MACROECONOMIC ANALYSIS OF THE INDONESIAN NICKEL INDUSTRY USING DEPEST ANALYSIS

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Abstract- The global push to accelerate the electric car industry is expected to increase world demand for nickel until 2030. Indonesia is the largest producer, with a Nickel production of 800,000 tons, or 30% of the world supply. The Indonesian government then responded to this global situation by issuing a law banning the export of 1.8% low-grade Nickel, in line with its policy of accelerating the national Strategic Project (PSN), focusing on nickel downstream (besides downstream other minerals and coal) to increase added value to strengthen the competitiveness of the national nickel industry on an international scale, suppressing imports and also creating energy independence. In an effort to achieve this downstream, it is necessary to carry out a macroeconomic analysis of the various opportunities and challenges faced in developing the Indonesian Nickel industry. This external analysis is the analysis Demography factors, Economy, Political, Ecological, and Social Technology (DEPEST). The results show: 1) Southeast Sulawesi has a demographic bonus with a low unemployment rate and the potential to be trained in trade and mining. 2) In terms of economic factors, Southeast Sulawesi Nickel has quite large reserves, and the LQ showed that the mining and quarrying sector has the highest comparative advantage compared to other basic sectors. 3) So far government regulations are accelerating the provision of added value to domestically manufactured products by relying on domestic raw materials. 4) The impact on socio-culture is to increase the community's welfare around the mining area as long as it is carried out while maintaining environmental sustainability. 5) There is a promising technology for downstream Nickel.
Keywords: Nickel Industry; Smelter; DEPEST Analysis

1. INTRODUCTION

1.1.Research Background

The global push to accelerate the electric car industry is expected to increase world demand for nickel by 4.6% from 2018 to 2025, and will continue to increase until 2030. The Geological Agency of the Ministry of Energy and Mineral Resources noted that world nickel ore production in 2019 reached 2.67 million tons, and Indonesia is the largest producer, with nickel production of 800,000 tons, or 30% of world supply (Ramli, R, 2020). Due to the high nickel resources in Indonesia, the Indonesian government, in declaring the acceleration of the National Strategic Project (PSN), focuses on nickel downstreaming (besides downstreaming other minerals and coal) to increase added value in order to strengthen the competitiveness of the national nickel industry on an international scale, suppressing imports and also create energy independence. Indonesia's nickel production position globally can be seen in the image below.

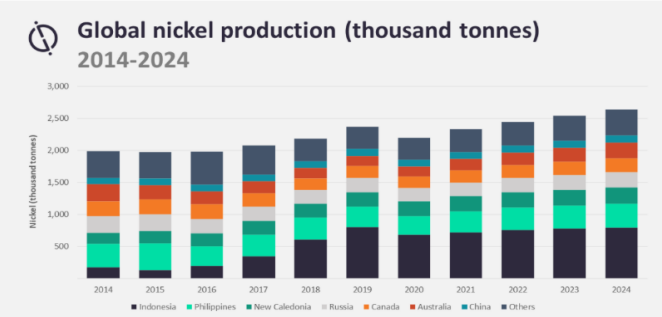

Figure 1. Indonesian Nickel Production in the Global Market
Souce: NS Energy (2020)

Nickel prices also soared and reached a record high this year at the level of USD 18,109 on the London Metal Exchange (LME), which had a positive impact on the share prices of nickel issuers (Edo,F,2021).

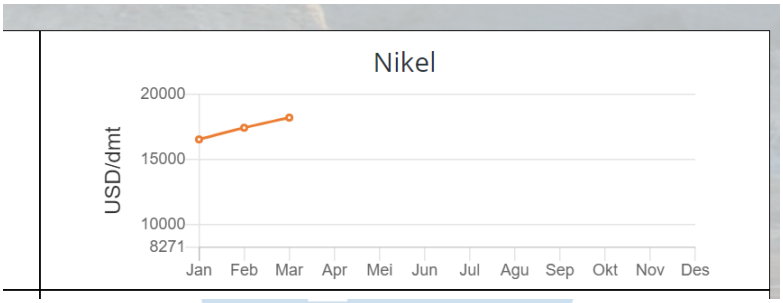

Figure 2. National Nickel Prices based on the ESDM Reference as of 19 March 2021
Source: Data Dunia Tambang, 2021

