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Revitalization of Tin Towards Control (Domination) of Tin as a Strategic Commodity

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Abstract
Tin, as one of the valuable metals in the modern industrial world, has played a crucial role in encouraging innovation and economic growth. Tin's extensive uses have made it an irreplaceable strategic commodity in maintaining a country's economic stability. This research will discuss how economic development can be done through the revitalization of tin to achieve control (domination) of tin as a strategic commodity. This research uses empirical research methods with a qualitative approach, sourced from primary and secondary data and data collection techniques using Library Research. This analysis will focus on opportunities and obstacles in tin revitalization. Rising commodity prices will trigger the operation of mines with marginal deposits and illegal mines, thereby triggering uncontrolled environmental damage. R&D for substitute materials, efficiency of use, and more efficient refining to recover secondary tin from electronic outcome waste will be intensively carried out, especially for conventional products that use tin and products that are relatively 'high/medium price sensitive' to the price of tin. Then, the growth of new reserves from living resources with increased exploration activities boosts resources. Key Success Factor is Regulation from Upstream to Downstream which is integrated with 'Law Enforcement' Financial Support for controlling the supply of tin commodities.

1. Introduction

Tin mining activities in Indonesia have been carried out for more than 200 years. Indonesia has quite large tin reserves and is spread over an area of more than 800 kilometers which is often called The Indonesian Tin Belt (Fahruddin, 2018). This stretch is part of The Southeast Asia Tin Belt which stretches for approximately 3,000 kilometers from mainland Asia towards Thailand, Peninsular Malaysia, and Indonesia. Tin is a class of metallic minerals that is opaque and can be a conductor of heat and electric current. Tin is now used to meet the needs of the electronics industry, packaging materials for food, dental amalgam mixtures as a substitute for mercury (Hg), mixtures in golf clubs and ammunition, bottle caps, as a flame retardant layer in electrical cable products and household appliances, solder tin, light bulbs, paint, and other conventional industrial needs, as well as for the production of environmentally friendly automotive energy storage (EV), namely Lithium Ion Batteries, as well as for renewable energy conservation equipment components such as 'Solar Panels', the use of which is increasingly growing and will continue to develop in line with technological developments because tin's properties as 'energy storage' are better than

other materials and as an ideal conductor and cannot be replaced (Rudiyanto, Rachmanita, & Budiprasojo, 2023) (Iskandar & Latief, 2018).

The tin mining process consists of several stages which are carried out thoroughly. The first stage, namely exploration, is a systematic study and analysis activity to find out how much tin reserves are contained. The second stage is mining operations where in the tin mining process there are two types of mining, namely offshore mining and onshore tin mining. The onshore tin mining process is carried out by spray mining and removing the top layer of soil using heavy equipment (soil dredging). The results obtained from this process are tin pellets. This process depends on the management and utilization of large amounts of water resources. The large dredged area produced in this process is called a pit. The final stage is processing, where the process of forming tin from tin ore produces tin bars (GUNTU, 2023) (Ricky, 2023).

Tin, as one of the valuable metals in the modern industrial world, has played a crucial role in encouraging innovation and economic growth in various sectors. Tin's extensive uses have made it an irreplaceable strategic commodity in maintaining a country's economic stability (Sahban & Se, 2018) (Badaruddin, 2018). However, despite its vital role, the tin industry often faces serious challenges that require in-depth attention and action to ensure stable and sustainable supply as well as greater influence in the global market because tin is a non-renewable natural resource, reserves and resource positions Indonesian tin is increasingly being pushed as a 'critical material', so it is necessary to save National Natural Resource Assets to develop domestic downstream industries and increase the value of the commodity while also being able to increase national income from the tin sector and have a greater economic impact.

Although tin has a very important strategic role in various sectors, many countries depend on imports to meet their industrial needs. This creates significant dependence on tin supplies from producing countries. This dependency can result in serious vulnerability to global price fluctuations and unstable supply. This challenge becomes clear when we look at the tin market in recent decades. Tin prices often experience sharp fluctuations, and uncertainty in supply has caused concern in tin-dependent sectors. Countries that depend heavily on tin imports could feel a significant impact when supplies are disrupted or prices spike

The particular challenge of illegal mining often arises in many regions, which can disrupt markets and cause significant economic losses. In addition, the lack of adequate infrastructure and lack of strict regulations in some tin-producing regions can hinder the development of this industry. Sustainable use of tin resources and the environment is also a major concern in revitalization efforts. The tin industry has also been criticized for the environmental and social impacts often associated with it. Unsustainable tin mining can have a detrimental impact on the environment. Deforestation, water pollution, and land degradation are some of the environmental problems often associated with uncontrolled tin mining. In addition, social issues, including problems related to human rights and poor working conditions in certain tin mines, have become a concern global (Marthen Arie, 2022).

