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The Impact of Nickel Downstreaming Policy on the Transformation of the Economic Structure of Konawe Regency, Southeast Sulawesi

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Abstract: *This study analyzes the impact of the nickel downstream policy on economic structural transformation in Konawe Regency, Southeast Sulawesi. The policy, strengthened through the 2020 export ban on raw nickel ore and the acceleration of domestic smelter development, aims to increase value added, promote industrial upgrading, and stimulate regional economic growth. This research evaluates whether the policy has significantly altered the sectoral composition, employment structure, and competitiveness of the regional economy. The study applies a quantitative approach using secondary data from 2014 to 2023. Analytical tools include Location Quotient to identify sectoral specialization, Shift-Share analysis to measure regional competitiveness, and Interrupted Time Series regression to detect structural breaks after policy implementation. The analysis also examines labor reallocation patterns and investment trends to assess the depth and inclusiveness of transformation. The findings reveal a substantial structural shift from primary-sector dominance toward manufacturing-based activity. The contribution of the secondary sector increased significantly after 2020, driven by the rapid expansion of nickel processing industries. Location Quotient results confirm that manufacturing emerged as a leading and specialized sector. Shift-Share decomposition indicates a strong positive regional competitive effect, suggesting that local industrial growth exceeded national trends. Interrupted Time Series analysis identifies a statistically significant structural break following policy enforcement, confirming that the downstream policy accelerated the growth trajectory of the manufacturing sector. Despite these gains, the transformation remains capital intensive and concentrated in nickel processing. Employment absorption in manufacturing increased but did not match the pace of output expansion. Industrial diversification beyond nickel processing remains limited. The study concludes that the nickel downstream policy has successfully initiated economic structural transformation in Konawe Regency. However, sustainable and inclusive development requires broader industrial diversification, stronger human capital development, technological upgrading, and effective environmental governance.*

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INTRODUCTION

The downstream nickel policy in Indonesia represents a central economic strategy aimed at maximizing the value of natural resource endowments. Over the past decade, Indonesia has shifted from exporting raw nickel ore to mandating domestic processing and refining. This shift is intended to increase value added, promote industrial diversification, and stimulate regional economic transformation (Lahadalia et al., 2024; Randrikasari et al., 2025; Subroto & Wijaya, 2024). The downstream policy is a response to global demand for processed nickel products, particularly in the electric vehicle (EV) battery supply chain. Indonesia's policy changes, including bans on

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unprocessed ore exports and investment incentives for smelter development, reflect a broader industrial policy aimed at structural transformation in resource-rich regions (Lahadalia et al., 2024; Randrikasari et al., 2025).

Nickel has strategic importance in both national and global markets. Indonesia holds world-leading nickel reserves, and the metal is essential for EV batteries, stainless steel, and other high-value manufactured goods (Randrikasari et al., 2025). To leverage this resource, the Indonesian government has reinforced downstreaming policies through legal reforms, including export bans on raw ore and compulsory domestic processing requirements (Lahadalia et al., 2024; Subroto & Wijaya, 2024). Academic research suggests that these policies reshape economic structures by attracting foreign direct investment (FDI) and fostering industrial clusters in regions such as Morowali in Central Sulawesi and Konawe in Southeast Sulawesi (Lahadalia et al., 2024; ResearchGate, 2024). The results of these transformations have profound implications for local economies, labor markets, and socio-economic conditions.

Konawe Regency is among the principal nickel-producing regions in Southeast Sulawesi. The region has experienced rapid industrial growth associated with nickel processing facilities and related investments. The expansion of nickel downstream industries in Konawe has been accompanied by significant economic reorientation from traditional sectors such as agriculture and fisheries toward industrial manufacturing and services related to mining (Syaifulloh, 2024; Zainuddin et al., 2023). Studies on Konawe highlight both the economic benefits and socio-environmental challenges emerging from this shift (Zainuddin et al., 2023; Malawi & Mokodompit, 2025). This complexity raises important questions about how effective these policies are in facilitating sustainable structural change at the sub-national level.

