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EMPIRICAL ANALYSIS OF ECONOMIC TRANSFORMATION IN INDONESIA

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Teuku Riefky[1], Mervin Goklas Hamonangan[2], Hardy Salim[3], Rifa Eka Rozani[4], Mohamad Dian Revindo[5]

Institute for Economic and Social Research, Faculty of Economics and Business, Universitas Indonesia

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Abstract

Indonesia aspires to achieve high-income status and become the world's fifth-largest economy by 2045, leveraging its natural resources, demographic advantages, and large domestic market. This study applies a descriptive, indicator-based analysis of secondary macroeconomic, trade, labor, and digital-economy data (2000-2024) from BPS-Statistics Indonesia, Bank Indonesia, ADB, IMF, World Bank, and related sources, combined with document analysis of Indonesia's economic transformation programs, to identify barriers and strategic opportunities for inclusive and sustainable annual growth of 6-7%. The findings indicate ongoing premature deindustrialization, low labor productivity, and a weak private sector contribution, as well as insufficient technological adoption and limited participation in global value chains. Despite some shifts toward higher-value-added sectors, productivity and efficiency remain stagnant, while the quality of human capital, as reflected by declining PISA scores, constrains labor market competitiveness. Investment inefficiencies, limited diversification, and low trade openness further challenge the transformation process. The digital economy, though growing rapidly, lags behind regional peers, hindered by inadequate digital infrastructure and low digital literacy. Addressing these issues requires strengthening human capital development, promoting innovation, enhancing connectivity, improving logistics, and formulating integrated policies to foster high-value production and global market integration. If successfully implemented, these strategic reforms will enable Indonesia to achieve its transformation goals, ensuring resilient growth, quality employment, and global competitiveness.

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Corresponding author: Mohamad Dian Revindo
Email: revindo@lpem-febui.org

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INTRODUCTION

Indonesia aspires to become a high-income country and aims to be the world's fifth-largest economy by 2045. The country's abundant natural resources, demographic dividend, and large domestic market are important assets for realizing this vision (ADB, 2024). However, achieving this goal requires inclusive and sustainable economic growth of 6-7% per year (Bappenas, 2023), which can only be achieved through structural economic transformation. In the last decade, Indonesia's economic structure has shifted from agriculture to services, with agriculture's contribution to GDP declining from 13.9% in 2011 to 11.8% in 2023. Furthermore, the manufacturing sector's contribution has declined from 22.1% to 20.4%, indicating signs of premature deindustrialization. Conversely, the high value-added service sector has increased from 15.7% to 19.8%, pointing toward a transformation toward a service-based economy (CEIC, 2024).

Indonesia's economic structural transformation appears to be moving in a positive direction, marked by a shift in economic activity from the agricultural sector to high-value-added services. However, structural transformation needs to be studied in greater depth by comparing GDP distribution and labor distribution to gain a comprehensive understanding of the dynamics of productivity changes between sectors. The proportion of labor in the agricultural sector declined more rapidly than the decline in its GDP contribution, from 36.39% in 2011 to 28.21% in 2023, indicating an increase in productivity. On the contrary, the manufacturing sector faced a decline in productivity, despite its GDP contribution declining. However, the proportion of labor increased from 13.8% to 13.9% during the same period. This rate indicates symptoms of premature deindustrialization. In addition, the workforce is increasingly concentrated in low-value-added service sectors, with a proportion increase from 35.2% to 41.3%, while the high-value-added service sector rose only slightly from 7.1% to 8.3%, indicating the limited ability of productive sectors to absorb labor.

Although the economic structure has shifted from agriculture to sectors with higher added value, the overall distribution of labor shows a worrying trend. In 2023, nearly 70% of the workforce will be employed in sectors with relatively low productivity, such as agriculture and low-value-added services. The CEIC (2024) data shows that sectors with high productivity tend to provide better wages, even though less than 10% of the workforce works in productive and high-wage sectors (such as mining and high-value-added services). Despite low productivity, workers tend to move from agriculture to low-value-added services because they offer higher wages. In addition to wage issues, the high concentration of workers in low-productivity sectors raises concerns about job quality, as these sectors often operate informally. The high contribution of the informal sector in these various sectors is related to low job security and social safety nets, leaving most of Indonesia's workforce in a vulnerable position.

Since 2020, the agricultural sector has lost more than a third of its workforce, which has moved to other sectors, while almost all other sectors have experienced an increase in their share of the workforce. However, data from the BPS-Statistics Indonesia (2000-2023) shows that most of these transfers have been to low-value-added sectors, particularly service activities such as trade, hotels, restaurants, and public and social services. On the other hand, the information and communication sector, as one of the high-value-added service activities, has experienced a decline in its share of the workforce, indicating barriers to access to the production sector. Thus, the decline in national labor productivity can be understood as a result of the dominant shift of labor to low-productivity sectors, so that the contribution of structural transformation to overall productivity improvement is still relatively limited.

To understand the dynamics of Indonesia's economic transformation, several key concepts and terminologies provide the analytical foundation. A comprehensive understanding of these concepts is essential for evaluating policies and formulating effective strategies, as elaborated below.

Development theory emphasizes that long-term economic growth is characterized by a shift of resources from the agricultural sector to the manufacturing and service sectors, followed by increased labor productivity and diversification of the economic structure (Chenery & Syrquin, 1976; Lewis, 1954). In the modern context, this transformation not only involves the movement of labor between sectors but also the strengthening of domestic and global value chains (Elms & Low, 2013) and the application of digital technologies that accelerate value creation. Intra-sectoral transformation promotes efficiency within the same sector through innovation and digitalization, while inter-sectoral transformation shifts the center of growth to more productive sectors (Naudé et al., 2013). The synergy between the two is an important foundation for inclusive, competitive, and sustainable economic growth.

A country's competitiveness is determined by the ability of its domestic sectors to produce high-quality and efficient products. Participation in global value chains (GVCs) can enhance access to technology, deepen skills, and expand export markets (Baldwin & Lopez-Gonzalez, 2015; Riefky, Sabrina, & Revindo, 2025). However, the literature indicates that mere participation in GVCs is insufficient; it is crucial for countries to move up the value chain by strengthening innovation capacity and technological capabilities (Gereffi & Fernandez-Stark, 2016).

The policies that support exports, control strategic imports, and attract both foreign direct investment (FDI) and domestic direct investment (DDI) constitute an essential instrument for strengthening competitiveness (Aghion & Howitt, 2009; Krugman, 1990). Well-targeted trade and investment liberalization can stimulate technology transfer, raise quality standards, and improve logistical efficiency. Conversely, unnecessary trade and investment barriers tend to erode competitiveness and isolate

the economy from the dynamics of global value chains.