This raises ethical questions about how tin is produced and traded. A fundamental change is needed in the way we approach the tin industry. This includes investment in research and development to improve processing technology, production efficiency, and reduce environmental impact. This investment will help us harness the full potential of the tin industry to meet the needs of a growing global market. To ensure the security of tin resources, it is important to maintain full control of these resources within the country's territory. In this way, the country will be able to avoid exploitation by foreign countries and ensure greater profits from its tin resources. Significant new resources and reserves have not yet been discovered or have not been discovered. The new world order is encouraging tin-producing countries to be more strict and selective in exploiting their reserves, therefore it is necessary to carry out research with the title Revitalizing Tin to Achieve Control (Domination) of Tin as a Strategic Commodity (Wahyu Nugroho, 2022) (Nugroho & SH, 2022).

2. Materials and Methods

This research was developed under the umbrella of management theory, by further analyzing the management strategy for Tin Revitalization to Achieve Control (Domination) of Tin as a Strategic Commodity. The qualitative approach because this qualitative research method is often called the "naturalistic research method" because the research is carried out in natural conditions (natural setting); It is also called the ethnographic method because initially, this method was more widely used for research in the field of cultural anthropology; and is also called a qualitative method because the data collected and the analysis is more qualitative in nature. The object of qualitative research is a natural object or natural setting, so this research method is often referred to as a naturalistic research method. A natural object is an object that is as it is, not manipulated by the researcher so that the conditions when the researcher enters the object, after being in the object, and leaving the relative object, do not change.

3. Results and Discussions

Tin as a commodity for the world market is non-renewable with limited resources and reserves. Indonesia is the No.2 producer and No. Net Exporter. 1 in the World. However, it only has 7% of the world's resources and 8% of reserves. The position of Indonesia's tin reserves and resources is increasingly becoming a critical material, so it is necessary to save National Natural Resource Assets to develop domestic downstream industries and increase the value of the commodity while also being able to increase national income from the tin sector and have a greater economic impact. With the increase in the value/price of tin commodities in the global market, we will be more financially empowered to conduct post-mining environmental reclamation and rehabilitation (Yusuf, 2018) (Puryono, 2016) (Adrian Sutedi, 2022).

The use of tin has grown and is increasingly irreplaceable due to these new uses. Currently, tin is used in addition to meeting the needs of the electronics industry and other conventional needs, as well as for the production of environmentally friendly automotive Energy Storage (EV), namely LithiumIon Batteries, as well as for components of renewable energy conservation equipment such as 'Solar Panels', the use of which is increasing and will increase. continues to develop in line with technological developments because tin's properties as 'energy storage' are better than other materials and as an ideal conductor and cannot be replaced. The material content of the 'unit product value' in tin-using products is tiny so it is an 'insensitive price' (Laura et al., 2019) (Aledan, Rasheed, Jasim, & Razak, 2021).

Around 65% to 70% of world tin production is consumed by countries in the Asia Pacific, especially China which consumes 45% of world tin production. China produces 30% of the world's tin supply, while China's consumption is 45%, making China a 'Net Importer'' of Tin. China's tin production is not sufficient for domestic needs. Indonesia produces 20 to 25% of the world's tin, while domestic consumption is only 5%. Consumption growth world tin est.2.5%/year until 2027, it is estimated that the largest growth will be for the use of 'tin solder'.

Opportunities to Dominate Tin Commodities and Increase/Develop Domestic Downstream Industries