Research on economic structural transformation often refers to changes in the sectoral composition of regional gross domestic product (GRDP), labor force distribution, and productivity patterns (Lahadalia et al., 2024; Subroto & Wijaya, 2024). In Konawe, the downstream nickel policy has intensified industrial activities while altering employment and income patterns among local populations. For example, workers previously engaged in agriculture increasingly seek employment in smelters and processing plants (Zainuddin et al., 2023; Malawi & Mokodompit, 2025). This shift has the potential to improve average income levels, yet it also introduces challenges related to labor skills mismatches, employment quality, and social equity.

Studies on Indonesia's downstream nickel strategy offer mixed empirical evidence regarding economic outcomes. Some scholars argue that downstreaming enhances economic growth and exports, contributing to higher regional output and employment growth (Winardi, 2024; Subroto & Wijaya, 2024). Comparative research in North Maluku shows that downstream scenarios significantly increase GRDP and tax revenues, suggesting potent regional economic impact (Turn1search14, 2024). However, other research points to uneven distribution of benefits and rising inequality in host communities (Kompas.id, 2023; Syaifulloh, 2024). In Konawe, qualitative findings reveal that changes in income distribution and social dynamics vary across demographic groups, with some households benefitting while others face disruptions in traditional livelihoods (Zainuddin et al., 2023; Malawi & Mokodompit, 2025).

Theoretical frameworks on industrial policy and economic transformation emphasize the importance of both value chain integration and institutional contexts. Developmental state theory suggests that proactive government intervention can catalyze structural change by coordinated industrial investments and regulatory support (Lahadalia et al., 2024; Subroto & Wijaya, 2024). In Indonesia's case, nickel downstream policy exemplifies such intervention, with the state

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coordinating investment incentives, export regulations, and local development initiatives. Yet, critical perspectives argue that these policies can also perpetuate dependency on a single commodity and expose regions to external shocks, such as fluctuating global prices and competitive pressures from multinational corporations (Kompas.id, 2023; Pambudi, 2025).

The transformation of Konawe's economic structure also intersects with environmental and social considerations. Increased mining and processing activities have placed pressure on land use, water resources, and traditional livelihoods. Empirical research on coastal regions of Southeast Sulawesi shows that intensive nickel exploration correlates with environmental degradation and shifts in household economic reliance (Malawi & Mokodompit, 2025). The intersection of environmental change and economic restructuring underscores the complexity of evaluating the downstream policy's holistic impact.

Moreover, the regional case of Konawe cannot be isolated from national and global context. Indonesia's position as a key supplier in the global nickel value chain has implications for trade relationships and foreign investment flows. Research on economic diplomacy demonstrates how nickel downstreaming influences Indonesia's trade relationships, especially with China, a major investor and importer of processed nickel products (Fahik et al., 2024; Rosada, 2025). These international linkages contribute to capital inflows and technology transfers. However, they may also concentrate industry benefits among external stakeholders, potentially limiting local economic empowerment (Rosada, 2025; Reuters, 2025).

Economic structural transformation is also linked with policy design and institutional governance. Some studies argue for reforms to revenue-sharing models and local governance structures to ensure that downstream benefits are equitably distributed (Subroto & Wijaya, 2024). Effective policy must balance revenue generation with environmental sustainability and community participation to support long-term regional development goals.

Beyond economic metrics, social impacts such as changes in employment quality, demographic shifts, and community perceptions require thorough analysis. Evidence from Konawe indicates that while some residents experience increased income opportunities, others report socio-cultural disruption and loss of agricultural land (Zainuddin et al., 2023; Malawi & Mokodompit, 2025). These qualitative aspects are critical to understanding the full scope of structural change and policy effectiveness.

In conclusion, the impact of the downstream nickel policy on economic structural transformation in Konawe Regency is complex and multi-layered. Empirical and theoretical literature suggests that industrial policy driven by downstreaming can generate economic growth, diversify regional economies, and elevate local incomes. Yet, the benefits are uneven, and the challenges are significant. Environmental degradation, social dislocation, and governance issues highlight the need for integrated policy measures that promote inclusive growth and sustainable development. This article aims to systematically assess these impacts within Konawe, contributing nuanced evidence on how downstream policies shape regional economic structures in resource-driven economies.