The literature on industrial development emphasizes the importance of developing high-value-added manufacturing sectors as drivers of structural transformation (Lall, 2004). Downstreaming commodities through the processing of agricultural, mining, and oil and gas products into higher-value products strengthens the national economic structure and reduces dependence on primary commodity exports. MSMEs play an important role in employment, innovation, and socio-economic stability (Beck & Demirguc-Kunt, 2006). The development of MSMEs encourages economic diversification and inclusive growth, despite facing challenges in financing, technology, and market access (Revindo, 2017; Revindo & Gan, 2018). Digital transformation is a key factor in increasing productivity and competitiveness (Brynjolfsson & McAfee, 2014). On the other hand, ICT infrastructure, data regulations, and digital literacy are necessary for MSMEs to become more efficient and competitive in domestic and global markets (ADB, 2022).

The quality of the workforce is a key factor in economic transformation. Improvements in education, skills, and vocational training have a significant impact on productivity and the adoption of new technologies (Acemoglu & Autor, 2011). Appropriate education and training increase human capital, accelerate the growth of high-value-added sectors, and drive income growth. Adequate physical and digital infrastructure strengthens economic connectivity through logistics efficiency, market access, and domestic industrial development (Jones & Vollrath, 2013). Reliable digital infrastructure also accelerates the integration of technology in production and distribution. Recent literature emphasizes the significance of the green economy (ADB, 2022; UNEP, 2011) as a key sustainable development strategy. The transition to environmentally friendly production, energy efficiency, and climate change mitigation creates new economic opportunities, drives innovation, and enhances global competitiveness through sustainable investment and climate-friendly policies.

In addition to the main concepts of economic transformation, several previous studies in the field of economics that address similar topics have been extensively reviewed. The main findings of previous studies provide an essential theoretical and empirical basis for understanding the dynamics of economic structural transformation, the role of the service sector, the digital economy, and industrial policy. The following is a review of several studies relevant to the research focus.

Herrendorf et al. (2014) described the process of structural transformation as a shift in resource allocation from the agricultural sector to manufacturing and then to the service sector. This transformation makes a significant contribution to long-term economic growth. Buera and Kaboski (2012) emphasized that an increase in per capita income drives demand for complex services and expands the service sector. Eswaran and Kotwal (2002) highlighted the role of the service sector as a supporter

and driver of independent growth through manufacturing support services. Meanwhile, Eichengreen and Gupta (2011) examined the contribution of the service sector to India's economic growth. The expansion of the service sector, particularly the export-oriented sector, plays an important role in increasing GDP and creating jobs.

Czernich et al. (2011) examined the relationship between broadband infrastructure and economic growth in OECD countries. They found that increased broadband penetration contributed significantly to GDP per capita growth. This emphasizes the importance of investing in digital infrastructure to drive productivity and innovation. A Study by de Clercq et al. (2023) examined the impact of broadband access on economic growth, focusing on the digital divide between urban and rural areas. The results showed that increased broadband access in rural areas can reduce economic disparities and promote more inclusive growth.

Liu (2019) in "Industrial Policies in Production Networks" explored the impact of industrial policy in the context of global production networks. This study demonstrated that targeted policy interventions in strategic sectors can enhance productivity and participation in global value chains (GVCs). For Indonesia, the implementation of effective industrial policies could increase competitiveness and integration in GVCs. Rodrik (2018) discussed how new technologies and GVCs affect the growth prospects of developing countries. Rodrik emphasized that although GVCs offer opportunities for global integration, there were challenges arising from the adoption of new technologies that could shift traditional comparative advantages. Therefore, industrialization strategies need to be adapted to the dynamics of technology and GVCs to ensure sustainable growth.

Banerjee and Duflo (2008) evaluated the characteristics and role of the middle class in the global economy. They concluded that the middle class plays an important role in driving economic growth through increased consumption, investment in education, and participation in the political process. This confirms the importance of policies that support the strengthening of the middle class. Gill and Kharas (2015) discussed the phenomenon of the "middle-income trap" and the challenges faced by middle-income countries in moving up to high-income status. They highlighted the need for innovation, economic diversification, and increased productivity to avoid economic stagnation. For Indonesia, this means that deep structural transformation and increased global competitiveness are needed to avoid the middle-income trap.

Barteska and Lee (2024) identified the role of bureaucracy in South Korea's export success. He found that competent bureaucrats and effective government policies contributed significantly to increased exports and industrialization. This study offers valuable lessons on the importance of bureaucratic reform and improved governance in promoting exports and economic growth.

Although the literature reviewed above offers substantive theoretical and empirical insight into structural transformation, service-sector expansion,

and GVC participation, three gaps remain. First, theoretically, most structural-transformation frameworks (Chenery & Syrquin, 1976; Herrendorf et al., 2014) treat inter-sectoral labor reallocation and intra-sectoral productivity growth as largely separate processes, with limited integration of the role that digital technology adoption plays in accelerating both simultaneously. Second, empirically, existing single-country studies on Indonesia have generally examined structural transformation, GVC participation, the service sector, or the digital economy in isolation, rather than jointly, so the interaction between digital downstreaming, service-sector transformation, middle-class dynamics, and trade/investment policy effectiveness has not been assessed within one integrated empirical framework. Third, from a policy standpoint, prior evaluations rarely link macro-level structural indicators (e.g., ICOR, TFP, ECI, GVC participation) with the specific set of domestic industrial, trade, investment, and digital-economy programs that the Indonesian government is currently implementing (Endito, Revindo, & Situmorang, 2026). This study addresses these gaps by providing an integrated, multi-indicator empirical assessment of Indonesia's structural transformation across five interlinked dimensions, macroeconomic performance, international trade and GVC participation, human resources, sectoral/firm structure, and the digital and green economy, and by explicitly connecting these indicators to the effectiveness of ongoing government transformation programs. The novelty of this study therefore lies in its integrative diagnostic approach and its direct policy linkage, rather than in a single-sector or single-indicator analysis.

This study is intended to provide insights from an academic perspective and to support the monitoring of the economic transformation agenda that has been and continues to be implemented by the Indonesian government. The study aims to analyze several key aspects, namely: the effectiveness of domestic industrial development in driving economic transformation; the effectiveness of programs designed to boost exports, control imports, and increase investment in fostering economic growth through industrialization; strategic challenges and issues related to economic transformation; and strategic policy recommendations to advance economic transformation.