Indonesia has the potential for low grade nickel, thus nickel downstream has a positive impact on the country's economy by increasing the production supply chain value, as well as being able to save nickel ore commodities from price fluctuations. An example of downstream processing is the processing of nickel ore into FeNi or concentrate, then processing it into Ni-sulfate and Co-sulfate. After that, it is processed again into a precursor which is the basic material for the battery material, which then produces a lithium-ion battery type battery. For this purpose, it is targeted to build 23 smelters in 2021 up to 53 smelters in 2024. (Databox, 2021). One of the focuses in accelerating PSN is accelerating the construction of a nickel smelter project in the Sulawesi region. (Fernando, E, 2020). The increasing number of smelter developments in Indonesia means increasing the need for nickel ore supply, which means the importance of exploring the production of nickel ore. Indonesia's largest nickel ore potential is in the areas of Southeast Sulawesi, Central Sulawesi and North Maluku.

Based on Minister of Energy and Mineral Resources Regulation No. 16 of 2020 concerning the Strategic Plan of the Ministry of Energy and Mineral Resources for 2020-2024, nickel ore production is estimated to almost triple to 71.40 million tons in 2024 from this year's production of around 19.31 million. tons. An increase in nickel ore production will begin to be seen in 2021 to 30.10 million tons, then increase again to 59.94 million tons in 2022, and 71.74 million tons in 2023. In line with the increase in nickel ore production, ore processed domestically increased. The domestically processed ore is targeted to increase to 52.14 million tonnes in 2024 from this year's target of around 12.77 million tonnes. Although not all of the nickel ore produced has been processed in domestic smelters, the ratio has increased to 73% in 2024 from this year's ratio of around 66%.

Based on the Minister of Energy and Mineral Resources data, ore processed domestically is targeted to increase to 21.32 million tonnes in 2021, then 43.58 million tonnes in 2022, and 52.61 million tonnes in 2023. These figures are indicators in the context of measuring the optimal availability of minerals to meet the needs.

1.2 Research Problem

Exploration for nickel ore, as well as exploration for other mineral and geological resources, is highly dependent on market needs (demand), the price of nickel ore on the international market, the price of processed nickel products, the geological conditions of an area, especially the Sulawesi region, technological developments in exploration which include refining technology or smelters, capital, political situation, legal certainty in Indonesia, and other external factors that are difficult to predict, especially after the financial and economic crisis due to the Covid-19 pandemic. 1. For this reason, the study of Nickel ore exploration focused on studying domestic demand using the DEPEST framework (Demographic, Economic, Political, Environmental, Sociocultural and Technological Factors), and strategic implications through SWOT/TOWS analysis. (Bargorett, E & Williams, B, 2014)

1.3 Literatur Review

1.3.1 Nickel and Its Benefits

Nickel is a mineral mine first discovered by Cronstedt in 1971 and was named kupfernickel (nicolite). This mineral is hard but malleable. Initially, nickel was considered as an impurity metal in copper, but along with advances in technology and research, it was possible to find the benefits of nickel as a valuable metal. In its pure state, this metal with the chemical symbol Ni has a soft texture and is physically rust resistant and can withstand exposure to extreme temperatures. However, nickel combined with iron and chromium will produce stainless steel that is strong but light.

In everyday human life, Nickel is related to daily necessities, namely:

1.3.1.1. Stainless Steel Basic Materials for Kitchen Equipment

About 65 percent of world nickel is used as an alloying agent for iron to form stainless steel. A mixture of nickel, iron and chrome that produces stainless steel (stainless steel) is currently used to make kitchen utensils, for example cutlery, pots, pans and others. These three materials produce strong metallic characters, are able to conduct electricity, and are not easily oxidized by water and air. That is why kitchen utensils made of stainless steel are classified as durable, do not rust easily, and are able to conduct heat well.

1.3.1.2. Coin Making Materials

Nickel, which is tough but malleable and anti-rust, is also used as a material for making coins. When compared to aluminum, nickel has a denser texture and heavier weight. Bank Indonesia (BI) first introduced nickel-based IDR 1,000 coins in 2010.

1.3.1.3. Making Automotive Frames

The nickel content in steel makes its strength and durability better than steel made from an alloy of aluminum. These advantages make nickel also used for the manufacture of automotive frames to produce durable frames because they are not easily damaged. Nickel also makes the automotive frame look shinier so it looks luxurious. Some vehicle components made of nickel include wheels, bumpers and exhausts. In addition, nickel is also used for building materials and railroads.

