - The electric vehicle: a review - Ning Ding*, K. Prasad and T.T. Lie - Lessons Learned On Early Electric Vehicle Fast-Charging Deployments - Michael Nicholas and Dale Hall - E-Governance Paradigm Using Cloud Infrastructure: Benefits and Challenges - Satyabrata Dasha, Subhendu Kumar Pani - Learning in urban climate governance: concepts, key issues and challenges- Wolfram, Marc - The Perceptions and Adaptation Strategies of Semende Coffee Farmers in Facing Climate Change Impacts -Muhammad Raka Hadiyan - Natural Disaster, Climate Change, Environment and Response- Ali Mohammad Rezaie Mohammad Feisal Rahman Saleemul Huq - Development objective implementation program sustainability (SDGs) in change climate in Indonesia- Gindo Leontinus R. Siringoringo - Indonesia's position and strategy in facing climate change to support national resilience- Tri legionosuko - Governance challenges if climate change policy in Indonesia- Rifka Sibarani
Innovative green transportation modes	2	<ul style="list-style-type: none"> - Sustainable and green transportation for better quality of life case study greater Cairo – (Egypt) Mona Mahrous Abdel Wahed Ahmed &Nanis Abd El Monem - Technology Innovations in Green Transport (January 2022) In book: Green Economy in the Transport Sector by Peter Bitta Bikam

(continued)

Table 1. (continued)

Topics related to	Number of Articles	Article name / authors
Governance on green transportations	4	- GOVERNANCE OF GREEN TRANSPORT CORRIDORS (November 2014) - Gunnar Prause - Smart Transportation using IoT at DKI Jakarta 2019 - Septia Redisa Sriratnasari, Gunawan Wang, Emil Robert Kaburuan, Riyanto Jayadi - Implementation of smart city concept: A case of Jakarta Smart City, Indonesia - Salsabila I Syalianda and Ratih D Kusumastuti - Challenges and Future Prospects for E-Governance in India - Poonam Malik Priyanka Dhillon, Poonam Verma

3 Result

3.1 Climate Issue and Governance

The earth's climate is rapidly changing, and it is for the worst, unfortunately. Countries have been growing exponentially for the past 40–50 years, with the abundance of natural resources such as fossil fuels and natural gas at humanity's expense. There are various ways to improve the situation due to disasters that cause climate change around the world in various fields. All forms of rules regarding the way of life, programs, activities and actions carried out by every formal and non-formal institution with the aim of raising awareness of the world community regarding the importance of the issue of climate change that can be realized [4]. For a long period of time, we are able to get away with it without having to face the consequences, as a result of our abusive and excessive use of our natural resources. The answer to this, is some form of international agreement, such as the signing of Paris Agreement that aims to keep nations from 196 countries to adhere to a maximum increment limit of 1.5 degree Celsius (1.5 °C) global target. In several studies, it is stated that the issue of climate change policy is often referred to as “the super wicked problem”. So many climate changes with complex scales have made climate change a global crisis in developed and developing countries, including Indonesia [5]. Indonesia is one of the country's most at risk of climate change. As one of the ASEAN countries, Indonesia is also feeling the impact of climate change by earning a loss of 6% annually on economic growth and perhaps more than double the similar estimate for the global average [6]. Maybe this is because Indonesia is located between two continents and two oceans. Historically, Indonesia has depended on a climate that can help its people live, in addition to gaining status as one of the archipelagic countries in the world [7]. Climate change is already exacerbating water shortages, limiting agricultural production, and threatening food security, and causing forest fires, coastal degradation,

loss of biodiversity and greater health risks associated with heatwaves and infectious diseases in several member states. Then, Projected Sea level rise results in increased coastal flooding, permanent inundation, and salinity intrusion for many densely populated and economically important coastal and estuarine areas city [8].

In this part, we will critically discuss the overall climate issues and some mitigation tools that are said to realistically move Indonesia away from the reliance on non-renewable energy sources such as coal and fossil fuels. After that, articles related to governing the oversight issue on this matter are also discussed further.

