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Integrating Business Models into Public Policy for Sustainable Transport in Batam City

Enos Paselle[1], *Etika Khairina*[2], *Agus Priyanto*[3], *Fathul Qarib*[4]

[1]*Department of Public Administration, Mulawarman University*
[2]*Department of Government Studies, Bunda Tanah Melayu College of Social and Political Sciences.*
[3]*Department of Government Studies, Terbuka University*
[4]*Kocaeli University, Turkey.*

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CORRESPONDENCE

Name: Etika Khairina
Email: etikakhairina@gmail.com

A B S T R A C T

This study aims to show how the government innovates in realizing sustainable development in transportation, and how the transition path of developing regions in this study focuses on the Batam city, accelerating change through public policy with a business approach. This study uses a qualitative descriptive approach, with primary and secondary data sources. Primary through observation, observation interviews, documentation, and focus group discussions. Meanwhile, secondary sources come from research results, literature studies, and documentation from the Batam city government and the mass media. The analysis technique uses triangulation assisted by the NVivo 14 tools application. The results of the study show that there are three programs that the government can utilize through a business approach to accelerate sustainable transportation, namely energy transition, mobility services, and multimodal infrastructure development. The energy transition can be carried out by implementing electric transportation even in long-term development. This step hurts the sustainability of electrical energy sources, but its externalities minimize the dissolution of fuel use. one of which is possible is park and ride which can connect the community with digital-based public services, and finally Batam City as an industrial city can utilize the private sector/companies as third parties (multilevel perspective), The interaction between the two will be on each other which can continue through integration to achieve alignment of goals according to the concept of sustainable development targets.

INTRODUCTION

The transport sector plays a significant role in air pollution resulting in climate change due to green house gases (GHG) emissions mostly inurban regions. Transportation is a large contributor to pollution and apart from energy generation and industrial processing. Sustainable transportation is framed as a critical urban issue intersecting with complex global issues, such as climate change(Bamwesigye & Petra, 2019; Leuenberger et al., 2020; Sultana et al., 2019a), as well as local issues like human health (Malasek, 2020a; Pawłowska, 2018; Zawieska & Pieriegud, 2020). In appreciation of this vital significance, transport systems have been referred to as the "lifeblood" of cities (Kwilinski et al., 2023), The transport sector is responsible for major parts of the overall greenhouse gas emissions with no substantial reductions (Leuenberger et al., 2014; Miller et al., 2016).

An efficient transport system is a key factor in a city's social and economic growth, According to (Ogryzek et al., 2020) frameworks frame sustainable urban transportation as a balance between economy, environment and society. The same thing was conveyed by (Sultana et al., 2019) Although reducing greenhouse gas emissions in the transportation sector may be more costly than in other sectors, this sector is essential to effective climate protection (Bamwesigye & Hlavackova, 2022; Kriukelyte et al., 2024a; Lane & Beeler Joseph, 2020). Replacing internal combustion engines with new energy vehicles, such as electric vehicles (EVs), appears to be a promising step towards envisioning urban sustainability (Gunartin, 2018; Pratiwi et al., 2015). According (Sharifi et al., 2020) Electric mobility-related technologies have been evolving rapidly.

Sustainable transportation is a part of sustainable development goals. A more general definition of "sustainable development" is "development that meets the needs of the present without compromising the capabilities of future generations to meet their own needs (He & Haasis, 2020; Zhao et al., 2020). Sustainable transportation aims to achieve the following general goals To ensure that our transport systems meet society's economic, social and environmental needs whilst minimising their undesirable impacts on the economy, society and the environment (Bailin & Wish, 2019; Lane & Beeler Joseph, 2020; Yigitcanlar et al., 2019). The goal of sustainable development is to strike the best possible balance between social, economic, and environmental goals (Hiremath et al., 2019). Some who are skeptical may believe that sustainable planning is just another term for comprehensive planning (Hipogrosso & Nesmachnow, 2019; Khansari et al., 2020). This may be the case, but the planning of many governments has been subpar.

The idea of sustainability offers a structure and resources for long-term, all encompassing planning that acknowledges the intricate connections that cut across traditional geographic and temporal boundaries. According to (Ahvenniemi et al., 2017; Gallo & Marinelli, 2020)resource depletion and air pollution pose the biggest longterm ecological risk and are often overlooked by traditional planning, sustainability is sometimes defined narrowly, for instance by concentrating on these issues. However, the definition of sustainability is becoming more inclusive, encompassing the problems depicted in Figure 1.