1.3.1.4. Main Ingredients of Rechargeable Batteries

The benefits of nickel which are equally important are as the main material for making batteries. Unlike disposable batteries, batteries made of nickel are rechargeable secondary batteries. Two types of nickel batteries that are popular and most widely used are Lithium-ion (Li-ion) Nickel-Cadmium (Ni-Cd) and Nickel Metal Hydride (NiMH). Nickel-based batteries are often used as an energy source for electronic equipment, including smartphones. In electronic devices, NiCad or nickel cadmium, known as a material for making batteries, nickel competes with lithium. It could be that, in some ways, nickel is a little behind. Lithium batteries (Lithium-ion batteries) can be smaller, easier to use, and safer for the environment than nickel-based batteries. Even with the same size and power, lithium batteries can last longer.

1.3.1.5. Wire Making Materials

Nichrome (Ni, Fe, Cr) is commonly used as a heating wire, and alniko (Al, Ni, Fe, Co) is used to make magnets. The character of nickel which is anti-rust and is able to conduct heat well is also used as a wire material, especially for use in laboratories and aircraft turbines. Nickel is also alloyed to make Palinit and Invar, nickel alloys with an expansion coefficient equivalent to glass. This mixture is used as an electric wire embedded in glass. That's what is commonly used in incandescent light bulbs.

1.3.1.6. Anti Rust Coating Material

Any metal that is coated with nickel will not be damaged quickly because it is anti-rust. These advantages make nickel often used for the outer layer of weapons and cans for food packaging. Nickel is also widely used to support internet networks in the country. IndiHome is an internet provider that relies on nickel to maintain the quality of its infrastructure, especially the fiber optic wire section. The nickel coating on IndiHome's infrastructure makes it more durable and effectively supports internet connection speeds. (Indihome, 18 Feb 2021).

On the other hand, the use of nickel is not without risk. Nickel mining which pollutes the waters around the mining area through the river flow, can have an impact on the marine ecosystem. Mainly because Ni is associated with other heavy metals, such as copper (Cu), arsenic (As), iron (Fe), and platinum (Pt). These heavy metals can form bonds and enter the bodies of marine organisms and are toxic. In addition, heavy metals can cause suspended solids (MPT) to increase, and can cause a decrease in water quality. (Lokadata, 29 January 2018)

1.3.2. Nickel's contribution to economic growth

Southeast Sulawesi Province (Southeast Sulawesi) has natural wealth in the agricultural, plantation and forestry, fisheries and marine, and mining sectors. For the agriculture and fisheries sector, data for 2020 there were 132.99 thousand hectares of rice plants with a production of 539.35 thousand tons of rice, followed by cocoa, coconut and fish crops. Another potential is for marine tourism such as the Wakatobi National Park which has the potential for high-value marine natural resources and has beautiful underwater panoramas, so that the beauty of Labengki Island is nicknamed the Raja Ampat of Sulawesi. From the mining sector, Southeast Sulawesi has nickel potential. Southeast Sulawesi nickel has quite large reserves, namely 97 billion tons with a nickel distribution area of 480 thousand hectares. based on data from the Department of Energy and Mineral Resources of Southeast Sulawesi Province. (BPS Sultra, 2021).

Geologically, the province of Southeast Sulawesi was formed from the collision of two large plates, the continental plate originating from Australia and the oceanic plate originating from the Pacific, which resulted in the southeast Sulawesi region based on tectonostratigraphy

consisting of 3 main constituent rock groups, namely: Continental terrane, Ocean terrane and Sulawesi. Molasses. Ocean terrane consists of an ophiolite complex which causes Southeast Sulawesi to have quite large reserves of nickel. (Geologisultra, 2012). The province of Southeast Sulawesi then became the center for nickel ore production and distribution to the world market.

