Reducing emissions and logistics costs in Indonesia: An overview

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Abstract. This study aims to determine the aspects of reducing emissions and logistics costs in Indonesia. This research used a qualitative approach with a descriptive method. The data was obtained through the literature study (secondary data). The results show that reducing emissions and logistics costs in Indonesia can be achieved by applying green logistics by emphasizing the more efficient use of energy. Fiscal policy support reducing emissions and increase the competitiveness of the logistics industry. This policy can be pursued through interest subsidies to finance investment in environmentally friendly transportation equipment, developments of environmentally friendly infrastructure, and quality fuel availability. In the long term, the efficiency benefits obtained are expected to exceed the cost of the spent investment.

1. Introduction
Increasing global warming, global climate change, Greenhouse Gas Emissions (GGE) have become a global concern for the earth's population regarding the future of the earth and humankind. Most of the increase in global average temperatures since the mid-20th century has been due to human activity-induced greenhouse gas effect [1]. Other consequences of global warming are reduced agricultural yields, loss of glaciers, and the extinction of various types of animals [2].

Indonesia's economy is the 16th largest globally and the largest in Southeast Asia. Indonesia's economic development is supported by logistics activities. Logistics activity is logistics management of the flow of goods and services between points of origin and points of consumption to meet customer needs. Logistics is positioning resources at the right time, at the right place, for the correct cost and good quality. Logistics refers to the efficient and economical transfer of goods [3].

Good logistics provides excellent benefits for a country in the global era. A sound logistics system will have global value chain integration and provide attractiveness for foreign investors [4]. As foreign trade and investment are vital to the absorption of foreign knowledge, poor logistics performance hinders access to new technology and knowledge, which hinders national productivity growth [5].

Increased trade will create a demand for logistics activities. On the other hand, logistics activities impact on the environment, starting from selecting suppliers, material and product content, production processes, packaging, transportation, and warehousing. There are logistics activities that trigger emissions.

Logistic transportation activities produce emissions. In a logistical context, the most significant contribution of GGE emissions is resulting from transportation activities [6]. Transportation activities also have an impact on environmental degradation, time consume, and natural resources depletion [7].

Transportation activities have an impact on the environment [8]. The impact of transportation is directly related to the fuel consumption of vehicles used for transportation. In addition, transportation activities affect the quality of the environment and public health because these activities cause
congestion, air pollution, noise pollution, and accidents [9].

Indonesia is the largest emitter of greenhouse gases after China, the United States, and India in 2015. The highest source comes from deforestation and peat forest fires, followed by emissions from burning fossil fuels for energy. On the other hand, Indonesia has a target to improve energy efficiency. The National Energy Conservation Master Plan (RIKEN) sets a target of reducing energy intensity by 1% per year until 2025. The National Mid-Term Development Plan for Awakening of five “priority sectors,” including energy and transportation [10]. In Indonesia, the transportation sector contributes less than 5% of the total national emissions, which most come from the forestry sector (fire and destruction) and land-use conversion. From energy emissions (fuel, coal, gas, and geothermal) the transportation sector contributes around 26% of emissions, with the fuel consumption reaches 50% of the total national fuel consumption each year.

Emission reduction in the logistics sector is needed to reduce the negative impact on the environment and human health. On the other hand, a reduction in logistics costs will increase the competitiveness of a country. An effective and efficient logistics system should reduce costs and emissions [11]. Transportation costs are the most significant logistics cost component [12]. Transportation costs are influenced by driving behavior, fuel consumption, vehicle maintenance, capital invested in vehicles, and administrative equipment [13].

Emission reduction brings benefits to logistics transportation activities. Cost savings through capacity utilization and transportation optimization result in reduced carbon dioxide emissions and reduced transportation costs. Transportation activities will consume financial resources, time, and environmental resources. Reducing emissions from logistics transportation is very important.

Integration and collaboration of logistical activities with suppliers and customers to reduce carbon dioxide emissions and negative environmental impacts from materials, production processes, products, packaging, transportation, warehousing, and distribution activities. Fleet optimization through the use of alternative fuel vehicles; Utilization of vehicles with high fuel efficiency; and selecting transporters with good environmental performance.