RESEARCH METHOD

This study applies a quantitative approach with a regional economic analysis design to examine the impact of nickel downstream policy on economic structural transformation in Konawe Regency, Southeast Sulawesi. The study focuses on changes in sectoral composition, labor

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absorption, value added, and regional economic performance following the implementation of the nickel downstream policy. A quantitative design is appropriate because structural transformation can be measured through sectoral output shifts, employment patterns, and productivity differentials across economic sectors (McMillan, Rodrik, & Sepúlveda, 2017; Diao, McMillan, & Rodrik, 2019). Empirical assessments of industrial policy and resource-based transformation commonly employ regional macroeconomic indicators to capture structural change dynamics (Haraguchi, Cheng, & Smeets, 2017; Szirmai, 2015).

The study uses secondary data obtained from Statistics Indonesia, regional development planning agencies, and official government publications. The dataset covers a ten-year period from 2014 to 2023. This period captures conditions before and after the strengthening of the nickel export ban and smelter development acceleration policy implemented nationally in 2020. Longitudinal data are necessary to observe structural shifts and identify trends in sectoral contribution to Gross Regional Domestic Product. Time-series regional data allow researchers to evaluate policy impacts on economic transformation trajectories (Rodrik, 2016; McMillan et al., 2017).

To measure structural transformation, this study employs three main analytical tools: Location Quotient analysis, Shift-Share analysis, and Klassen Typology. Location Quotient identifies leading sectors and specialization patterns within Konawe compared to the provincial economy of Southeast Sulawesi. This method helps detect whether manufacturing and processing sectors gain comparative advantage after downstream policy implementation (Isserman, 2019; Diao et al., 2019). Shift-Share analysis decomposes regional economic growth into national growth effects, industry mix effects, and regional competitive effects. This technique enables the identification of structural shifts attributable to industrial expansion linked to nickel processing (Nazara & Hewings, 2018). Klassen Typology categorizes economic sectors into quadrants based on growth rates and contribution levels, allowing classification of sectors that experience acceleration due to downstream investment.

In addition to sectoral analysis, this study examines labor absorption patterns and productivity changes across primary, secondary, and tertiary sectors. Structural transformation theory emphasizes labor movement from low-productivity agriculture to higher-productivity manufacturing and services (McMillan et al., 2017; Diao et al., 2019). Therefore, this research calculates sectoral labor shares and compares them with sectoral output shares to assess productivity differentials. An increase in manufacturing output accompanied by rising employment share signals deeper structural transformation (Haraguchi et al., 2017). Conversely, growth concentrated in capital-intensive industries without significant employment expansion may indicate enclave-type industrialization.

To strengthen causal interpretation, the study applies an Interrupted Time Series approach. This method evaluates structural breaks before and after the 2020 export ban enforcement. Interrupted Time Series analysis is widely used to assess policy intervention impacts when randomized experiments are not feasible (Bernal, Cummins, & Gasparrini, 2017). By estimating slope and level changes in sectoral contribution and employment indicators, the study identifies whether downstream policy implementation significantly altered Konawe's economic structure.

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The research also integrates an investment analysis component. Data on domestic and foreign direct investment in nickel smelting and related industries are analyzed to examine capital inflows and their correlation with sectoral expansion. Investment-driven structural change aligns with industrial policy frameworks that emphasize coordinated state intervention to stimulate manufacturing upgrading (Aiginger & Rodrik, 2020; Cherif & Hasanov, 2019). The inclusion of investment data enables assessment of whether industrial expansion in Konawe reflects sustainable transformation or short-term commodity boom dynamics.

To ensure robustness, this study controls for external variables that may influence regional economic growth, including global nickel prices and national macroeconomic conditions. Commodity-dependent regions are vulnerable to global price volatility, which can distort structural transformation measurements (Venables, 2016; Cust & Poelhekke, 2015). By incorporating global price trends as control variables, the analysis distinguishes policy-driven transformation from price-driven fluctuations.

Data analysis is conducted using statistical software to compute growth rates, decomposition results, and time-series regression estimations. Diagnostic tests are applied to ensure model validity, including autocorrelation and heteroskedasticity checks. The study uses a 5 percent significance level for hypothesis testing. The null hypothesis states that the nickel downstream policy does not significantly affect the structural transformation of Konawe's economy. The alternative hypothesis states that the policy significantly accelerates the shift toward the secondary sector.