RESEARCH METHODS

This study combines qualitative and quantitative research, which includes an in-depth description and analysis to understand the current conditions related to economic transformation, aiming to improve the national economic structure, enhance global economic competitiveness, optimize trade and investment, and foster domestic industry development and MSME empowerment. The research team conducted observations and analyzed documents related to the economic transformation program. Additionally, the research team will utilize numerical data and statistical analysis to test hypotheses and address research questions. The objects in this

study include Economic Transformation programs within the scope of the study, including: (1) Industrial and MSME development (by sector), (2) Development of business sectors in the economy, industry and services, (3) Increasing exports and managing imports, (4) Increasing investment, (5) Developing the digital economy, (6) Developing the green economy, and (7) Increasing the competitiveness of dominant business sectors, including services, in the global market. The units of analysis in this study include business actors involved in the economic transformation program.

The analysis of the national economic structure, particularly in relation to the economy and digital down streaming, the transformation of the service sector, and the condition of the middle class in Indonesia, is based on the variables defined in the table below.

Table 1. Indicators in National Economic Structure Analysis

Variable	Definition and Operationalization of Variable
Digital Economy and Digital Downstreaming	
Size of Digital Economy to GDP	The proportion of the digital economy to total GDP. This variable measures the contribution of the digital economy to overall GDP by comparing the value of the digital economy to the total value of GDP.
Size of Digital Economy per Capita	The size of the digital economy per capita measures the contribution of the digital economy per resident in a country. This variable is calculated by dividing the total value of the digital economy by the population.
Growth of Digital Economy	The digital economy encompasses all economic activities that utilize information and communication technology (ICT), such as e-commerce, fintech, and other digital services. These variable measures the annual growth rate of the digital economy.
Internet Penetration	Proportion of the population accessing the internet. The measurement is calculated by determining the percentage of the population that accesses the internet relative to the total population.
Mobile Broadband and Cellular Network Usage	The number of people who access the internet via mobile or wireless networks. The measurement is based on data on the number of people who subscribe to active mobile broadband internet.
Transformation of the Service Sector	
Share of Value Added in the Service Sector	The ratio between GDP generated by the service sector and overall GDP is expressed as a percentage. GDP can be based on either constant prices or current prices, where current prices

	reflect relative changes in service prices compared to general prices.
Number of workers in the service sector	The number of workers in the service sector illustrates how much the service sector can absorb labor.
Share of Workers in the Service Sector	The ratio between the number of workers in the service sector and the total number of workers is expressed as a percentage.
Real Wages/Salaries of Service Sector Workers	The weighted average of wages/salaries of workers in the service sector, adjusted for inflation, serves as an indication of worker productivity growth.
Number and Proportion of Formal Workers in the Service Sector	The number of workers in the service sector who are classified as formal workers, as well as the ratio of formal workers in the service sector to the total number of workers in the service sector. This indicator is used to assess the extent to which the service sector has developed in providing decent employment.
Exports of Services (Tradable Services)	Annual nominal exports of services reflect the extent to which domestically produced services can be traded internationally. Higher nominal exports and a larger share of service exports indicate greater competitiveness in the service sector.

Source: processed by author

The analysis of national economic competitiveness, which is related to the global supply chain, industrial competitiveness, and human resources, as well as domestic industrial development, will use indicators whose definitions are contained in the table below.

Table 2. Indicators in National Economic Competitiveness Analysis

Variable	Definition and Operationalization of Variable
Direct measurement	Direct measures of competitiveness are produced by competitiveness rating agencies, such as the International Institute for Management Development (IMD) or the World Economic Forum (WEF). Each agency has different components, for example, the IMD competitiveness index (2024) uses four groups of measures: economic performance, government efficiency, business efficiency, and infrastructure.
	Global Supply Chain
Trade Openness	Using the ratio of total trade value (export value plus import value) to GDP to illustrate the extent to which the economy relies on trade as an engine of growth.

Foreign Value Added in Exports	This is the value of imported goods required to produce goods/services that will later be exported.
Backward GVC Participation	The ratio of foreign value added in exports to total export value describes a country's position as a buyer in the global supply chain.
Forward GVC Participation	The share of a country's domestic value added that is re-exported through partner countries, indicating that country's position as an upstream supplier within the global production network.
Industry and Human Resources	
Economic Complexity Index	The size of a country's export diversity and complexity is based on what is exported, relative to the export composition of other regions.
Logistics Performance Index	An index that measures the efficiency of the customs system, the quality of export-import infrastructure, the ease of arranging shipments, the competence of logistics services, the ability to track consignments, and the number of on-time deliveries.
Percentage of Educated Workers	The proportion of workers who have completed bachelor's, master's, and/or doctoral programs. This indicator measures the overall quality of human resources within a country.
PISA score	The level of scholastic ability of fifteen-year-old children in mathematics, science, and reading from the Programme for International Student Assessment.
Development of Domestic Industries	
Current Account	The current account is one component of the balance of payments, which records international transactions related to a country's receipts and expenditures arising from transactions in goods and services, income, and current transfers. The current account consists of the balance of trade in goods, services, income, and current transfers. Through this variable, we can observe how Indonesia's exports and imports have evolved over time.
FDI	Foreign Direct Investment (FDI) is capital investment or investment made in Indonesia (domestically) by foreign parties (outside the country), whether individuals, business entities, or foreign governments. Measurement is carried out using FDI investment realization data.
DDI	Domestic Direct Investment (DDI) or Domestic Investment (PMDN) is investment made in Indonesia (domestically) by Indonesian citizens, domestic business entities, or the domestic

	government. It is measured using PMDN investment realization data.
Share of GDP VA sub-Sector	The proportion of value added in a particular sector to total GDP. This is measured by comparing the value added of a particular sector to total GDP. For example, the share of GDP VA in the manufacturing sector will be measured by comparing the value added of the manufacturing sector to total GDP.

Source: processed by author

This study used secondary data. Secondary data was obtained from datasets provided by the BPS-Statistics Indonesia, Bank Central of Indonesia, the World Bank, and other organizations that provide data related to selected variables. The two approaches are combined because policy effectiveness cannot be inferred from quantitative indicators alone: document analysis is needed to identify which specific government programs and policy instruments the observed indicator trends can plausibly be attributed to, while the quantitative indicators are needed to establish whether those programs coincide with measurable structural change.

Quantitative methods were applied to secondary data obtained in accordance with the definition and operationalization of variables. The data analysis techniques used included general techniques in exploratory data analysis, covering data examination, descriptive statistical calculation, trend and ratio analysis (including construction of derived indicators such as ICOR and sectoral productivity), data visualization, and comparative benchmarking against ASEAN-6 and other peer countries (Chatfield, 1986; Morgenthaler, 2009). The research team described the trends of the indicators mentioned above and then performed a correlation analysis between government program spending and economic transformation indicators, business activity indicators, and other indicators to examine the relationship between the movements of the two variables.