Climate change is a global issue, and all nations should collectively come together to react to avoid a global catastrophe. Various plans as a form of prevention must be made in order to offer potential benefits in considering before deciding [9]. A common phenomenon is that, developing nations due to wanting to develop their countries will be producing the most carbon emissions, but in fact, it is the developed nations that are releasing the most greenhouse gas emissions, and the developing nations are left to face the climate consequences [10]. For context, sample developing nations such as Bangladesh, Indonesia and Malaysia are just some examples of Asian developing nations that are most at risk from the impacts of climate change [11]. The same also can be said for the African continent, whereby according to a United Nations Environmental Program (UNEP) report, the region is most likely to be affected by extreme living conditions such as long-term drought and water scarcity. Yet, with the ongoing crisis that is happening in African countries, activities like coal and lithium mining are ramping up, all in the name of “nation development”, but at the expense of the greater environment as well as the regional ecosystem [12]. Circling back to the context of Indonesia, as coal mining is one of the more aggressive activities that is undertaken by the country, with the country alone producing 616 million tons of coal in 2019, making Indonesia the world’s biggest coal exporter and also the twelfth largest consumer of coal worldwide [13]. The rapid and immense rise in becoming a major coal player has come at a huge cost towards the environment. In Borneo and Sumatra, these coal mining activities that often lack proper oversight, have caused problems like water pollution and landscape degradation, on top of the most obvious problem, which is air pollution nationwide. So that it can be said that the city holds the key in preventing and adapting to climate change, the city can produce about two thirds of the total emissions of greenhouse gases globally and is able to make the same contribution as energy consumption [14]. Climate change involves impacts on the present and the future [15].

Climate Issue Mitigation Tools

In this part, our group will try to introduce a radical, relatively unheard plan into transforming Indonesia into a clean, renewable energy powerhouse around the Southeast Asia (SEA) region. The answer for it is the introduction of building a renewable energy island (REI). The original idea was introduced by the Danish government’s ambitious plan to overhaul how the country gets its energy sources. The size of the entire energy island will be around 120,000 square meters in area size, which is equivalent to the size of 20 football fields. It is then powered by the capacity of 200 wind turbines that can generate 3 gigawatts of energy [16]. Basically, the renewable energy island will serve as the green energy platform to serve the energy needs of Indonesians, from powering housing electricity to refuelling electrical vehicles. Although it might seem futuristic

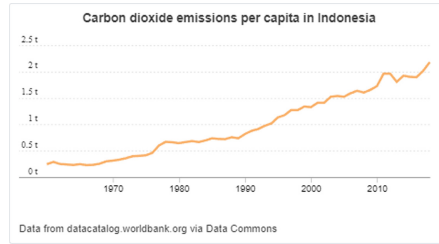


Fig. 2. Carbon dioxide emission in Indonesia as of 2018 [20].

and unattainable, there is actually a small-scale success story, in which Samsø, a region in Denmark, successfully built their own Samsø Renewable Energy Island and also have been successful in their transforming a large parts of its energy system in a period of 10 years, from relying on non-renewable sources to a fully green energy source [17]. Indonesia also is a great country to implement such measures, with the country having almost 6,000 inhabited islands and some of those can be the perfect location to implement the REI project. This is also inseparable from the close relationship with Indonesia's natural and cultural heritage [18].

Once we address the need to have a green energy source in order to power Indonesia towards a green country, now we will address the underlying pollution issue surrounding the country. As Indonesia, like most of the countries, is still heavily relying on non-renewable energy sources like fossil fuels, decreasing the reliance on fossil fuels and accelerating the deployment of low-carbon technologies is paramount [19]. Up until the year 2018, Indonesia's carbon emission level is at 2.18 metric tons. High levels of carbon emissions will have long lasting effects towards living organisms such as humans, flora, and faunas. Figure 2 indicates Indonesia's steady rise in carbon emissions since the 1960s. Its shown on Fig. 2.

To address this problem, technological and biological sequestration techniques will be enforced. For technological solutions, the carbon capture and storage (CCS) technology will be introduced here, and basically CCS are just one of many technological tools that can assist to reduce carbon emissions from the atmosphere [20].

Essentially, CCS will be acting as a carbon extraction tool, that sucks carbon dioxide out from the atmosphere, and once the captured carbon is obtained, it is being transferred and stored deep under used oil rigs, onshore or offshore [21]. Moving to biological sequestration, mass reforestation activities need to be carved out and planned, as biological carbon sequestration is nature's way of absorbing the carbon in the atmosphere. However, comparing it to CCS, nature's way of capturing carbon may be longer, and results may not be as visible.