So far, Southeast Sulawesi has only been a place to sell raw materials, while other countries have become a place for processing to finished materials, trading and distribution. Starting January 2020, the government banned the export of nickel ore with the issuance of the Minister of Energy and Mineral Resources Number 11 of 2019. Export restriction policies for downstreaming or downstreaming interests in order to create considerable added value for the economy. Various calculation predictions for this downstream business have emerged, including PT Indonesia Asahan Aluminum (Inalum) holding the state-owned mining industry, which stated that downstream mining can increase added value by up to 7 times. This calculation is based on a comparison of the value of US mineral exports between raw and processed products, that after going through the refining process the contribution of mineral mining products to US GDP increased from 0.62 percent to 4.63 percent. Processed mineral raw materials can increase added value 3.14 times from the previous process and make their contribution to GDP even greater, reaching 14.54 percent. (Katadata.co.id, January 9, 2020).

2. RESEARCH METHOD

This research is an applied research by conducting a macroeconomic analysis to be able to identify the external environmental analysis of the Nickel industry in Indonesia, especially Southeast Sulawesi. Thus the analysis tool is descriptive statistics using secondary data. This external analysis aims to identify and analyze the strengths and weaknesses of the Nickel industry macro-environment, along with challenges and opportunities. Thus it can become the basis of policy for both the government and companies wishing to get involved in the Nickel industry.The most common method for carrying out this external analysis is DEPEST analysis, namely Demography factors, Economy, Political, Ecological, Social Technology. From the DEPEST Analysis, it is then derived in a SWOT analysis, especially in terms of Opportunity and Threat.

3. RESULT AND DISCUSSION

3.1. Demographic Factors.

Southeast Sulawesi has 2,624,875 inhabitants, or as much as 13.17% of the total 19,934,000 inhabitants of Sulawesi island in 2020. The population growth rate for the last 10 years is 1.58%, which is a decrease compared to previous years, However, the working age population, namely 15-64 years old, is quite large, namely 68.62% of the total population. Thus Southeast Sulawesi is still in the demographic bonus period.

Table 1. Employment Indicators for Southeast Sulawesi Province in 2020.

Description	Total population	Additional description
Population	2.624.875	13,7% (of the total population of the island of Sulawesi)
Working age population	1.936.802	73,79 % (from total population)
Labor force	1.351.092	69,83% (TPAK)
Working population	1.289.232	
Unemployment	61.860	4.57%

Source: BPS Province of Southeast Sulawesi, processed.

Table 1 shows the demographic bonus of Southeast Sulawesi, which has a population of more productive age than the non-productive age population, with an unemployment rate that is lower than the national unemployment rate. The composition of the population of the province of Southeast Sulawesi in 2020 shows that 25.96% of the population are millennials aged 24-39 years who are of productive age, plus generation X aged 40-55 years as much as 18.89%. The young and elderly population (non working age population) is only 13.5%, relatively small so the burden on the workforce should be relatively small.

Because human capital is an important factor of production in addition to the quantity of labor itself, the availability of an educated workforce is very important. In table 3 it can be seen the potential of human resources in the province of Southeast Sulawesi.

Table 2. Education and Workforce of Southeast Sulawesi Province, 2020.

Educational attainment	Total	Percentage of the Working Age Population (%)
Primary School	642.494	33,21
Junior High School	389.719	20,14
Senior High School	631.551	32,64
Collage	217.038	11,21
Total	1.934.802	

Source: BPS Province of Southeast Sulawesi, processed.

The data in Table 2 shows that there are most workers who have only graduated from elementary school, namely 33.21% followed by high school graduates. The least are college graduates. This data is consistent with the high number of unemployed in Southeast Sulawesi for high school graduates reaching 47.56% of the total unemployment. This can be a challenge as well as an opportunity for companies to procure educated and skilled human resources. Workers with high school graduates have the potential to be trained to become skilled workers in the manufacturing and trading industries, including the mining industry, with jobs as workers, operators of transportation equipment, and administration and marketing personnel. In particular, it can be seen that the number of workers in the mining sector according to education in Table 3.

Table 3. Labor and Education in the Mining & Quarrying Sector Southeast Sulawesi Province, 2020.

Higher Education	Total Working Labor Force
Primary School	7.729
Junior High School	5.522
Senior High School	13.046
Collage	4.530
Total	30.827

Source: BPS Province of Southeast Sulawesi, processed.

Data on Table 3 shows that the largest number of workers currently working in the mining and quarrying sector are high school graduates (42.3%), followed by elementary school graduates, high school graduates and the rest are at least university graduates. The availability of a large number of workers in the mining and quarrying sector is a good human resource potential for the mining industry which can be used as skilled labor through various education and training programs that can be provided by companies (on the job training). This is supported externally by the existence of vocational education that is relevant to the needs of

the mining and quarrying industry, which is carried out by the government in an effort to improve the quality of the workforce. For the company itself, it will help achieve a learning curve according to the specialization of its workforce so as to increase the productivity and performance of the company.