The six analytical pillars used to organize the Results and Discussion, macroeconomic performance, international trade and global value chain participation, human resources and employment, sectoral and company structure, the digital economy, and the green economy, correspond to the seven program areas defined in the scope of this study (see the objects of analysis listed above) and to the indicator groups defined in Tables 1 and 2. They were selected because together they capture the three channels through which structural transformation is expected to operate: reallocation of labor and value added across sectors (macroeconomics, sectoral/company analysis), the economy's external competitiveness and integration into global production networks (international trade), and the underlying enablers of productivity growth (human resources, the digital economy, and the green economy as a forward-looking sustainability constraint). Table 3 summarizes the

guiding argument and primary data source for each of the six analytical pillars.

Table 3. Analytical Pillars, Guiding Arguments, and Data Sources for Economic Transformation Analysis

Analytical Pillar	Guiding Argument	Primary Data Source
Macroeconomics	Growth quality depends on the balance between capital accumulation and productivity (TFP, ICOR)	BPS, ADB, Penn World Table
International Trade & GVC	Competitiveness depends on trade openness and position in global value chains, not export volume alone	ADB, IMF, World Bank
Human Resources & Employment	Productivity growth is bounded by workforce education and skill quality	CEIC, SAKERNAS, OECD-PISA
Sectoral & Company Analysis	Firm-level structure determines how efficiently sectoral growth translates into productivity gains	BPS Large and Medium Industry Survey
Digital Economy	Technology adoption is a key enabler of productivity growth in the modern structural-transformation literature	Statista, ITU, World Bank
Green Economy	The transition to low-emission production is an increasingly binding constraint on long-term, sustainable growth	Bappenas' Low-Carbon Development Initiative, IEA, Global Forest Watch

Source: processed by author

RESULTS AND DISCUSSION

a. MACROECONOMICS

Current Situation

Indonesia's economic growth in the third quarter of 2024 showed a stagnant trend, with a growth rate of only 4.95% (y.o.y), continuing the average growth pattern of around 5% since 2014 (except during the COVID-19 pandemic) (CEIC, 2024). Although the first two quarters of 2024 were influenced by seasonal factors such as elections, Ramadan, and Eid al-

Fitr, which drove domestic consumption, economic growth did not show significant improvement outside of these seasonal periods. The economic slowdown after the first quarter was also influenced by a decline in government spending following the completion of infrastructure projects and election activities, indicating a high dependence on public spending and weak private sector productivity.

Signs of economic stagnation are increasingly evident from sectoral performance, with 11 out of 17 economic sectors experiencing slow growth in the second and third quarters of 2024. Improvements in several sectors, such as trade, accommodation, and agriculture, were primarily driven by seasonal factors and commodity prices, rather than increases in real productivity. Furthermore, the manufacturing sector continues to weaken and grow below the national average, signaling symptoms of premature deindustrialization. Slowdowns also occurred in the construction, real estate, and business services sectors due to declining government spending and the private sector's limited role in driving sustainable economic growth.

Analysis based on the Solow-Swan growth model indicates that the primary source of Indonesia's economic growth over the past two decades has been capital accumulation, rather than increased productivity. The contribution of labor and production efficiency (total factor productivity/TFP) has declined. Over the past two decades, Indonesia's economic growth experienced an upward trend until around 2010, after which it stagnated and then reversed into decline. During this period, capital accumulation became the primary source of growth, with a consistently increasing contribution, while the contributions of labor and total factor productivity (TFP) tended to fluctuate and decline. In 2007, out of GDP growth of 6.3%, labor contributed 2.8%, while in 2011, TFP contributed 2.9% to the growth of 6.2%. Based on data from the Penn World Table 10.0 (2019), the contribution of labor declined to 1.5%, and TFP to only 0.4%, resulting in economic growth stagnating at around 5%. This reflects a decline in national productivity and production efficiency.

Compared to many other countries, Indonesia still lags behind in terms of productivity, both in relation to developed countries and several developing countries. Based on the author's calculations of Asian Development Bank (ADB) data for the year 2024, Indonesia recorded a Total Factor Productivity (TFP) index of 0.90 and a labor productivity index of 1.42. These values place Indonesia below Singapore, the United States, China, India, Turkey, Vietnam, and Saudi Arabia. This condition indicates that, despite Indonesia's relatively high economic growth, the low level of national productivity limits the potential for optimal growth and weakens the country's global competitiveness. This competitiveness can be measured through the Economic Complexity Index (ECI), which assesses a country's production capacity based on the diversity and complexity of its products. A positive ECI value reflects a high-tech economy, while a negative value indicates a dependence on the primary sector.

Based on the ECI indicator, the level of complexity of the Indonesian economy still shows suboptimal performance. During the 2010-2021 period, Indonesia's ECI value fluctuated within the range of -0.10 to 0.07, with a value of -0.09 in 2021, ranking it 64th out of 133 countries (Center for International Development, 2021). Although there was a slight improvement compared to 2020, when Indonesia was ranked 69th with a value of -0.10, this position remains relatively low compared to other developing countries. During 2016-2021, Indonesia's ECI value was the lowest compared to China, India, and other ASEAN-6 countries, reflecting the limited complexity of the national economy. A comparative analysis between Indonesia and China reveals that, from 1995 to 2021, Indonesia's production structure remained dominated by low-value-added primary sectors, particularly agricultural and mining products, while the contribution of high-value-added products did not increase significantly. During this period, the dominance of low-value-added products in the national production structure has increased, indicating stagnation in the process of diversification and industrialization of the Indonesian economy.

In comparison with China, Indonesia's transformation of its production structure shows a significant contrast. Between 1995 and 2021, China successfully transitioned its production base from low-value-added products to high-tech and complex goods, including machinery and electronics (Center for International Development, 2021). In contrast, Indonesia still relies on low-complexity primary commodities. National flagship products, which were originally dominated by oil, gas, and wood products in 1995, shifted to palm oil, coal, and their derivatives in 2021. This high dependence on natural commodities makes Indonesia's economy vulnerable to global price fluctuations, hinders industrial diversification, and weakens structural competitiveness in the international market.

In the context of current economic growth, the government is striving to increase productivity by accelerating investment. Total investment in the third quarter of 2024 reached IDR 431.48 trillion, or 26.2% of the annual target of IDR 1,650 trillion, growing 15.3% (y.o.y.) despite slowing down from 22.5% in the previous quarter. Foreign Direct Investment (FDI) accounted for 53.9% (IDR 232.7 trillion), marking a consistent upward trend since the end of 2023. Conversely, Domestic Investment (PMDN) weakened, with growth of only 11.6% (y.o.y.), down from 29.1% in the previous quarter, due to a slowdown in the primary sector, particularly in forestry and mining. Cumulatively, the January-September 2024 period recorded investment realization of IDR 1,261 trillion, or 76.5% of the national target, an increase of 19.8% compared to the same period last year.