Expert researchers point out that the damaging effects of climate change will result in a proportional reduction in developing countries, especially in the poor, who are vulnerable and likely to be less able to adapt. This damage can hinder the development of the economy. Following are the 3 steps towards a low carbon economy [4]:

1. Changing the path of economic growth towards a low carbon footprint and reducing greenhouse gas (GHG) emissions per rupiah of production and consumption,

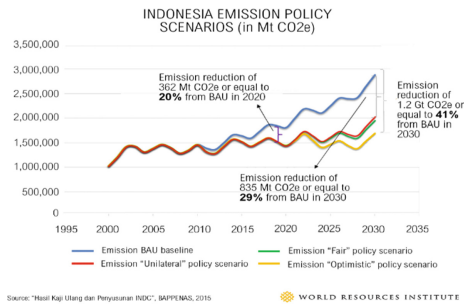


Fig. 3. Scenarios of gas emission policies in Indonesia [4].

2. Economic decarbonization through the adoption of low-carbon technologies in industry and changing consumer lifestyles,
3. Utilizing low-carbon technologies in new investments in the OECD report, identified key technological innovations that are important for achieving a low-carbon economy. Including sequestration and storage of carbohydrates (CCS) which involves the absorption of carbon dioxide before it is emitted into the atmosphere as well as negative emissions that remove greenhouse gases from the atmosphere, especially to offset emissions from sectors such as industry and aviation. It shown in Fig. 3.

The government has completed the document Intribution Nationality Determined Contribution (INDC) with a target to reduce carbon emissions by year 2030 by 29%. After 2020, low emission development will focus on energy, food and water resources sectors and pay attention to Indonesia as a country Island. Indigenous people are mentioned as an important part of overcoming climate change. The draft INDC was announced on the Ministry of Environment website and Forestry, for the next two weeks to get input from the community. Figures 29% obtained from the results of good analysis with a methodical theoretical approach and empirically over a long period of time calculated based on the estimated activity carried out, and government policies in nation building. Even though from 2020–2030, the estimated emission reduction is three percent to 29%, metric tons are still a big number. Now, among the sectors, there are still negotiations about how many numbers are realistic for Indonesia because Indonesia has a manufacturing industry, life our maritime, which means sea transportation also consumes a lot of emissions. By 2030, biggest emission reduction from energy sector no longer in the forestry sector [22].

3.2 Green Transportation and Governance

Actualizing a smart city and application of green mobility require concrete framework and planning, and this is also applied to the governance model. Governance is a system which controls, decides, and manages the policies of a country, making it inseparable from citizenship. Unlike a traditional city, modern cities require advanced technology which enables a governance system to become transparent and thorough. Therefore, in order to support the implementation of smart cities which include green mobility, the governance system should also be designed accordingly, in which one of the feasible

designs is to create an e-governance system. E-governance system is based on ICT (information, communication, and technology) concept, allowing positive key changes such as [23]:

1. Automation: e-governance replaces traditional methods from accepting to transmitting information to an automated system with nearly zero percentage error rate,
2. Informatisation: this system supports government in creating and implementing certain policies through data-centered decision making,
3. Transformation: e-governance system transforms traditional information processing into ICT-based.

Jakarta has been implementing the concept of e-governance through the concept of Smart City Portal. Smart City Portal is a website which centralizes essential information regarding the Departments and Bureaus of Jakarta, hoping to ease the public service, improve business and individual activity bureaucracy. Citizens are able to gain direct access to important information such as health units' availability, crime footage, and details about disasters such as earthquakes, floods and affected areas. These concepts provide efficient assistance which promotes transparency and avoids corruption and collusion. Nonetheless, in the implementation practice, there are several major obstacles and challenges the government has to counter.

Low Awareness Rate

According to a survey that was conducted by DKI Jakarta Communication and Information Agency in 2019 stated that only roughly 12.88% of respondents knew about the Jakarta Smart City Portal. Additionally, only 11.85% of respondents had accessed the portal [24]. The survey also stated that the users' usage intensity was relatively low, with the average of maximum three times a week. In order to actualize e-governance, the public must be aware of this facility. There should be more exposure through socializations.

Lacking Green Infrastructures

The current infrastructure and resources Jakarta have haven't taken green mobility into account. Through the project Smart Mobility, within the last five years, the government has already been building transportation infrastructure. This project allows digital connection and real-time synchronization of transportation databases (schedules, locations, stops) to support mobility of citizens. One of the innovations that has been created is Tijeku, an application which focuses on Transjakarta [25]. However, this innovation solely isn't in line with the concept of green mobility, where carbon dioxide emission is supposed to be alleviated. Applications which are similar to Tijeku support fossil fuel-based transportation to operate, indirectly causing people to live unsustainably.