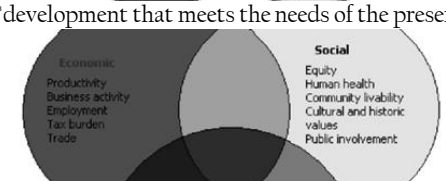

Figure 1. Problems that occur due to transportation.

Even while Figure 1 suggests that each problem falls into a distinct category, in reality, these frequently overlap. For instance, pollution is an environmental issue that also has an impact on the fishing and tourism sectors (economic issues) and human health (social issues). The understanding that affects and goals frequently interact, which necessitates integrated analysis in solutions, is reflected in sustainable planning.

A narrow definition of sustainability sometimes ignores the connections between problems and chances for concerted responses. For instance (Kigochi, 2024)while some measures for reducing emissions from climate change may worsen existing social, economic, and environmental issues, other strategies offer several advantages. According (Trindade et al., 2022)Up until recently, the majority of economists believed that greater mobility had net economic benefits regardless of its social and environmental consequences. However, new research shows that beyond an optimal level, increased motor vehicle travel can have overall negative economic effects because driving imposes external costs that can offset direct economic gains and the marginal productivity of increased travel is declining (Stafford Smith et al., 2017) This suggests that identifying techniques that increase the efficiency of the transportation system over time can assist achieve all of these goals, rather than continually requiring choices between economic, social, and environmental objectives (Agaton et al., 2020; Pandey & Erbaugh, 2024).

In order to monitor trends, compare regions and activities, assess specific policies and planning choices, and establish performance goals, sustainability is typically assessed using a set of quantifiable indicators (Miller et al., 2016). The choice of indicators has a big impact on the analysis's outcomes. When assessed using one set of indicators, a given program or policy may rank highly, but when ranked using another set, it may rank badly (Podgórniak-Krzykacz & Przywojska, 2023). When choosing indicators, there is a conflict between comprehensiveness and ease of use. Although it is more convenient to employ a smaller range of indicators with readily available data, significant implications may be missed (Sultana et al., 2019). Though it can cost too much to collect, a larger set can be more thorough.

Sustainable development and transport are linked – for example cities around the world experience congested roads due to reliance on automobiles, which leads to emissions and social costs such as accidents that ultimately threaten public health and safety, requires a special approach through public policy to address this issue. In public policy, many models can be used, including a business model with a partnership system. To understand the relationship between different concepts, the table below explains the definitions and sections that standardize the terminology used in this research.

Tabel 1. Termonilogy Of Concepts

No	Concepts	Defenitions
1	Sustainable Transportation. (Sultana et al., 2019)	Sustainable development issues using three dimensions– environment, economy, and social.
2	Model business in Public Policy. (Butt, 2019).	The approach involves privatesector participation in policy-making to provide sufficient information for informed decision-making.
3	Sustainable Development Goals. (He & Haasis, 2020).	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sources: (He & Haasis, 2020; Sultana et al., 2019; Butt, 2019).

The SDGs framework has established a solid policy foundation, including transportation (Butt et al., 2024). Based on a literature review, many indicators can show how to implement sustainable concepts. One approach that can be used is a business strategy, which plays a crucial role in achieving multidimensional, transformative strategic change, including transportation, through the Partnership work model. To easier understand the relationship between concepts and theories and their direct application from the results of business models in public policy to realize sustainable transportation in Batam City or Goals and ways toward sustainable transportation, the following is presented in Figure 2.

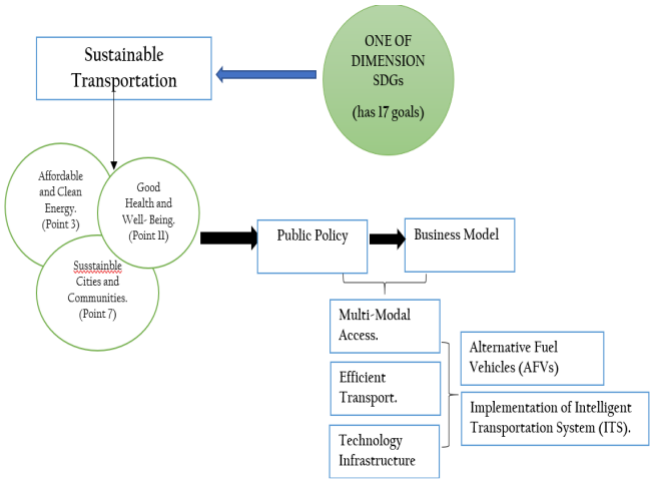

Figure 2. Goals and ways toward sustainable transportation.
Source: Researcher, 2025

Urban transportation and mobility are both direct and indirect targets within the SDGs. Direct targets for urban transportation and mobility are outlined in Goal 3 (healthy lives), Goal 7 (affordable and clean energy), Goal 9 (industrial innovation and infrastructure), Goal 11 (sustainable cities and organizations), and Goal 12 (responsible consumption and production). Indirect SDG goals related to transportation and

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mobility include Goal 2 (zero hunger), Goal 6 (clean water and sanitation), and Goal 13 (climate action).