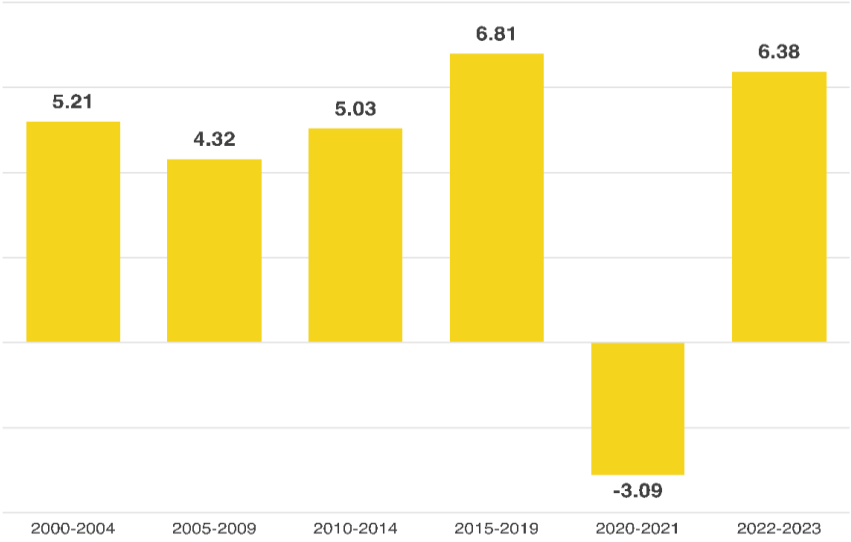
The transportation, warehousing, and communications subsector was the primary driver of investment realization in the third quarter of 2024, with a total of IDR 58 trillion, or 13.5% of total investment, representing a 4-percentage point increase compared to the previous quarter. The basic metals and metal

products, non-machinery, and related equipment industry ranked second with an investment value of IDR 55.9 trillion or 13% of the total, despite a 4.7 percentage point decline from the second quarter of 2024. Meanwhile, the mining sub-sector contributed IDR 44.6 trillion or 10.3% of total investment. These three subsectors show consistent dominance, reflecting high attractiveness for both domestic and foreign investors (CEIC, 2024). Spatially, investment realization in the third quarter of 2024 remains concentrated on the island of Java, with a total of IDR 212.7 trillion, or 49.3% of the total national investment, slightly lower than outside Java, which reached IDR 218.8 trillion, or 50.7%. Investment growth on Java Island was recorded at 15.9% (y.o.y), higher than the 14.6% (y.o.y) growth in areas outside Java. Central Sulawesi, driven by downstream activities, became the only non-Java province to enter the top five regions with the highest investment, alongside Jakarta, West Java, East Java, and Banten, with a total value of IDR 38.8 trillion, or 9% of the total national investment (CEIC, 2024).

As for the source of investment, Asia remains the main source of foreign direct investment (FDI) in Indonesia in the third quarter of 2024. Singapore recorded the highest investment of USD 5.5 billion, followed by Hong Kong with USD 2.2 billion and China with USD 1.9 billion. This increase was driven by major projects in the electric vehicle (EV) battery sector involving companies from South Korea and China. This investment inflow is in line with Indonesia's strategy to attract sustainable funding through green investments that support long-term economic resilience. However, the dominance of investment from Asian countries underscores the need to diversify FDI sources to minimize risks from regional economic turmoil.

Although investment realization has increased, productivity remains relatively low. This is reflected in the Incremental Capital to Output Ratio (ICOR), which indicates the efficiency of investment in generating additional output. An increase in the ICOR value indicates a decline in capital productivity, as greater investment is required to generate the same economic growth. The long-term trend shows that Indonesia's ICOR value increased from 4.32 in the 2005-2009 period to 6.38 in the 2022-2023 period. This means that in 2022-2023, approximately 1.5 times more investment will be needed to achieve the same level of growth as in the 2005-2009 period. This deterioration in capital productivity is consistent with the pattern described by Aghion & Howitt (2009), in which growth increasingly reliant on capital accumulation rather than total factor productivity tends to raise the capital-output ratio over time. In Indonesia’s case, this is compounded by continued dependence on public infrastructure spending noted earlier, which tends to have longer payback periods and lower private-sector multiplier effects than productivity-enhancing investment in technology or human capital, helping to explain why rising investment realization has not translated into a proportional increase in growth.

Figure 1. Incremental Capital to Output Ratio (ICOR) of Indonesia (2000-2023)



Source: BPS-Statistics Indonesia; Calculation by LPEM FEB UI staff

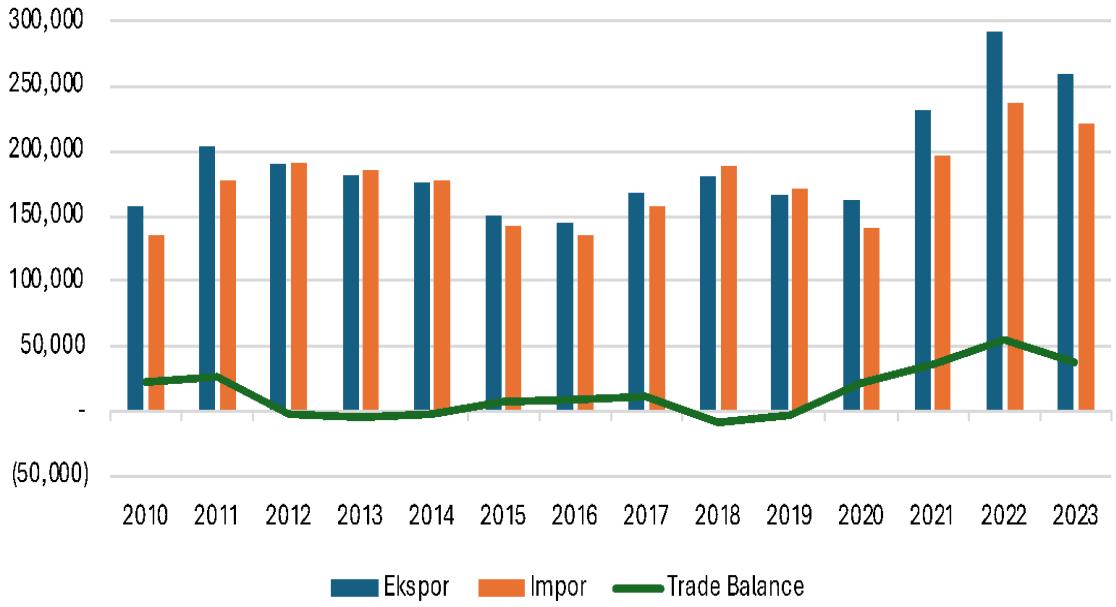
b. INTERNATIONAL TRADE

Current Situation

A country's industrial competitiveness can be measured by its level of involvement in the global market. Countries with high export and import activities demonstrate their production capabilities to compete in the international market and good access to quality raw materials and capital goods. Conversely, low involvement in the global supply chain indicates weak competitiveness of domestic products or limited access to competitive production inputs from abroad.