Emission dan pollution arising from logistics activities is a form of negative externality that increases the risk of climate change. Externalities are defined as costs or benefits of economic activity that are not reflected in prices. Externalities occur when one person's actions have an impact on other people or the environment without obtaining any consequences, resulting in inefficiency in the allocation of factors of production.

Government action is needed to address negative externalities. The government plays a role in supporting transportation by providing the necessary infrastructure, such as the construction of roads, ports, airports, rail networks, transportation policies, and transportation services in order to improve national logistics performance, encourage economic growth and prosperity.

The government can use both sides of public finance (i.e., public spending and taxes that generate public revenues) to influence economic outcomes. The use of government spending and taxation to influence the economy includes expenditure and taxation instruments, such as taxes, subsidies, grants, and government spending decisions. Fiscal instruments (i.e, government spending and taxation) can influence people's behavior in support of policy objectives.

The Efforts to reduce emissions and logistics costs are important to protect the environment and improve competitiveness. The study was conducted to reduce emissions in transportation activities that can support the reduction of logistics costs. Furthermore, this study describes fiscal policies to support climate change issues rewarded with greenhouse gases in the logistics sector.

2. Methods of research

This research used qualitative approach by examining and reviewing secondary data obtained from library research. The data was obtained through literature study (secondary data) from journal articles and various research reports. Data from library research were analyzed descriptively qualitatively, which describes all research results (data) in systematic writing through the process of data reduction, explanation, and conclusions/verification.
3. Results and discussion

3.1. Reducing emission and logistic cost

Transportation activities produce fuel combustion emissions in vehicle engines, thereby increasing the carbon footprint, especially carbon monoxide (CO), carbon dioxide (CO$_2$), and Particular Matter (PM) which can harm the environment and the health of humans. Carbon dioxide (CO$_2$) emissions are a type of gas emission that results from the burning process of fossil fuels [14]. The higher the carbon content in fossil fuels, or the less efficient combustion process, will generally produce more significant CO$_2$.

Table 1. CO$_2$ emission factors based on fuel type (tons/TJ).

| Fuel                     | Default | Lower | Upper |
|--------------------------|---------|-------|-------|
| Gasoline                 | 69.3    | 67.5  | 73    |
| Other Kerosene           | 71.9    | 70.8  | 73.6  |
| Gas/Diesel Oil           | 74.1    | 72.6  | 74.8  |
| Residual Fuel Oil        | 77.4    | 75.5  | 78.8  |
| Liquifield Petroleum Gases | 63.1   | 61.6  | 65.6  |
| Refinery Gas             | 57.6    | 48.2  | 69.0  |
| Paraffin Waxes           | 73.3    | 72.2  | 74.4  |
| White Spirit & SBP       | 73.3    | 72.2  | 74.4  |
| Other Petroleum Products | 73.3    | 72.2  | 74.4  |
| Natural Gas              | 56.1    | 54.3  | 58.3  |

Source: IPCC, 2006 [15].

Logistics costs are formed from activities that support the logistics process, namely customer service, transportation, warehousing, inventory storage, and logistics administration. The percentage of Indonesia's logistics costs to GDP is 27%, while South Korea is 16.3%, Japan is 10.6%, and the United States is only 9.9%. The component logistics cost consists of cost of transportation (12.04% to GDP); administration cost (4.52% to GDP), and storage cost (9.47% to GDP). The transportation cost is dominated by land transportation (72.21%) [16]. This statistic clearly shows that Indonesia's logistics costs are still costly due to the inefficient logistics activities of companies, thus reducing the competitiveness of Indonesian companies, which can also reduce the competitiveness of the country.

The leading cause of the high cost of logistics in Indonesia is the infrastructure condition, which is considered inadequate to support the smooth flow of logistics traffic. Likewise, the intermodal or multimodal transportation system is still experiencing obstacles due to the difficulty of transportation access from production centers to ports and airports or vice versa. These obstacles are due to the not yet optimal infrastructure of ports and airports [17]. This causes the quality of service to be low and service rates to be expensive.