3.2. Economic Factors

Southeast Sulawesi Province (Southeast Sulawesi) has natural wealth in the agricultural, plantation and forestry, fisheries and marine, and mining sectors. For the agriculture and fisheries sector, data for 2020 there were 132.99 thousand hectares of rice plants with a production of 539.35 thousand tons of rice, followed by cocoa, coconut and fish crops. Another potential is for marine tourism such as the Wakatobi National Park which has the potential for high-value marine natural resources and has beautiful underwater panoramas, so that the beauty of Labengki Island is nicknamed the Raja Ampat of Sulawesi. From the mining sector, Southeast Sulawesi has nickel potential. Southeast Sulawesi nickel has quite large reserves, namely 97 billion tons with a nickel distribution area of 480 thousand hectares. based on data from the Department of Energy and Mineral Resources of Southeast Sulawesi Province. (BPS Sultra, 2021).

Geologically, the province of Southeast Sulawesi was formed from the collision of two large plates, the continental plate originating from Australia and the oceanic plate originating from the Pacific, which resulted in the southeast Sulawesi region based on tectonostratigraphy consisting of 3 main constituent rock groups, namely: Continental terrane, Ocean terrane and Sulawesi. Molasses. Ocean terrane consists of an ophiolite complex which causes Southeast Sulawesi to have quite large reserves of nickel. (Geologisultra, 2012). The province of Southeast Sulawesi then became the center for nickel ore production and distribution to the world market.

Before the Corona pandemic in 2020, economic growth was relatively high, 6.5%, able to grow above the national growth of 5.02%, and compared to the economic growth of several other major provinces in Indonesia. In 2019, while the sectors that experienced the highest growth were the manufacturing industry (9.19%), health services and social activities (8.24%), wholesale and retail trade (7.73%) and mining and quarrying (7. ,53%). Comparison of Southeast Sulawesi's economic growth compared to several other provinces can be seen in Table 4.

Table 4. Comparison of Southeast Sulawesi's Economic Growth with Several Major Provinces

5 Major Provinces	2018 (%)	2019 (%)
Southeast Sulawesi	6,42	6,50
DKI Jakarta	6,17	5,82
East Java	5,50	5,52
West Java	5,66	5,07
Central Java	5,31	5,40

Source: BPS Province of Southeast Sulawesi, processed.

High economic growth in the province of Southeast Sulawesi is an indicator of the province's high economic potential and high business opportunities. Southeast Sulawesi's export value in 2019 grew by 44.32%. Export growth was driven by increased export value of iron and steel, metal ores, silt and ash, as well as fruits. In sequential order, the highest export

growth was achieved by exports of fruits (460.79%), exports of metal ore, silt and ash (90.63%), and exports of iron and steel (72.02%). It shows that 97.73% of Southeast Sulawesi's total exports consist of iron and steel, metal ore, slag and ash, and mineral fuels, with an increase of around 90.63% respectively from 2018 to 2019.

The availability of natural resources, especially nickel, asphalt, gold and other mining products, makes the investment climate in Southeast Sulawesi very prospective. The Southeast Sulawesi One-Stop Investment and Integrated Services Service (DPM PTSP) noted that investment realization in Southeast Sulawesi reached IDR 11 trillion in 2017, and there was a positive trend of investment realization in 2020 where in 2020 the cumulative investment realization from 2020 to the third quarter reached IDR . 17.53 Trillion. Investment realization in the third quarter of 2020 consisted of FDI of Rp. 4.98 trillion and PMDN of Rp. 0.43 Trillion. Investment realization affects economic growth and achievement of investment realization targets for 2020 (dpmptsp Southeast Sulawesi, 2020). This increased investment is a positive impact of the nickel ore export ban that took effect January 1, 2020.