In terms of the international trade balance, Indonesia has recorded a surplus for 54 consecutive months, from May 2020 to October 2024. On an annual basis, this surplus has also been consistent since 2020. In October 2024, the trade surplus reached USD 2.48 billion, down 23.22% (m.t.m) from USD 3.23 billion in September 2024 and down 28.53% (y.o.y) from USD 3.47 billion in October 2023. Despite the decline, this achievement shows the sustainability of Indonesia's trade surplus. Both exports and imports grew in October 2024, but the larger increase in imports caused the surplus to decline.

Figure 2. Indonesia's Trade Balance (million USD), 2000-2023



Source: BPS-Statistics Indonesia; Calculation by LPEM FEB UI staff

Indonesia's imports grew by 16.54% (m.t.m.), from USD 18.82 billion in September 2024 to USD 21.94 billion in October 2024, and increased by 17.49% (y.o.y.) compared to the same period last year. In October 2024, the machinery and mechanical equipment group, which contributed 15.88% to total imports, declined by 2.09% (m.t.m), while electrical machinery or equipment grew significantly by 29.20% (m.t.m) with a contribution of 14.29%. Plastics and their derivatives also rose by 5.52% (m.t.m) with a contribution of 5.34%. This increase reflects the expansion of the manufacturing industry, supported by optimism in the Industrial Confidence Index (IKI).

Imports of raw materials rose by 18.49% (m.t.m), mainly due to an increase in volume and a decline in aggregate import prices, including a 61.87% increase in crude oil imports and a 37.86% increase in oil products. In general, imports are still dominated by high-value-added products.

Based on our calculation of data from the ADB for 2024, Indonesia's export value reached USD 24.41 billion in October 2024, growing 10.69% (m.t.m) from USD 22.06 billion in September 2024 and increasing 10.25% (y.o. y) from USD22.14 billion in October 2023. Both oil and gas and non-oil and gas exports showed monthly growth, with non-oil and gas exports driven by the manufacturing sector, which rose 12.04% (m.t.m) and contributed 8.98% to total growth. The increase mainly came from animal/vegetable fats and oils (HS15), which rose 53.67%, mineral fuels (HS27), which increased 5.50%, and footwear (HS64), which rose 25.87%. On an annual basis, almost all non-oil and gas sectors grew positively, except for mining, which declined due to a 7.93% (y.o.y) drop in coal exports and a 3.31% decline in volume. Overall, Indonesia's exports are

still primarily dominated by commodity products, including minerals, vegetable oils, and base metals.

In assessing Indonesia's competitiveness in the global market, a positive trade balance does not always reflect strong competitiveness. A more comprehensive indicator is the level of trade openness, which is measured by the ratio of exports and imports to total GDP. Based on our research team using ADB data from 2022, Indonesia's trade openness ratio is only 45.5%, which is lower than the average for low-income countries (52.9%), middle-income countries (52.7%), and high-income countries (67.2%). This figure is also below the global average of 62.5% and the East Asia and Pacific average of 61.1%. Historically, Indonesia's trade openness has continued to decline from 71.44% in 2000, lagging behind neighboring countries such as Thailand, Malaysia, Vietnam, and the Philippines.

In addition to the aspect of trade openness, the analysis of Indonesian product competitiveness in the international market can also be expanded through a study of Indonesia's involvement in the Global Value Chain (GVC). In the context of the contemporary global economy, GVC represents cross-border linkages in the production process of goods and services, where each component can originate from various countries and contribute to the final added value of a product. However, the dynamics of the flow of goods and services in the GVC are not fully reflected in conventional international trade indicators such as the value of exports and imports. The GVC is defined as a series of stages in the production of goods or services involving at least two countries, with each stage contributing to an increase in added value (Antràs & Gortari, 2020). Unlike traditional bilateral trade, GVC-based trade is multilateral and complex because it spans multiple national borders, thereby requiring a more in-depth and nuanced analytical approach.

In measuring a country's involvement in GVCs, the Trade in Value-Added (TiVA) indicator is used to capture the domestic value added generated at each stage of the global production process. Participation in GVCs is divided into two main dimensions, namely forward participation and backward participation. Forward participation reflects the extent to which a country's exports are used as inputs in other countries' exports, indicating the country's contribution as a supplier of raw materials or intermediate components in the global supply chain. Conversely, backward participation shows the extent to which a country's exports depend on imported raw materials or inputs, indicating the country's level of integration into the international production structure. Together, these two indicators provide a deep understanding of a country's strategic position and the complexity of its participation in the value-added-based global economic system.

According to the ADB (2023), if a country's forward participation percentage is higher than its backward participation, then that country tends to focus on exporting upstream products, namely activities that produce goods or components used as raw materials in other countries' production processes.

Meanwhile, suppose the percentage of backward participation is higher than that of forward participation. In that case, this indicates that the country is more involved in downstream trade activities, specifically the processing of semi-finished materials into final products. Thus, raw products are generally correlated with forward participation, while semi-finished products are more synonymous with backward participation.

On the other hand, our calculations of ADB data related to GVC participation in 2022 shows that Indonesia had a GVC participation rate of 37.65% in 2022. This participation rate tends to be lower than that of various neighboring countries and peers, such as India (38.82%), the Philippines (47.35%), Thailand (50.43%), Malaysia (58.34%), Singapore (60.39%), and Vietnam (62.38%). Indonesia's GVC participation rate also tends to decline, where in 2010 Indonesia's GVC participation rate was 40.11% and reached its highest point in 2011 at 41.11%. Furthermore, Indonesia's GVC participation is dominated by forward participation rather than backward participation. Of Indonesia's 37.65% GVC participation rate, 21.24% comes from forward participation and 16.41% comes from backward participation. In other words, Indonesia's GVC integration is driven more using Indonesian products as raw materials for other countries' exports than by Indonesia's use of imported raw materials. The low level of backward participation is also reflected in the low foreign value-added component in Indonesian export products. This forward-dominant pattern indicates that Indonesia's integration into GVCs is still driven primarily by exporting raw and semi-processed commodities rather than importing intermediate inputs to manufacture higher value-added goods, consistent with Gereffi & Fernandez-Stark's (2016) observation that countries positioned upstream in a value chain capture a smaller share of value added. This helps explain why, despite a positive and persistent trade balance, Indonesia's Economic Complexity Index has remained low and stagnant relative to peers, a high volume of trade does not by itself indicate the technological upgrading that structural transformation requires.