In general, the inefficiency factors that cause the number of emissions in the transportation sector is as follows: types of energy / fuel, technology and types of vehicles, regulations, transportation and spatial planning systems, vehicle driving behavior and techniques [18]. Opportunities for efficiency in the transportation sector can be done immediately without having to make significant investments. For example, the application of adequate regulations, changes in behavior, and vehicle driving techniques can increase the efficiency of significant fuel use and reduce the number of emissions released.

The benefits of transport sector efficiency are not only for reducing emissions but also for direct and more significant economic benefits. The key to reducing emissions in the transportation sector is efficiency; the more efficient the transportation system, the fewer emissions it produces.

The successful implementation of strategies and programs for reducing CO$_2$ emissions in the logistics sector, known as green logistics, environmentally-friendly logistics - requires commitment and seriousness from entrepreneurs, governments, and the community. The application of green logistics can reduce emissions by improving the logistics transportation system.

From entrepreneurs in the logistics sector, CO$_2$ emissions can be reduced through the use of quality...
fuels and the more efficient operation of the number of vehicles. The role of entrepreneurs, especially producers of goods owners and entrepreneurs of vehicle operators, is carried out by implementing redesign of transportation networks to be more efficient and intensive training of drivers to behave in a safe & environmentally friendly [19]. Driving is the key to the success of green logistics in Indonesia. Willingness to share resources, especially sharing vehicles with other producers of goods owners, so that economies of scale can be achieved and vehicle capacity optimization is also the key to the success of green logistics.

Consumers as part of society can encourage the implementation of green logistics by choosing products produced from producers who apply green logistics. In addition, familiarize the 3R (reduce, reuse, and recycle) behavior of products that are used daily, to reduce CO₂ emissions [20].

Green logistics encourages increased competitiveness. Environmentally friendly logistics activities aim to limit greenhouse gases in order to save energy and prevent environmental pollution. Companies can do various ways to streamline the total cost of logistics by implementing Green Logistics, namely by minimizing energy and resource consumption to reduce non-renewable resources, reduce energy use, and reduce air pollution. Companies can do various ways to streamline the total cost of logistics by optimizing route, quantity, capacity, fuel and mode of transportation [21].

In Indonesia, the condition of transportation facilities and infrastructure has not supported the efficiency of transportation costs. this causes the average logistics cost to increase. However, the company has the opportunity to reduce logistics costs by implementing green logistics. Companies can improve the efficiency of logistics activities to reduce the company's total logistics costs [22].

3.2. Fiscal policy to reduce emission and logistics costs
Most of the components of logistics costs come from the transportation sector. On the other hand, almost all transportation infrastructure is owned and managed as a public good or service [23]. To that end, transportation policy is directed at creating a fair and competitive business environment, preventing monopolies, balancing the environment, and saving energy [24].

Government support policies are essential to attract investment in green transportation in the logistics sector to mitigate climate change. In green logistics, the government plays a role in supporting conditions for manufacturing, transportation, and distribution processes that are minimally polluted [25].

Providing tax incentives can drive behavior change towards green logistics [26]. Based on Indonesian regulations, incentive policies can be directed at energy-saving projects that positively impact living conditions (economy). The role of government support is to support green transportation to increase the benefit value of the logistics sector for the community. This government support logistics efficiency and competitiveness. Types of incentives that can be provided include income tax facilities (tax allowance and tax holiday), value added tax, and luxury goods tax. In addition, Indonesia can provide subsidies in the context of financing investment towards the development of green logistics.

4. Conclusion
Reducing emissions and logistics costs in Indonesia can be achieved by applying green logistics by emphasizing the more efficient use of energy. Fiscal policy support to reduce emissions and increase the competitiveness of the logistics industry. This policy can be pursued through interest subsidies to finance investment in environmentally friendly transportation equipment, development of environmentally friendly infrastructure, and quality fuel availability. In the long term, the efficiency benefits obtained is expected to exceed the cost of the investment that has been spent.

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