The results of the Location Quotient (LQ) analysis conducted by the Ministry of Finance (2021) to identify leading sectors of regional economic activity that encourage growth in the development of the Southeast Sulawesi region. The results of LQ can be seen on Table 5. An LQ value > 1 indicates that the sector is a base sector or leading sector, has a relatively larger share than other sectors so that this sector is able to meet consumption both within and outside Southeast Sulawesi. The Mining and Quarrying Sector has the highest comparative advantage compared to other basic sectors. This is supported by the Mining and Quarrying Differential Shift (DS) value of 0.220 (or > 0), which means that the level of competitiveness (competitiveness) of the activity/sector is compared to the total growth of the activity/sector in the Southeast Sulawesi region. The processing industry has the lowest comparative advantage.

Table 5. Base Sector Comparative Advantages in Southeast Sulawesi, 2019.

Sector	LQ in 2019	Average LQ in 2015- 2019
Agriculture, Forestry and Fisheries	1,78	1,76
Mining and Quarrying	2,77	2,55
Manufacturing Industry	0,29	0,28
Contruction	1,22	1,25
Transportation and Warehousing	1,06	1,09
Administrasi Pemerintahan, Pertahanan dan Jaminan Sosial Wajib	1,40	1,49
Jasa Pendidikan	1,46	1,47

Source: Ministry of Finance, 2020. Processed.

However, the government's policy to build smelters will increase, among other things, increased industrial production of the ferronickel base metal in Southeast Sulawesi, apart from the local government's efforts to encourage the development of local food processing industries and other natural resources. This includes the development of micro and small-scale industries.

3.3. Political Factors.

The banning of exports of nickel ore with a grade of less than <1.7% according to Ministerial Regulation (Permen) of ESDM Number 11 Years which came into force on 1 January 2020 is based on 3 reasons, namely: 1). To accelerate the provision of added value to domestically manufactured products, relying on domestic raw materials. 2). So that the government can accelerate steps to realize Indonesia as a producer of batteries and electric vehicles. 3). Encouraging the domestic industry has made Indonesia a major producer of nickel-based finished goods. Thus only nickel ore that has been processed can be exported. This is also in line with plans to encourage investment in lithium battery factories for electric vehicles.

This law is related to Government Regulation (PP) Number 1 of 2014 concerning Implementation of Mineral and Coal Mining Activities, as well as Minister of Energy and Mineral Resources Regulation Number 1 of 2014 concerning Criteria for Increasing Value Added. (katadata.co.id, 9 January 2020)

The impact of this PP is as follows:

1. The first impact is legal uncertainty for investors, because initially this regulation will be enforced in 2022, and then accelerated to 2020. This for investors is a matter of government consistency
2. In the short term, the export value of nickel drops to zero, which has an impact on the current account deficit (CAD).
3. Potential for the emergence of illegal exports
4. World nickel prices are getting more expensive due to reduced supply of 20% from Indonesia
5. Higher nickel ore prices, in theory, will encourage miners across the country to increase production, estimated to have the potential to increase to 200 kt (200,000 metric tons) based on data from the last 5 years. This can only be limited by legal and environmental restrictions
6. International problems in the trade sector with the European Union which have an impact on the steel industry and disputes up to the WTO (CNBC Indonesia, 03 October 2019).
7. Indonesia has so far had 40% of China's total imports, as the main importer in 2019 or as much as 350 kt (350 thousand metric tons). This gap will be filled by the Philippines as the main potential source by supplying 295 thousand tonnes from 2020 onwards.
8. Tax revenue prior to the enactment of this Ministerial Regulation, International Trade Tax contributed IDR 903.97 billion or 28.69% of total tax revenue, due to the high exports of the Southeast Sulawesi region, with the main commodities in 2019, namely Mining Products (Ferronickel and Nickel Ore), Agricultural Products (Cocoa Butter and Cashew), and Fishery Products. (Kementrian Keuangan, 2019).

3.4. Sociocultural factors

The positive impacts of the nickel processing and refining development plan on income and social in Southeast Sulawesi Province directly are:

a) Improving the regional economy in the form of increasing Gross Regional Domestic Product. The added value of nickel products increased by 400%.
b) Increased employment and employment opportunities. It is estimated that it will absorb 4000 new workers
c) There is an increase in income per capita/head of family, savings increase, investment increases, welfare increases. A study found that it was known that the income of the surrounding community before working in mining companies received an average of Rp. 1,961,111.00 per month. Income increased by an average of Rp. 3,166,667.00 per month with mining activities.
d) Community micro enterprises develop. Some people take advantage of business opportunities by opening micro-businesses such as small-scale kiosks: grocery stalls, food stalls on the outskirts, credit counters, small industries for making tempeh, tofu chips and screen printing, services (for example barbers, tires repairs, motorcycle repair shops and tailors). , craftsmen (for example souvenirs, timber and wickerwork) agriculture/livestock (for example crops, native chickens, ducks, catfish, fish and

shrimp ponds). This business is profitable for both parties, namely between the community and the mining employees.

e) Nickel downstream or downstream integration policies will attract the attention of business players/investors and the government.