a. Tin consumption is predicted to continue to increase from year to year (assuming 2.5% growth until 2027), in line with the growth in consumption for environmentally friendly electric vehicles, batteries, and solar panels. Usage growth will be driven by mining production and recycled tin (est. 30%).
b. Bearing in mind, Indonesia is the world's no.2 largest producer. Limiting the intake of refined tin into the global market, will disrupt the global tin supply chain and become an opportunity for Indonesia to produce downstream tin products, both industrial products (solder, chemical, metal) and finished products (automotive, electronics, glass, PVC, dill).
c. In order not to disrupt foreign exchange earnings and the economy in the tin sector, measures to limit the intake of pure tin ingots to the global market are carried out in stages using existing governance and trade instruments for tin mining products and creating a tin ecosystem that is investment friendly for domestic downstream industries.
d. Massive government involvement through a tin commodity revitalization agency involving tin business actors and financial institutions. Its role is to accommodate production and sell both exports and to support domestic supplies in encouraging the development of domestic downstream industries. In other words, the revitalization agency will act as a supply controller.
e. Penetrating and filling the growing market for downstream tin products into the global market will be a challenge in itself and will require massive efforts from the government to attract downstream industry investors to move/relocate some production capacity to Indonesia to fill the 'existing' market. Simultaneously with efforts to build a domestic upstream-downstream tin ecosystem.
f. Integrated government regulatory instruments are needed to support:
    1) The growth of Timan Hillr's investment,
    2) Use of Hili in industrial products to meet the needs of the electronics, automotive, glass, PVC, etc. industries (prohibition/restrictions on imports of Hillr tin products for these industrial needs)
g. Strengthening Tin Trading Regulations
h. Structuring and Auditing Implementation of norms mining (including environmental audits)
i. Massive government involvement through a tin commodity revitalization agency involving tin business actors and financial institutions. Its role is to accommodate production and sell both exports and to support domestic supplies in encouraging the development of domestic downstream industries. In other words, the revitalization agency will act as a supply controller.

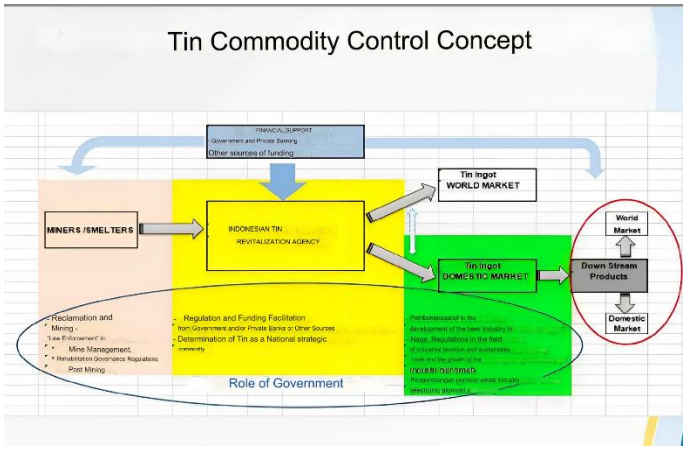

Figure 1

Indonesian Tin Revitalization Agency

As 'Upstream and Downstream Controller of Tin Commodities' Benefit :

a) National Endurance

- Control of 'Tin' resources which have a strategic role in meeting world needs for 'high tech products' as well as to support the development of domestic downstream industries.
- Natural Resources + Technology + Government Regulation = Maximize Country Wealth

b) Increase the price of tin on the global market. This will have a positive impact on:

- Receipt of DHE
- PNBP receipts
- Increasing the level of 'profitability' of business actors in the Tin Industry, which in turn will
- More financially capable of enforcing post-mining reclamation and restoration that does not only meet normative benchmarks.

Rising commodity prices will trigger the operation of mines with marginal deposits and illegal mines, thereby triggering uncontrolled environmental damage. R&D for substitute materials, efficiency of use, and more efficient refining to recover secondary tin from electronic outcome waste will be intensively carried out, especially for conventional products that use tin and products that are relatively 'high/medium price sensitive' to the price of tin. Then, the growth of new reserves from living resources with increased exploration activities boosts resources. Key Success Factor is Regulation from Upstream to Downstream which is integrated with 'Law Enforcement' Financial Support for controlling the supply of tin commodities. Support for the development of Domestic Downstream Industries (fiscal incentives, etc.).

4. Conclusion

Tin, as one of the valuable metals in the modern industrial world, has played a crucial role in encouraging innovation and economic growth in various sectors. Tin's extensive uses have made it an irreplaceable strategic commodity in maintaining a country's economic stability. For tin revitalization to occur to achieve control (domination) of tin as a strategic commodity, strengthening of the Tin Trading Regulations must be carried out. Structuring and Auditing Implementation of mining norms (including environmental audits) and massive government involvement through a tin commodity revitalization agency involving tin business actors and financial institutions. Its role is to accommodate production and sell both exports and to support domestic supplies in encouraging the development of domestic downstream industries. In other words, the revitalization agency will act as a supply controller.

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