One of the key elements of sustainable urban development lies in sustainable mobility and transportation. Therefore, a systemic and integrative approach is needed, encompassing spatial, transportation, and environmental planning. Development efforts that promote effective urban mobility include improving infrastructure, Technology systems, enhancing efficient services, and implementing multimodal systems.

This research aim to examine the integration of business models into transportation policies to achieve sustainable transportation. This is necessary to accelerate Batam City's transition path as a developing region, accelerating transformational change through a business-driven approach to policy. The business approach here is understood as private sector involvement in alternative initiatives initiated by the government to accelerate sustainability in the transportation sector.

As an industrial city in Indonesia and having a policy on free trade, specifically Batam-Bintan-Karimun (BBK), which of course business and trade are very fast moving and supported by being directly neighboring with Singapore and Malaysia, Vietnam, and Thailand, is a factor in the high and easy mobility in Batam City. For this reason, having a comprehensive mode of transportation by sea, land, and air is crucial. Batam is also a destination city for Indonesians who want to continue their lives; the urban system operates on population growth. According to the most recent data from the Batam City Population and Civil Registration Service, the population of Batam City in 2023 will be 1,240,792 people, a large number that, of course, affects the increase in the number of vehicles. According to Traffic Corps data, the number of vehicles in Batam City in 2023 will be 1,000,075 units. Both are undoubtedly directly related to congestion, pollution, and city order.

The interim results demonstrate the absence of sustainability indicators in Batam City, which can be attributed to the city's lack of relevance and characteristics for sustainable transportation. The current state of Batam City indicates a lack of efficiency in transportation and limited options available to the community. The road route does not provide clear certainty; there are only two lanes along the Batam city road, namely the left and right lanes. We continue to carry out road construction as part of access development, but we don't have a specific division for motorbikes, bicycles, public transportation, four-wheeled cars, or containers with eight to sixteen wheels. All types of vehicles access all highways, thereby ensuring minimal road safety.

According to the Kepri Regional Police Traffic Unit, there were 629 traffic accidents in Batam City in February 2024. While public caution is necessary in this case, the government should also consider implementing preventive measures, such as policies, to minimize road risks. Furthermore, the available modes of transportation are limited and lack connectivity. The government has provided public transportation (trans batam), but it is not followed by services and facilities that are comfortable for the public to access; the time needed to wait and change buses for each route, the costs incurred, and the use of ICT and disability services are minimal.

Furthermore, Batam city conditions are far different from several other big cities, such as Jakarta and Surabaya, which have taken early steps forward by developing new solutions, including expanding the railway network and building BRT lines. (Wong et al., 2018) The implementation of special BRT lines has proven effective, providing faster and more reliable services for the community. (Johnston, 2016)In addition, connecting various forms of transportation through intermodal centers improves overall passenger connectivity and comfort. Despite Batam City's reputation as an industrial city with high investor and regional income, it still lacks adequate transportation access.

In the past, Batam City has bolstered its economic development by attracting more investors, fostering business and trade relationships, boosting tourism, and creating employment opportunities for the community. However, it is crucial to strike a balance by augmenting transportation services, as smart cities necessitate a balanced provision of adequate transportation facilities and infrastructure. As one of Indonesia's industrial cities with high per capita income, Batam City is experiencing rapid economic growth. However, (Kriukelyte et al., 2024) stakeholders must establish a shared understanding of the long-term sustainability of this sector, ensuring a balance between environmental and social aspects, rather than solely concentrating on economic aspects.

As a policymaker, the Batam city government must carefully consider its approach when determining policy instruments, keeping in mind that policies play a crucial role in shaping the transformation of the mobility sector in national life. This policy instrument will serve as a crucial tool for formulating transportation policies that promote sustainability (Kriukelyte et al., 2024a; Zawieska & Pieriegud, 2020), aligning with the 2030 Agenda for Sustainable Development and the Paris Climate Agreement. The (UNDP, 2016), in collaboration with countries worldwide, has firmly asserted that a sustainable model is the only viable model for transportation development. (Hiremath et al., 2019) Therefore, sustainability indicators serve as tools in policies that govern the evolution of transportation systems towards sustainable transportation.