Smart Transportation

Smart cities are increasingly evolving, initializing new strategies, and programs that have a significant influence on policy making and scheduling while coexisting with urban facilities. To recognize urban planning offers to a smarter city context, it is now necessary to understand the contribution of the smart city in overall urban planning

and vice versa. Currently, transportation has been seen as a connection to all aspects of life across the world. The green urban mobility model has been proposed to investigate urban traffic information to characterize important features of smart mobility in the smart cities. The development of intelligent transportation systems using the proposed model that makes traffic easier in the city to transport safely and more comfortably.

The aim of this research is to explore the relation of smart city and green transportation development that could be applied in Jakarta and to contribute an understanding to the existing body of knowledge, areas of good practice allied to potential topics of future research. The green transport corridor concept represents a cornerstone in the development and implementation of integrated and sustainable transport solutions based on trans-shipment routes with concentration of freight traffic between major hubs and by long distances of transport marked by reduced environmental and climate impact.

However, one of the main reasons why this issue is relevant is because nowadays, Indonesia is facing air pollution threats. Based on the data from IQair by June 22, 2022, Jakarta has officially become the city with the worst air quality and urban pollution in the world. According to the Deputy Governor of DKI Jakarta, Ahmad Riza Patria, Jakarta's efforts in implementing the green transportation concept began with planning the transition of Transjakarta buses into electric buses by targeting 80% of the buses to have turned into electric buses by 2030. In the context of fulfilling energy in the future, he affirmed his vision, which is to create a national energy policy program until 2025, reducing the use of fuel oil from 54.4% to 26.2%. Fuel oil, which has been popularly used, will gradually be diverted to the use of gas, coal, and other alternative energy to meet transportation and household needs, and will gradually increase the number of electric vehicle users so as to reduce energy use and the impact of air pollution.

Indicators of sustainable transport are:

1. Travel safety for drivers and passengers,
2. Energy use by modes of transportation,
3. CO₂ emissions by mode of transportation,
4. The effect of transportation on the surrounding environment,
5. Emission of toxic and hazardous chemicals, air pollution due to modes transportation,
6. Use the land for transportation modes such as parking lots,
7. Disturbance of natural areas by modes of transportation,
8. Noise pollution by modes of transportation.

To create Jakarta environmentally comfort, we need an approach that is used to create less transportation (reduce transportation) or do not produce greenhouse gases (zero transportation). According to Williams (2012) [7], some indicators of Green Transportation are the level of ownership of private cars, level of fuel use, time and distance of travel, level of use of public transport, mass transport, facilities for cycling and running, and smart transportation management systems.

Some indicators of Green Transportation according to Williams (2012) which are in Jakarta city are:

1. The level of private motor vehicle ownership in 2019 to 2021 in the City of Jakarta according to BPS data is showing the number of private car ownership in Jakarta

continues to increase. It is very difficult to lower the number of motorized vehicles because it has not been supported by adequate public transportation.

2. Fuel Consumption Levels.

In January 2021 PT Pertamina Regional West Java recorded an increase in consumption of Perta Series (Pertalite, Pertamax, and Pertamax Turbo) fuel oil in South Jakarta City, West Jakarta City and East Jakarta City. In the South Jakarta City area, the consumption of Pertalite (RON 90) increased by about 39% compared to the average daily normal consumption of more than 190,000 Liters. Meanwhile, the consumption of Pertamax (RON 92) also increased by about 2% compared to the average daily normal consumption of almost 5,000 Liters. Meanwhile, the consumption of Pertamax Turbo (RON 98) also increased by around 2% compared to the average daily consumption of more than 1,000 Liters. Pertamina also recorded an increase in Perta Series consumption in the West Jakarta City area, where Pertalite consumption increased by around 38% compared to the average daily normal consumption of almost 186,000 Liters. For Pertamax consumption, it was recorded that there was an increase of around 1% compared to the average daily normal consumption of more than 2,000 Liters. Likewise in the East Jakarta City area, Perta Series fuel consumption increased by around 34% compared to the normal daily average consumption of more than 72,000 Liters.

3. Time and Distance of Travel

Quoted from detik.com, according to data from the TomTom Traffic Index 2021, in 2021, there will be a decrease in the level of congestion in Jakarta. The data shows the average travel time is reduced by 2 minutes per day. Jakarta has a congestion rate of 34%. That number decreased slightly from the previous year which was recorded at 36%. The meaning of the 34% congestion rate is that the average travel time is 34% longer in traffic jams than in normal conditions when traffic is smooth. So, when a normal journey from point A to point B takes 30 minutes, with the same distance the travel time is 34% longer when traffic jams.

