

# ***PORTER'S FIVE FORCES ANALYSIS: BATTERY AS ALTERNATIVE TRANSPORT FUELS IN INDONESIA***

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## **Overview**

The era of dependence on gasoline as the primary transportation fuel has begun to end, mainly due to the global movement in the energy sector to gradually and certainly shift towards clean, environmentally friendly and aim to reach net-zero emission by 2050 or sooner. For the past decades, Indonesia has been used gasoline as the primary fuel for the transportation sector. Indonesia was one of the global oil producers and a member of the Organization of the Petroleum Exporting Countries (OPEC) from 1962 until 2008. However, Indonesian crude oil production has been rapidly declining for the past decade and even could not meet the domestic oil demand. Consequently, Indonesia has become a net importer of crude oil for about the last 20 years.

On the other hand, based on the United States Geological Survey (USGS) data, Indonesia is the largest nickel producer globally, accounting for 31% [1]. Indonesia is currently preparing a road map for battery-based electric vehicles as an alternative to fossil-based vehicles (Internal Combustion Engine/ICE). This strategy aligns with Indonesia's General National Energy Plan, as the Indonesian government targeted 2,200 electric cars and 2,13 million electric motorcycles in Indonesia by 2025. The current problem is that most vehicles in Indonesia are still fossil fuels. Indonesian Ministry of Transportation data showed that only 2,278 battery-based vehicles (car and motorcycle) [2]. Compared to Indonesia's vehicle and population growth, the achieved number of battery-based vehicles is very low and far from the updated target or even the initial target. From these problems, a study was conducted using Porter's five forces analysis to measure how the competition from batteries as alternative fuels compares with other fuels competitors in Indonesia. In addition, this study examines Indonesia's opportunities and role in the global battery-based vehicle supply chain.

Battery electrics are a promising option and alternative to replace fossil fuels. Battery electric vehicles (BEV) in recent years have increased in use and stock in several developed countries. Batteries are the main components of electric vehicles (EV) in addition to traction motors, controllers/inverters, modules, and converters. Geopolitically, China also dominates the world EV manufacturing market, especially in batteries. In 2020, China successfully controlled 77% battery capacity, 80% raw material refining, and 60% global EV components. EV batteries are made up of a mixture of nickel, manganese, cobalt, and lithium [3].

## **Methods**

The study in this paper uses a qualitative method, namely Porter's Five Forces Analysis. In the context of the competition analysis of batteries as alternative fuels compared with other fuels, it can be defined using five crucial factors called the "Five Forces Model" proposed by Michael Porter (1979). Porter's Five Forces is a further development of the Strength - Weakness - Opportunity - Threat (SWOT) method in the field of industrial economics. The main difference with SWOT is that Porter's five forces are utilized to analyze competition in an industrial environment. Porter's Five Forces focuses on five external strengths, while the SWOT analysis focuses more on the internal industry/organization by analyzing its internal potential. Porter's five strengths are micro tools with economic fundamentals of competition, while the SWOT analysis is relatively macro. Porter's Five Forces model analysis is a qualitative business/industry analysis to evaluate the competitive advantage and long-term profitability. The main purpose of this analysis is to determine the level of industry competition, evaluate the strengths and weaknesses (external-internal), and determine industry strategy.

## **Results**

Based on Porter's five forces found five variable strengths for batteries as alternative fuels in Indonesia:

- a. Bargaining Power of Suppliers  
Bargaining power for Indonesian battery suppliers lies in the development of the battery industry. Currently, Indonesia already has an Indonesian Battery Company (IBC). In addition, Indonesia has started to build an electric car battery factory in Karawang, West Java, run by a South Korean consortium partnered with IBC. The factory prepares EV battery cells, modules, and pack manufacturing batteries.
- b. Bargaining power of Buyers

The strength from the buyer's side is that battery-based vehicles are environmentally friendly and low-emission vehicles. These facts create interest for buyers to choose the option of battery as an alternative transportation fuel compared to fossil fuel vehicles, especially for buyers with a better consciousness over climate issues.

c. Threat of Substitute Products or Services

The threat and challenge from substitute products are that the price of fossil-based vehicles in Indonesia is still lower than battery-based vehicles. This makes the development of batteries as an alternative transport fuel a dilemma. Because the price of battery-based vehicles is higher economically if the government does not provide subsidies and policy support. In addition, the main material for batteries such as nickel in Indonesia has also previously been used for other industrial raw materials. In addition, as one of the biggest palm oil producers, Indonesia is also developing biofuels as an alternative fuel for the transportation sector.

d. Threat of New Entrants

The battery industry has a high barrier for the new entrants, such as the high investment, high technology, and complex processes from upstream to downstream. A clean smelter technology in the upstream and safe recycling processes with environmental manners are just a glimpse of requirements that must be satisfied by the industry player. With a fairly complex system, the level of competition for new entrants in the battery industry will be relatively low.

e. Rivalry among existing

China and the US are the leading players in the global electric vehicle and batteries market. Chinese battery-maker CATL controls about 30% of the world's EV battery market. On the other hand, Indonesia will find it difficult to enter the external market. Even though Indonesia has abundant nickel resources, Indonesia is a new player in the global battery-based vehicle industry and supply chain.

## Conclusions

Based on our study, batteries as an alternative transport fuel in Indonesia are still lacking in several aspects, such as market competition, product use, and development. One of the main concerns comes from the threat of substitute products or services. The price of fossil-based vehicles in Indonesia is still lower than battery-based vehicles and the government subsidies for several types of gasoline. These conditions make the idea of batteries as an alternative transport fuel becoming less competitive in Indonesia. Another strong external factor that hinders is the rivalry among existing. Indonesia is a new player in the global battery industry. China and the US are the most well-developed players and dominate the global battery markets and industries. Indonesia's domestic readiness is also still in its early stages, and the industry is not yet mature and challenging to compete globally.

China and other battery-based vehicle producer countries lack or even do not have raw materials to ensure the sustainability of the batteries and EV engine chassis manufacturing. On the other hand, the demand for raw materials will continuously increase, in line with the growth of global EV utilization in the future. Therefore, geopolitically the role of countries with resources for EV and EV battery manufacturing will be very strategic and become the key to the sustainability of the global EV supply chain. Indonesia has the largest nickel reserves globally and the most prominent automotive sales & production market among countries in Southeast Asia, making Indonesia a country with a promising opportunity to become a regional hub for the EV industry in the Southeast Asia region if supported with the right policies.

## References

[1] US Geological Survey, Mineral Commodity Summaries 2021. 2021.

[2] Indonesia Ministry of Transportation, Press Release May 2021. 2021.

[3] The Purnomo Yusgiantoro Center, Mapping Indonesia's EV Potential in Global Supply Chain. 2021.