However, management methods that are unsustainable have negative impacts as follows: more than 200,000 hectares of mining land in Central Sulawesi has had an impact on the community and the carrying capacity of the environment. The impact is felt by the community, such as floods and river pollution. Dozens of IUP mining companies in Konawe and Konut are suspected of carrying out illegal logging, clearing protected and conservation forests as well as HPT forests.

3.5. Technology Factors

Downstream Nickel in Ferronickel (FeNi) and Nickel Pig Iron (NPI). Downstream nickel is carried out through smelting technology (pyrometallurgy) using high grade nickel ore (saprolite) to produce ferronickel (FeNi) and nickel pig iron (NPI) which will then be processed into stainless steel. This downstream process is the most common process carried out in Indonesia. Companies that use this technology are PT. Antam Pomalaa, PT. IMIP, PT. Virtue Dragon Nickel, and PT. Solar Majestic Earth.

Downstream Nickel in Nickel Matte. The second nickel downstream process is almost the same as the first process, carried out through smelting technology using high grade nickel ore (saprolite) to produce nickel matte (nickel sulfide) which can be used to produce pure nickel metal, stainless steel, and nickel sulfate compounds (raw materials for manufacturing nickel-based lithium ion batteries), an example of a company that has done this is PT. Vale Indonesia.

Downstream Nickel in Nickel Sulfate Compounds. Downstreaming with leaching technology (hydrometallurgy) using low grade nickel ore (limonite). However, the downstream process is still under preparation. Products that can be produced are pure nickel metal and nickel sulfate compounds (raw materials for manufacturing nickel-based lithium ion batteries). In addition, pure cobalt metal and cobalt sulfate compounds (the raw material for manufacturing nickel-based lithium ion batteries) can also be produced. The company that plans to do this is PT. IMIP and PT. Vale Indonesia.

Nickel can be used in various industries, from construction, chemical, kitchen appliance manufacturing, battery manufacturing, automotive to finance. More downstream nickel in Indonesia is expected to provide direct welfare to the people of Indonesia by becoming a country that can export the nation's products in the form of stainless steel, nickel-based lithium batteries, nickel metal, nickel chemical compounds, and other nickel products. (Dartwin, June 30, 2020).

4. CONCLUSION

4.1 Conclusion

Analysis of demographic, economic, political, ecological, socio-cultural and environmental factors shows the diversity of opportunities as well as challenges in the development of nickel ore as the prima donna of the mining industry in Indonesia. Indonesia's main strength as a nickel ore exporter compared to other countries in the world is the large reserves of low grade nickel ore which, if processed, will increase the added value of up to 400%. With the prospect of world demand for processed nickel ore with the establishment of a battery factory for electric cars in the future, opening up opportunities for the nickel downstream industry in Indonesia, thus making the government determine nickel as a priority for accelerating the National Strategic Project (PSN), focusing on downstream nickel to create

national energy independence. . With the construction of 48 smelters by 2024, the input absorption capacity of nickel ore will increase to 60 million tons per year, which means it will be able to accommodate domestic nickel production.

However, in addition to these opportunities there are still several threats, especially in the political, economic, social and environmental sectors. The occurrence of a trade dispute with the European Union could result in retaliation against Indonesia's exports later. Uncertainty about investment in electric car batteries is also a threat as well as environmental damage caused by the widespread clearing of forests and land for this excavation area. Causing negative externalities and increasing community costs that must be borne by the surrounding community.

4.2 Research Limitations and Suggestions for Further Research

This research only focuses on domestic production capabilities, opportunities, and threats from within the country. This research has not gone into Indonesia's competitiveness or comparative advantages compared to other nickel-exporting countries worldwide. Thus, comparing domestic and world nickel production will complement the analysis and description of the competitiveness of the Indonesian nickel industry in the global market.

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