METHOD

This type of research is qualitative (descriptive) with a Phenomenological Approach. The study uses two types of sources are primary data and secondary data. Primary data was obtained through interviews and documentation, Observation and FGD. Interviews were conducted with the Batam City Transportation Agency and the Batam City Bapeeda and the Batam City and Regional Spatial Planning Section. The technique used to gather interview data was purposive sampling. Purposive sampling is the process of selecting a sample based on specific considerations, such as population characteristics or previously known traits, due to consideration of specific characteristics or traits. Therefore, in this interview, the information providers were those directly involved in transportation and others who support transportation policy.

To obtain valid evidence, observations were conducted. In this study, the observation was conducted directly at the location of several problem points to ensure the truth of the phenomenon that occurred. Secondary Data Secondary data used in this study came from documentation in the form of reports from organizing institutions, regulations, previous research results, books, journals, information from mass media, and official sites that can be accounted for. Overall, the work period required, starting from going into the field, processing or processing data, takes almost 4 months, namely from June 2024 to September 2024.

The data analysis technique in this study is the first Triangulation technique, data reduction. In this stage, a

classification will be carried out on information that can be used as Information. The data in this study, in the form of all interview results, will be presented in full, relevant research results, documentation results from social media, and observation results. Second, the display/presentation of data, selected data, and relevant selection results are then arranged in detail and systematically. According to this stage, to facilitate in-depth analysis, the results of relevant data reduction will also be assisted by software, namely N-Capture on the N-Vivo 12 Plus. It is done by importing interview data.

Interview data will be coded in NVivo by specifying codes and notes in the Crosstab Query menu. This is used to determine understanding in the field with the referenced theory. After determining the suitability of the results and theory, it is explained using group queries used to find concepts related to the nodes. Finally, the application will display related and unrelated sections.

Documentation Results in the form of relevant research, relevant online news, and government reports will be read by N Vivo-12 Plus. Furthermore, the coding process will be carried out by grouping the data into categories according to the Theory and Indicators of the indicators needed. The results can be displayed in the form of tables, graphs, and diagrams after being arranged systematically. Third, Conclusion Drawing is carried out, referring to the Presentation results after obtaining results that are by the theory and have a complete analysis, also proven by valid documentation, then conclusions will be drawn. Overall, the research systematics can be understood from the Figure 3 below.

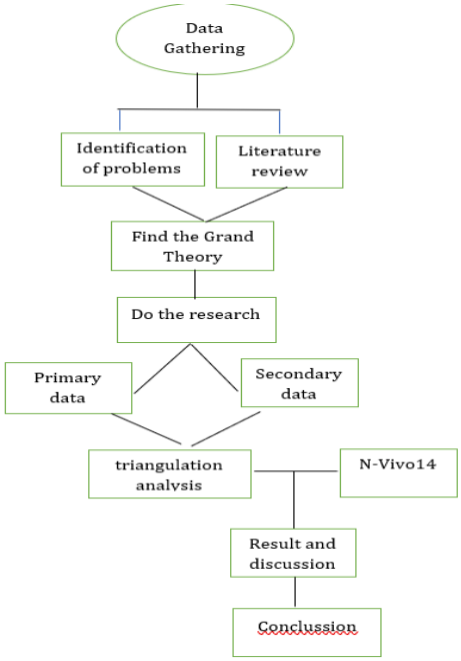

Figure 3. research systematics.
Source: researcher, 2025

RESULTS AND DISCUSSION

Mobility services, energy transition and the creation of multimodal integration infrastructure are examples of business approaches in the transportation industry that can be used to achieve sustainability (Cho & Choi, 2020; Kigochi, 2024; Malasek, 2020b). In order to promote sustainable mobility, a number of nations, notably Germany, Norway, and Oslo, have embraced this simple idea and chosen to use autonomous, emission-free vehicles. Meanwhile, particularly in the industrial city of Batam, there is a lack of consensus on sustainable transportation for both personal and public transportation. Consequently, there is no centrally imposed regulatory policy that guides for instance the transition from emission-producing vehicles to renewable energy, specifically electricity. Therefore, this issue should be considered when formulating policies prioritizing the future.

Within the New Public Service paradigm and governance concept, the involvement of business elites is not solely for economic gain. However, to meet social and environmental demands, business elites should help realize a more decent life for society and ensure the sustainability of future generations. This includes involving the private sector as a partner in every policy that regulates all aspects and areas. In this discussion, we will examine how public transportation policies should consider the private sector in meeting sustainability goals.

In a Research (Kriukelyte et al., 2024a) integrates desire performance into business, where he suggests that policy makers consider consumer preferences, travel patterns, and regulatory requirements to ensure regional policy interventions. Below are two alternative business models that can be used to promote sustainable transportation in Batam City.

a. Alternative Fuel Vehicles (AFVs).