In addition to trade in goods, international trade also encompasses trade in services, which is categorized into high- and low-value-added services. Our calculations of IMF data (2010-2023) shows that Indonesia has consistently experienced a widening trade deficit in services, from USD 9.79 billion in 2010 to USD 17.78 billion in 2023. The largest deficits came from cargo transportation services (USD 7.36 billion), information and communication technology (USD 2.71 billion), and intellectual property usage (USD 2.29 billion), indicating Indonesia's dependence on imported patents. In addition, deficits also occurred in financial services, passenger transportation, and construction. Conversely, surpluses were recorded in tourism and recreation services (USD 2.37 billion) and manufacturing support services (USD 0.73 billion). Overall, Indonesia remains a net importer of high-value-added services.

On the other hand, Indonesia's low competitiveness in the global market, both

in goods and services trade, cannot be separated from domestic challenges, especially in terms of logistics and connectivity. Adequate infrastructure is essential to reduce logistics costs and increase the volume of international trade. However, Indonesia's infrastructure and logistics development performance remains limited. Our calculations using World Bank data (2007-2023) shows that Indonesia's Logistics Performance Index (LPI) exhibits a fluctuating trend with no significant improvement. There has been a decline in the international shipping and tracking components, while timeliness and logistics competence and quality have tended to stagnate. Despite improvements in the customs and infrastructure components, Indonesia still lags behind peer countries such as Singapore, China, Malaysia, Thailand, and the Philippines.

c. HUMAN RESOURCES AND EMPLOYMENT

Current Situation

Indonesia, with a population of more than 280 million, has great potential to undergo economic transformation by strengthening the quality of its human resources. The quality of human resources is the main foundation for the success of this transformation, so investment in education is important to create a skilled and innovative workforce. The Program for International Student Assessment (PISA) score is an indicator of the quality of education and human resources. However, Indonesia's PISA score has declined in the last three editions. In the Mathematics category, it fell from 386 (2015) to 366 (2022), Reading from 397 to 359, and Science from 403 to 383 (OECD, 2023). The decline in Indonesia's PISA scores in all categories from 2006 to 2022 reflects a downward trend in education quality, which has implications for the weakening of human resource quality at the national level.

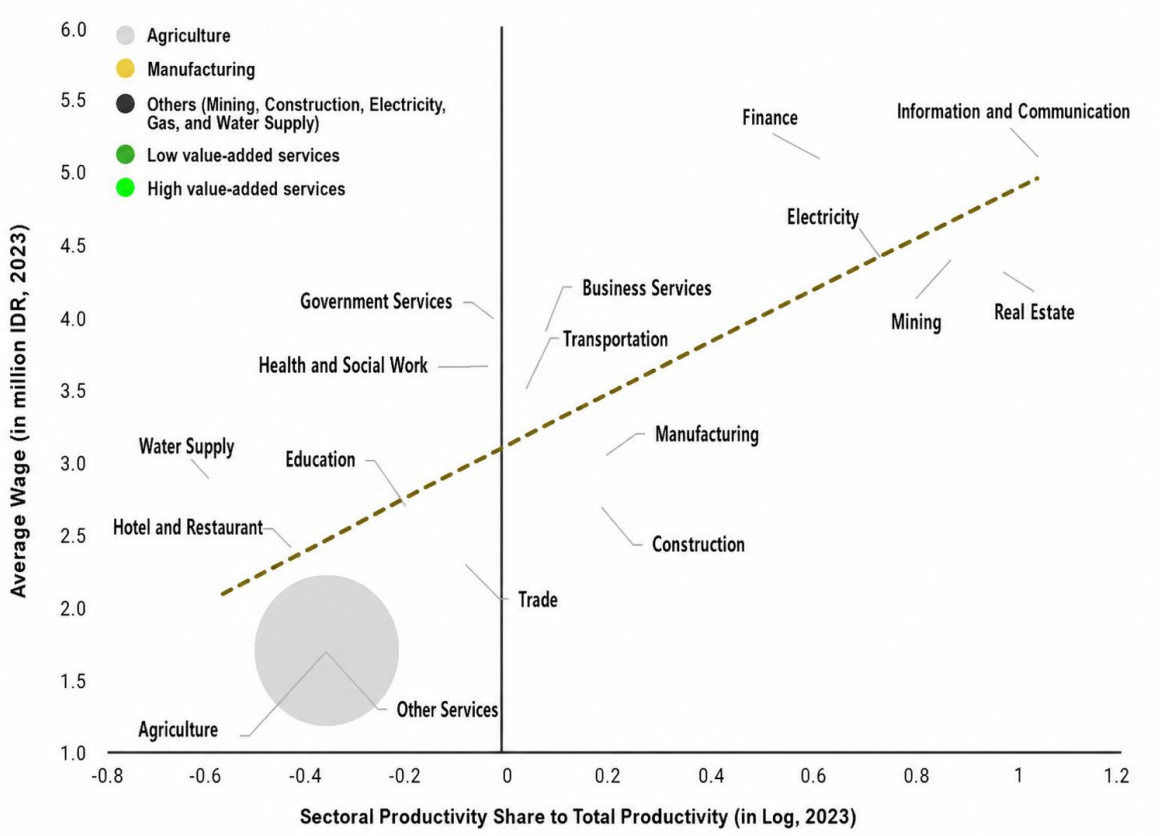
Compared to the ASEAN-6 countries, Indonesia's PISA scores tend to lag behind those of other countries. In 2022, Indonesia's PISA scores were higher than those of the Philippines, but lower than those of other ASEAN-6 countries in all categories, indicating that Indonesia's literacy, numeracy, and science skills were lower compared to other countries. This is related to limitations in the quality of education, which has a direct impact on the quality of human resources and basic workforce skills, potentially affecting the competitiveness of Indonesia's workforce (OEDC, 2023).

The quality of Indonesia's workforce can be measured by its level of education. The CEIC data for the period 2012-2023 shows that the number of workers increased from approximately 114 million in 2014 to over 140 million in 2023. Throughout this period, workers with only a primary school education still dominated, accounting for more than 20% each year. Meanwhile, workers with advanced education, including bachelor's, master's, and doctoral degrees, increased from 4.8% in 2010 to 10.3% in 2023. This trend shows an increase in the educational capacity of the national workforce, although overall, the proportion of the total workforce is still relatively low compared to the needs of a labor market that is increasingly knowledge and technology based.