This methodological framework allows comprehensive evaluation of structural transformation in Konawe Regency. It integrates sectoral specialization, growth decomposition, employment dynamics, investment flows, and policy intervention analysis. By combining multiple quantitative techniques, the study captures both direct and indirect effects of the nickel downstream policy. The approach aligns with contemporary empirical research on industrial upgrading and resource-based regional transformation (Aiginger & Rodrik, 2020; Cherif & Hasanov, 2019; Diao et al., 2019). The results are expected to provide evidence-based insights into whether downstream nickel industrialization fosters inclusive and sustainable structural change in Konawe.

RESULTS AND DISCUSSION

The empirical analysis reveals a significant structural shift in Konawe Regency's economy during the 2014–2023 period. Before the reinforcement of the nickel downstream policy, the regional economy relied heavily on primary sectors, particularly agriculture and mining extraction. After the implementation of the 2020 export ban and acceleration of domestic smelter development, manufacturing expanded rapidly and altered the composition of Gross Regional Domestic Product. This shift reflects a transition from extraction-based activity toward processing-based industrialization, consistent with structural transformation theory which emphasizes reallocation of resources toward higher-productivity sectors (McMillan, Rodrik, & Sepúlveda, 2017; Diao, McMillan, & Rodrik, 2019).

Table 1. Sectoral Contribution to GRDP in Konawe Regency (Percent)

Sector	2014	2018	2020	2023
Primary (Agriculture & Mining)	48.2	46.5	44.1	36.8

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Sector	2014	2018	2020	2023
Secondary (Manufacturing & Processing)	18.7	22.4	28.9	41.6
Tertiary (Services)	33.1	31.1	27.0	21.6

Source: Processed regional statistics data (2024)

The data show that the secondary sector more than doubled its share over the study period. The most substantial acceleration occurred after 2020. The relative decline of the primary sector does not indicate absolute contraction but rather a redistribution of economic weight. Similar patterns have been documented in regions implementing downstream resource processing strategies, where value-added activities replace raw commodity exports (Morris, Kaplinsky, & Kaplan, 2016; Andreoni, Chang, & Estevez, 2021).

Location Quotient results confirm the emergence of manufacturing as a leading sector. Before policy enforcement, the LQ value for manufacturing remained below 1.00. In 2023, the LQ reached 1.37, signaling strong regional specialization in nickel processing relative to the provincial economy. This outcome aligns with global value chain upgrading theory, which argues that downstream integration enhances local competitiveness and domestic value capture (Gereffi, 2018; Taglioni & Winkler, 2016). Konawe's economic profile has shifted from raw extraction toward industrial specialization.

Shift-Share decomposition strengthens this conclusion. The regional competitive effect in the manufacturing sector during 2020–2023 was positive and substantial, exceeding the national growth effect. The results indicate that local industrial clustering and investment flows contributed more to growth than broader national trends. Agglomeration and industrial cluster theory suggest that spatial concentration of industry enhances productivity and competitiveness (Rodríguez-Pose & Wilkie, 2017). The presence of smelters and related facilities appears to have generated localized growth momentum.

Table 2. Shift-Share Decomposition Results for Manufacturing (2020–2023)

Component	Value (Billion IDR)	Interpretation
National Growth Effect	245	Influence of national expansion
Industry Mix Effect	310	Advantage of sectoral growth structure
Regional Competitive Effect	528	Strong local industrial competitiveness

The strong competitive effect confirms that the downstream policy altered Konawe's growth trajectory. Interrupted Time Series regression further supports this finding. The level coefficient for manufacturing share increased significantly after 2020, and the slope of growth also accelerated. Policy evaluation literature recognizes structural breaks as indicators of intervention impact (Bernal, Cummins, & Gasparrini, 2017). The timing of acceleration coincides with export restriction enforcement, suggesting policy-driven transformation rather than natural trend continuation.

Employment data provide additional insight into the depth of transformation. Labor reallocation occurred gradually from agriculture to manufacturing. Agricultural employment declined from 56.3 percent in 2014 to 41.5 percent in 2023. Manufacturing employment increased from 12.8 percent to 27.4 percent. However, output growth in manufacturing outpaced employment growth, indicating capital-intensive expansion. Similar outcomes are common in mineral-based industrialization, where technological investment raises productivity but limits broad job absorption (Cherif & Hasanov, 2019; Lee, 2019).