In realizing sustainable transportation, private sector involvement can be applied in providing alternative fuels. As a solution to meet sustainability targets, many efforts have been made to develop new fuels and engines capable of reducing pollutant emissions. In recent decades, the automotive industry has increased the production of alternative fuel vehicles (AFVs) that utilize fuels such as electricity, natural gas, and hydrogen, as they are derived from low-carbon sources and/or enable improved vehicle energy efficiency. Alternative fuels differ from traditional fuels because they are not based on gasoline or diesel and are characterized by very low levels of pollutant emissions.

Currently, the following main alternative fuels are the most promising and/or used in road transportation. These measures have been implemented in European countries. The main alternative fuel vehicles currently used in the automotive industry include electric vehicles such as battery electric (BEV), plug-in hybrid (PHEV), natural gas (NGV), liquefied petroleum gas (LPGV), and hydrogen fuel cell (HFCV).

Based on research results through documentation of central government regulations through the Paris Agreement or the Paris Agreement has been ratified through Law Number 16 of 2016. This shows Indonesia's determination to contribute to reducing Greenhouse Gas emissions globally. As a form of this commitment, Indonesia has set an emission reduction target through the Nationally Prepared Contribution (NDC). Initially, Indonesia's GHG emission target was 29% unconditional and 41% conditional (with international support) in 2030. However, in 2022, the target was updated in the Enhanced Nationally Determined Contribution (ENDC) document. The unconditional emission target was included at 31.89% and the conditional at 43.20%. More ambitiously, Indonesia targets achieving net-zero emissions by 2060 or sooner.

This regulation should serve as a foundation for the Batam city government to transition from fossil fuels to environmentally friendly ones. However, research shows that Batam's regional regulations on transportation have not fully emphasized environmentally friendly measures. This is evident in the absence

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of electric-powered Trans-Batam buses; overall, public buses in Batam are fueled by fossil fuels. Likewise, for private transportation, people have not yet switched to electric vehicles, whether motorcycles or cars; even if there are, only a few people. This is undoubtedly due to the lack of a specific government appeal to switch to electric vehicles. Another factor is the continued availability of conventional vehicles on the market, indicating that the government still legalizes them for marketing, which is certainly profitable from a business perspective.

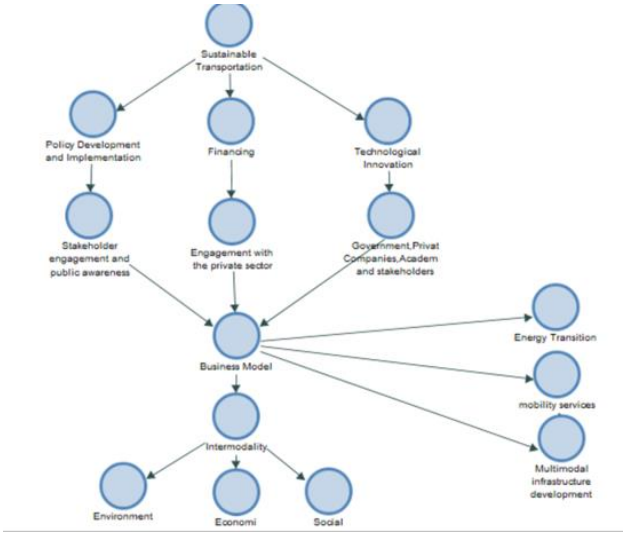
The interaction between government and business in realizing this alternative can be implemented in several forms, including:

1. The government is providing various incentives and regulatory relief to encourage private sector participation in new and renewable energy development. One form of this support is fiscal incentives for companies investing in green energy. These incentives include income tax relief, reduced import duties on renewable energy equipment, and eased investment licensing.
2. In addition to fiscal incentives, the government is also opening opportunities for private companies to participate in public-private partnership (PPP) schemes for energy infrastructure development. Through these schemes, companies can collaborate with the government in building and operating renewable energy-based power plants under competitive tariff mechanisms.
3. The private sector can participate through Engineering, Procurement, and Construction (EPC) projects offered by PT PLN (Persero), or through the Independent Power Producer (IPP) scheme, Public Private Partnership (PPP), or through other schemes such as Build, Lease and Transfer.

Government and private sector involvement in electricity development needs to be continuously strengthened to create a more inclusive and highly competitive energy ecosystem. With more companies investing in green energy, Batam City can encourage, strengthen, and accelerate Indonesia's efforts towards a low-carbon economy and achieve its long-term sustainable development goals.