4. Level of Use of Public Transport

Actually, the coverage of mass transit services in Jakarta reaches 96.1 percent of the population. Transjakarta bus passengers continue to increase. In 2014 the number of Transjakarta passengers was 112 million per year and increased by 69 percent in 2018 to 190 million passengers.

5. Mass Transport

According to data.jakarta.go.id alerts, in 2020 the number of public transportation in Jakarta is dominated by microbus cars with a total of 2,605 units. Followed by city transportation (angkot) KWK (Koperasi Wahana Kalpika) totaling 2,042 units, Transjakarta 1,296 units, Bemo replacement (APB) 577 units, and Metromini buses 7 units.

6. Facilities for Cycling and Running

In Jakarta, pedestrian and cyclist facilities have been built, but they are not matched by strict regulations. Rules are written only, not actively enforced. Making two-wheeled or four-wheeled riders, not infrequently bravely pass the sidewalk and not infrequently car drivers park their vehicles on special bicycle lanes. Drivers also tend not to prioritize pedestrians and cyclists who want to cross. Other than that, Jakarta has quite complex problems, for example, there are still many traders

who trade on the sidewalks, selfish drivers, and the road structure is still not well organized. These are some of the problems that need attention.

7. Smart Transportation Management System

The Ministry of Transportation has taken steps to accelerate the implementation of a smart transportation system by collaborating with the Ministry of Agrarian, Infrastructure and Transport of the Republic of Korea (Ministry of Land, Infrastructure, and Transport) in a number of sectors.

The process of signing a Memorandum of Agreement (MOU) for the land transportation sector was carried out between the Director General of Land Transportation, Budi Setiyadi and the Deputy Minister of Agrarian Affairs and Infrastructure of the Ministry of Land, Infrastructure and Transport of the Republic of Korea, Yun Seong-won, witnessed by the Minister of Transportation of the Republic of Indonesia, Budi Sumadi's work.

The cooperation between the two countries includes the implementation of a grant from the Republic of Korea on a pilot project for the construction of ITS and the development of a bus terminal, as well as a Bus Information Management System (BIMS) in Jakarta, Bogor, Depok, Tangerang, and Bekasi area.

The implementation of ITS in Indonesia, continued Director General Budi, will greatly help solve transportation and traffic problems in Indonesia. "We will immediately implement traffic management by implementing ITS and it is hoped that in 2022 it will begin to be implemented in several corridors in big cities in Indonesia. We have also integrated the ITS scheme with how Indonesia is committed to building BTS for urban mass transportation," he said.

The author sees the following activities as particular priorities for the development of the transportation in the cities:

1. Reduce congestion; Strategies to reduce congestion can be done by: transportation and management information; mobility management, access restrictions, promotion of public transport, distribution of goods and logistics, parking management, road pricing.
2. Reducing energy use and exhaust emissions; in reducing use energy and exhaust emissions can be done with mobility management, promotion use of bicycles and non-motorized vehicles, carpooling, fuel clean and environmentally friendly, such as the use of biofuels, gas fuel, electric vehicles and other clean vehicles such as hybrids; Promotion more intensive public transportation so that private vehicle users want to switch to public transportation; and Application of traffic control levies and various tariff and fiscal policies.
3. Reducing local emissions and improving the quality of life in the city center can be done with; access restrictions, distribution of goods and logistics, parking management
4. Improved transportation efficiency can be done by: integration of multi transportation capital, mobility management, promotion of bicycle use, carpooling, restrictions access, promotion of the use of public transport and road pricing.

4 Conclusion

A theoretical framework of the climate issue and the mitigation tools also green transportation to be applied on Jakarta has been presented. The concept delivers an ability to pull on the actors required (such as governance and also public attention and awareness) in a horizontally integrated collaborative process to gain a mitigation tools for climate change and green transportation for smart city concept that is not just centred on data and technology, but appreciates other factors associated to ‘connected’ success in delivering economic and social change and development in a resilient and sustainable manner.

The research project will be through a data driven approach review, pilot, and identification of network synergies across the city of Jakarta that complement that desire to adopt a data driven approach that embraces technology for multidisciplinary economic, climate and social good. As this is an indirect study based on the data already available, there will definitely be emerging areas of future research related to the research findings, which will be published in the next related paper.

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