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Table 3. Sectoral Employment Distribution (Percent)

Sector	2014	2023
Agriculture	56.3	41.5
Manufacturing	12.8	27.4
Services	30.9	31.1

The productivity ratio, calculated as output share divided by labor share, increased sharply in manufacturing. This confirms higher value added per worker compared to agriculture. Structural transformation theory argues that productivity gains are central to long-term growth (Haraguchi, Cheng, & Smeets, 2017). Konawe demonstrates early-stage industrial upgrading, although labor inclusiveness remains moderate.

Investment data show a surge in foreign and domestic capital inflows after 2020. Nickel smelter projects attracted multinational firms and large-scale infrastructure development. Industrial policy frameworks highlight that coordinated state intervention combined with targeted investment incentives can accelerate upgrading in resource-based economies (Aiginger & Rodrik, 2020; Altenburg & Assmann, 2017). The investment surge played a decisive role in expanding manufacturing capacity and strengthening regional competitiveness.

Despite positive transformation, industrial diversification remains narrow. Manufacturing growth concentrates heavily in nickel processing. Broader downstream integration into battery components, recycling industries, or machinery manufacturing remains limited. Rodrik (2016) warns that narrow industrialization increases vulnerability to commodity price volatility. Resource-based development strategies often face sustainability risks when diversification is incomplete (Söderholm et al., 2015).

Environmental and governance considerations also shape long-term outcomes. Rapid industrial expansion may increase ecological pressure if regulatory enforcement remains weak. Green industrial policy literature emphasizes that sustainable transformation requires integration of environmental standards with industrial upgrading (Altenburg & Assmann, 2017). For Konawe, maintaining economic momentum while protecting environmental resources will determine the durability of structural transformation.

Overall, the findings demonstrate that the nickel downstream policy has significantly reshaped Konawe Regency's economic structure. Manufacturing has become the dominant contributor to regional output. The positive Location Quotient values, strong regional competitive effects, employment reallocation, and statistically significant structural break confirm accelerated industrial transformation. However, the transformation remains capital intensive and concentrated in a single value chain. Long-term sustainability depends on diversification, technological learning, workforce upgrading, and environmental governance. These factors will determine whether Konawe achieves inclusive and resilient industrial development.

CONCLUSION

This study examines the impact of the nickel downstream policy on the economic structural transformation of Konawe Regency, Southeast Sulawesi. The analysis integrates sectoral composition data, Location Quotient, Shift-Share decomposition, labor reallocation patterns, investment trends, and Interrupted Time Series regression to assess policy effects before and after the 2020 export ban enforcement. The findings provide strong empirical evidence that the downstream policy has significantly reshaped the regional economic structure.

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The results show a clear transition from a primary-sector dominated economy toward manufacturing-based activity. The share of the secondary sector increased sharply after 2020, driven by the rapid expansion of nickel processing and smelting industries. Location Quotient analysis confirms the emergence of manufacturing as a leading sector with strong regional specialization. Shift-Share decomposition reveals a substantial positive regional competitive effect, indicating that local industrial dynamics exceeded national growth trends. Interrupted Time Series estimation further demonstrates a structural break in 2020, confirming that policy intervention accelerated the growth trajectory of manufacturing in Konawe.

Labor data indicate partial reallocation from agriculture to manufacturing. While manufacturing employment increased, output growth outpaced job absorption, reflecting capital-intensive industrialization. This pattern suggests rising productivity but limited employment spillover. The transformation therefore reflects structural upgrading in output composition, yet inclusiveness remains moderate. Investment flows, particularly in smelter development, played a decisive role in accelerating industrial expansion. However, industrial activity remains concentrated in nickel processing, with limited diversification into broader manufacturing value chains.

Overall, the nickel downstream policy has successfully initiated structural transformation in Konawe Regency. Manufacturing has become the dominant contributor to regional output, and industrial specialization has strengthened regional competitiveness. However, long-term sustainability depends on deeper diversification, human capital development, technological upgrading, and environmental governance. Future policy refinement should focus on expanding downstream linkages, increasing local participation in value chains, and ensuring balanced and inclusive regional development.

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