Ecreases consumer comfort and flexibility, which makes driving an EV less alluring. continue to defend the absence of charging infrastructure by claiming that, given the small number of electric vehicles on the market, this business model is not now profitable. To meet the charging requirements of early adopters, however, public charging infrastructure must be developed. Accordingly, research on the placement of charging stations in residential areas and at consumers' houses revealed a notable change in the user's attitude as he had an easily accessible charging facility. According to a study, a well-established EV charging station is considerably superior to different convenience policy initiatives like bus lanes.

Based on the UNDP agreement, there are three main elements of policy recommendations on sustainable transportation (Nations, n.d.2017) policy development and implementation, financing, and technology innovation. Each of these elements contributes to the realization of a simplified picture of sustainable transportation. The image below illustrates this clearly. The author attempts to simplify the three elements in literature.



Source: NVivo14 pluss, 2025

Figure.4 Element of Sustainable Transportation

The image above highlights three key elements that are necessary to achieve sustainability in the transportation sector. First, policy development and implementation: making planning decisions, policies, and transportation investments based on three dimensions of social, environmental impacts (including climate), and economic growth. We must integrate all sustainable transportation planning efforts into the development of balanced transportation modes, ensuring vertical equity between government levels and horizontal equity among modes, regions, and sectors. Secondly, we can enhance sustainable transportation systems, initiatives, and projects by boosting international development funding and climate funding. Thirdly, the government should promote sustainable transportation technologies by investing in results-oriented policies and encouraging private sector investment and action through diverse incentive structures.

A business model approach allows for the integration of these three elements and their derivatives. Business model embeds a platform that facilitates the efficient distribution of supply and demand (Kriukelyte et al., 2024b). (Butt et al., 2024)Despite the digital nature of service exchange, digital management underpins all its processes. This means that companies can act as intermediaries in the transportation system. (Leuenberger et al., 2014)Thus, the innovation transportation platform realizes new value by utilizing existing resources, eliminating the need for physical additions. Things that need to be considered in policy are social, economic, and environmental factors must be considered in policy.

The business model, through the concept of partnership, can achieve a balance in these factors, starting with the energy transition. The Indonesian government has committed to the Ministry of Transportation to increase the unconditional emission reduction target from 29% to 31.89% and conditional from 41% to 43.20%. The Enhanced Nationally Determined Contribution (ENDC) document has stated the target. The long-term target can be a reference for the Batam city government's policy to switch to electric bus transportat The community would save tens of millions annually if all buses in Batam City ran on electricity instead of diesel. of millions. Reduced noise and air pollution, among other areas, lead to significant savings in health care costs.

According to the study's findings, transportation policies in Batam City have not taken into account the energy transition. (Kumar & Alok, 2020a)Electric vehicles are the means by which the energy transition is realized in private vehicles. The energy transition through electric vehicles for personal use is still controversial at this time on a national scale(Kumar & Alok, 2020), so it has not been emphasized in regions like Batam City. However, if it is implemented in public transportation, it will constitute a significant technological advancement. The operation of electric buses embodies this reality. Another innovation from mobility governance, known as electric-based public transportation, is the implementation of electric buses.

Based on the research results, Batam City has not launched electric buses; all modes still use fuel that can produce emissions, while other cities, such as Jakarta, have launched 30 electric buses as a form of energy renewal in public services. Batam City has yet to implement safe, comfortable, and easily accessible public transportation. The benefit is that the procurement of electric buses can create sustainable mobility along with the transition from private vehicles to public transportation. So, this can be an alternative policy to realize sustainable transportation. If the problem of limited electricity procurement energy and limited natural resources prevents the policy from being applicable to private vehicles, it can at least be applied to public transportation

b. Implementation of Intelligent Transportation System (ITS).

This model involves self-driving as the main solution for Intelligent Transportation Systems (ITS), developed in recent years to shift traveler behavior toward a smarter approach to transportation infrastructure use. As an ITS development (Elassy et al., 2024), Cooperative Intelligent Transportation Systems encompass new technologies related to in-vehicle data transmission and automation for road traffic management (Kaiser & Barstow, 2022; Shokoohyar et al., 2022).

The application of Information and Communication Technology (ICT) to transportation engineering is a developing field, namely Intelligent Transportation Systems (ITS). The definition of ITS is a sophisticated application that, without realizing intelligence itself, aims to provide innovative services related to various modes of transportation and traffic management, and allows various users to obtain better information and make the use of transportation networks safer and more coordinated.

Thus, ITS not only depends on road transport but encompasses all technologies and their (integrated) application across all modes of transport (road, rail, air, and water) to improve the overall transport system and make it sustainable. The goal is to find the optimal balance between three fundamental aspects: Efficiency, environmental friendliness, and safety. The need for intelligent transport systems arose along with the significant increase in traffic flow, which led to high congestion and low safety levels. In recent years, most countries in the world have provided regulations for the adoption of ITS in their transport infrastructure networks.

Based on the European Union's experience in Cooperative Intelligent Transport Systems, which use technology that enables road vehicles to communicate with other vehicles, with traffic signals and roadside infrastructure, and with other road users. This system is also known as vehicle-to-vehicle communication or vehicle-to-infrastructure communication.

As reported in the European Union definition, two new ITS applications are involved in their cooperative form: Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) systems. This second system also includes new technologies driven by the automotive industry in their development and commercialization, namely connected and automated vehicles. These technologies require sophisticated equipment within the vehicle to enable continuous data exchange between the vehicle and the infrastructure and achieve a certain level of vehicle automation.

Transportation Information Systems (ITS) utilize various ICT solutions to develop integrated systems aimed at improving interoperability between their components. The key technologies underlying Intelligent Transportation Systems are: Global Positioning System (GPS); Dedicated Short Range Communications (DSRC); wireless networks; mobile phones; vehicles or probe devices; radio or infrared beacons; roadside cameras; Variable Message Signs (VMS); and traffic signals.

Based on ITS research results, an Area Traffic Control System (ATCS) has been implemented in Batam City to manage traffic at intersections. This system enables automatic traffic signal regulation based on real-time data, thereby speeding up vehicle flow and reducing travel times. In addition to helping improve intersection performance, ATCS is also expected to optimize public transportation and enhance road safety.

Furthermore, ITS itself is not just about comfort but also contributes to improving the public transportation system, such as helping passengers find more accessible transportation options and connecting to various modes effectively. Therefore, private sector involvement can be implemented in this step, including the development of the Transit Oriented Development (TOD) concept and partnerships in managing public transportation, such as buses.

Based on the research results, mobility services implemented with a business approach in Batam City are limited to online transportation services from Grab, Gojek, and Maxim. This should align with the UNDP's recommendations, which suggest involving stakeholders as third parties who can assist in providing mobility services, while still adhering to the concept of sustainability. This can certainly be incorporated into the policy instrument through a business approach, paving the way for a future policy that regulates online taxi mobility services and private services. The policy that can be incorporated as an instrument involves the implementation of mobility services available in Batam City, including online taxi services, and companies can assist in facilitating this mobility.

According to the research results, there are 1,039 different types of companies. Of that number, there are 192 companies engaged in transportation, including cargo and logistics, goods delivery services, and box truck rentals. Currently, there are three companies that provide online transportation services (Grab under PT Grab Indonesia, Gojek under PT Aplikasi Karya Anak Bangsa, and Maxim under PT Teknologi Perdana Indonesia). In 2013, Grab and Gojek entered Batam City, and in 2014, Maxim also became an online-based transportation service. Furthermore, the city of Batam only provides conventional mobility services, while Transbatam, as a public transportation provider, accepts payments via the Brizzi Card, Qris, LinkAja, AstraPay, GoPay, Ovo, Shopeepay, Dana, and M-banking systems. However, the concept of sustainability extends beyond providing cashless payment services alone. Online taxi bookings or applications that can detect the presence of Trans Batam, which can motivate

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people to start switching to using Trans Batam, have not been developed. In addition to the limited bus fleet, minimal bus stop services also have an impact.

As a company that develops transportation booking software services, we are responding to the emergence of low-quality and expensive public transportation services like Trans Batam and Mimbar (Angkot) in the city of Batam. Over time, the company has shifted its overall mission to challenge private car ownership by offering various services such as taxi bookings, food delivery, market access, bill collection, and goods delivery. However, based on observations in the field, the existence of these services has not been able to help realize sustainable transportation in the city of Batam.

To ensure that customers don't have to wait for long, the government can implement a fast service program for Trans Batam. This program, of course, complements improvements in bus stop services, which provide information on the presence of buses and an integrated system. In this case, the policy must be capable of balancing the taxi industry by competing in an established market and revealing changes in user preferences and needs.

Finally, the infrastructure for multimodal integration is being developed. The TOD transit-oriented development is still minimal and not evenly distributed in Batam City. TOD services are only available at several points, namely the Batam International Ferry Terminal Area, the Batam Hang Nadim Airport Area, and the Punggur Terminal Area. Today, public transportation in Batam City (Trans Batam) only offers the BRT (Bus Rapid Transit) System. This offer can be considered in Batam City. TOD is a pattern of urban development that maximizes the amount of residential, business, and recreational space within walking distance of public transportation. To connect all public service access, the Batam City government needs to develop a Transit-Oriented Development (TOD) system.

Transit-Oriented Development (TOD) includes the integration of transportation modes carried out by connecting Transbatam stops with stations, ports, and airports in Batam City. (Pandey & Erbaugh, 2024) Usually other cities connect with MRT, LRT, and KRL stations. Although Batam City lacks these service facilities, it has established a link between the airport and public transportation, known as Damri, as well as a connection between the Batam International Ferry Port, situated in Batam Center, and Transbatam. We can interpret this as a failure of the TOD System in Batam City to fully realize an effective and efficient mode of transportation. We need to expand TOD services to other public spaces. In this case, before leveling TOD, the Batam City government needs to improve the hate or terminal services. The government has not yet provided safe parking for vehicles accessing Trans Batam. Actually, the TOD System can be realized by providing safe parking facilities for the community, which will in turn encourage the community's motivation to access Trans Batam.

Based on the results of the study on point 2, is Micro mobility services including the provision of multimodal integration facilities are not optimal in Batam City, then point 3 shows the absence of good multimodal development. Based on the image above, the Batam City Government can introduce innovative approaches, such as investment value capture programs, green bonds, and transit-oriented development grants. So based on the review to build multimodal infrastructure, the Batam City Government can realize integration through the Transit Oriented Development (TOD) program.

Theoretically, the implementation of this development could facilitate the realization of additional services within the economy (Dugarova & Gülasan, n.d.; Pawłowska, 2018). Every public space, including ports and airports, must connect with services. This includes bus stop services that are easily accessible from residential areas. Additionally, each station must offer a secure parking area (park and ride service) for individuals who continue their journey with Transbatam. The government should prepare regulations for parking rates at bus stops or terminals. Here are the accessible Transbatam routes. We can begin building integrated access by using the Transbatam service points as a basis for public transportation.

Transbatam route consists of route 1, namely Sekupang-Batam Center. Route 2, namely: Batam Center-Tanjung Uncang. Route 3: Sekupang-Jati. Route 4: Sagulung-Sekupang. Route 5: Joti-Batam Center. Route 6 Tanjung Piayu-Batam Center. Route 7 Nongsa Batam Center. Route 8: Punggur-Jati. These routes should switch from BRT (Bus Rapid Transit) to TOD. The main route can be designed to park and ride as a TOD. Furthermore, there is a need to develop the connectivity of stops and terminals with factories. Vehicles from factories, as well as goods transport vehicles from all factories, contribute significantly to congestion, noise, and the high number of accidents. The government, in collaboration with stakeholders, must take this issue seriously. Regulations governing the operation of factory goods transport vehicles are necessary, as their presence poses a significant threat to public safety.

The development of Transit-Oriented Developments (TODs) and the provision of park and ride services at the main bus stops are two key initiatives that can ensure the region's economic stability by generating income. Environment: neat and safe governance (Kurniawan, 2019; Rerung & Wakim, 2019; Sinaga et al., 2019). social society, namely public order, security, and safety. However, considering the current state of Batam City as input for the policy, another issue related to local governance is the utilization of public space. For example, claims made by micromobility services to public space (to use vehicles) necessitate new competition to gain a share of the operating space and transportation infrastructure, such as highways, bicycle and pedestrian paths, sidewalks, parking racks, and so on. The general public, as well as other modes, services, and functions that use public space and/or transportation infrastructure, are directly impacted by all of this, as is the governance of public authorities over the use of public land and transportation infrastructure.

CONCLUSION

Sustainable mobility is one of the main focuses of transport policy at all levels. In theory and based on the experience of developed countries, there are many steps or business models that could help governments achieve sustainable transportation goals. However, this study only identifies two alternatives that could be implemented by the Batam city government. Batam City, as an industrial city, must have political decision makers, from transnational to national and local institutions, incorporate the promotion of sustainable mobility into their programs, with different emphases based on their environmental sensitivities. However, it is essential to remember that the approach or concept applied by the Batam City government as a decision maker does not function in isolation, and the systemic context that shapes the business approach also contributes significantly to sustainability. In other words, it is necessary but not sufficient for

an organization to be sustainable, as the system itself can create a lock-in effect that encourages certain business behaviors and activities that act as barriers to achieving a sustainable transition. In addition, the Batam City government needs to develop a formal strategy regarding the use of public space (how to prioritize among functions and services) needed to achieve the overall goal, as more and more diverse services express interest in using the space. Similarly, service providers flagged the lack of access to real public space as a barrier to innovation and business in Batam City.

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