Based on SAKERNAS data, Indonesia's workforce is spread across the primary, secondary, and tertiary sectors, with a continuous shift in dominance. In 2010, out of a total of approximately 108 million workers, 42.3% worked in the tertiary sector, 39.5% in the primary sector, and 18.2% in the secondary sector. In 2023, the proportion of workers in the tertiary sector increased to 49.6%, while the secondary sector decreased to 21%, and the primary sector decreased to 29.4%. On average, the tertiary sector grew by 3.24% per year, faster than the secondary (3.15%) and primary (-0.30%) sectors. These percentages indicate a shift in the employment structure towards the service sector, although the SAKERNAS 2023 data suggests a negative correlation between worker productivity and the high proportion of informal workers in various economic sectors.

Moreover, worker productivity levels are positively correlated with sectoral wage levels, as shown in Figure 3. Sectors with higher productivity generally offer higher wages. For example, the agricultural sector, with productivity of around Rp3 million per month, generates wages of Rp1.7 million, while the manufacturing sector, with productivity of Rp10.8 million, provides wages of Rp3 million per month. However, inequality persists because the average wage of workers is still lower than the productivity value generated in various economic sectors. This wage-productivity gap is consistent with Acemoglu and Autor's (2011) argument that returns to human capital are highly sector-specific: sectors that have adopted skill-intensive production techniques tend to capture disproportionately more value than they distribute in wages, while lower-productivity sectors such as agriculture remain wage-suppressed by an abundant pool of low-skilled labor with limited outside options. Viewed this way, the wage-productivity gap may reflect not only a distributional issue but also a possible symptom of structural transformation being constrained more by the pace of skill upgrading than by sectoral reallocation alone, as workers appear to be moving toward higher-wage service activities faster than the underlying skill base needed to sustain productivity gains in those sectors is developing.

Figure 3. Labor Productivity and Sectoral Wages



Source: CEIC; Calculation by LPEM FEB UI staff

d. SECTORAL & COMPANY ANALYSIS

Current Situation

Companies are the main units where production activities take place, namely the process of converting inputs such as labor and capital into outputs in the form of goods and services. Thus, the better a company's performance in converting inputs into outputs, the higher its productivity and economic transformation. Company-related indicators include the number of manufacturing companies based on labor, dominant sources of capital, and company size by sector. The processing or manufacturing industry is a key sector driving economic growth in various countries. Indonesia's Q2-2024 data shows that the manufacturing sector contributed 19.8% to GDP, meaning that about one-fifth of the national economy's added value came from processing industry activities.

Manufacturing companies play an important role because they produce goods that are easily traded internationally (tradable goods), thereby reflecting a country's global competitiveness. Typically, this activity is carried out by companies that have achieved economies of scale, with large capital and labor capacities to produce efficiently at minimum cost. However, in Indonesia, the manufacturing industry structure is still dominated by medium-sized companies, namely those that employ 20-99 employees. Our calculations of 2010 BPS data shows that around 70.8% of manufacturing companies are classified as medium-sized, while large companies with more than 100 employees only account for 29.2% of the total number of national manufacturing companies.

The composition of manufacturing companies in Indonesia, based on size, has shown gradual changes without substantial shifts over the past decade. Data from the BPS Large and Medium Industry Survey shows an increase in the number of large companies over the past two decades, with their share reaching 36.6% of total manufacturing companies in 2021. These findings indicate that some medium-sized companies have successfully moved up to become large companies. However, our analysis of BPS data for the 2010-2021 period also indicates a decline in the size of a number of companies due to the COVID-19 pandemic, which has put pressure on aggregate supply and demand, reduced production, cut jobs, and downsized businesses. In 2021, around 55.2% of manufacturing companies were still classified as medium-sized, indicating that structural transformation remains vulnerable.

Another indicator in assessing economic transformation is the structure of majority capital ownership in manufacturing companies. The increase in companies with foreign capital reflects a reduced dependence on domestic financing and opens opportunities for cross-border knowledge and technology transfer. However, the dynamics of capital in Indonesia's manufacturing industry remain limited. Based on the Large and Medium Industry Survey, around 92% of manufacturing companies are still dominated by domestic capital over the last two decades. This condition

indicates stagnation in the capital structure, where most companies face limited access to foreign investment and continue to rely on the domestic financial market.

On the other hand, MSMEs also play a significant role in Indonesia's economic transformation, particularly in creating added value. Based on the author's calculations of ADB data reports from 2018, the contribution of MSMEs to total GDP consistently exceeds that of large enterprises, making them one of the main drivers of national economic growth. The dominance of MSMEs reflects a high level of economic inclusiveness and broad community participation in business activities. However, this condition also shows that most businesses still face limitations in increasing their capacity and production scale. Theoretically, the longer a company operates and competes in the market, the more its productivity and scale of operations should increase. However, indicators from the manufacturing sector and the national business structure show that the transformation process towards increased productivity and efficiency is still slow and limited. This stagnation in firm-size structure is consistent with Lall's (2004) argument that structural transformation requires not merely the presence of manufacturing activity, but its consolidation into internationally competitive, scale-efficient firms capable of capturing economies of scale. The persistence of medium-sized, domestically financed companies as the dominant firm type may indicate that barriers to firm growth, rather than a shortage of entrepreneurial activity, are constraining Indonesia's transition toward a more productive industrial structure.

e. DIGITAL ECONOMY AND DIGITAL DOWNSTREAMING

Current Situation

The digital economy has been a major driver of global economic growth in the last decade. In Indonesia, although this sector has shown positive growth, the size of the digital economy per capita still lags behind neighboring countries and developed countries. According to a 2021 Statista report, Indonesia's digital economy per capita is around US$240, far below Thailand (US$917) and Malaysia (US$1,559). This gap is even more apparent when compared to the United States (US$7,223) and the United Kingdom (US$9,027), which illustrates the significant difference in productivity levels and digital-based economic value creation at the individual level.

The contribution of the digital economy to Indonesia's Gross Domestic Product (GDP) also increased from 1.3% in 2017 to 5.5% in 2021, indicating its growing role in the national economy. However, this figure is still lower than that of Malaysia (13.6%) and Thailand (12.9%), and far below that of developed countries such as the United Kingdom, where the digital economy contributes more than 20% to GDP (Statista, 2024). This percentage indicates that, although Indonesia is on the path to digital transformation, there is ample room to accelerate progress, particularly by strengthening digital infrastructure, expanding access to technology, and enhancing the quality of human

resources, thereby increasing national digital competitiveness sustainably.

The Development of Indonesia's Digital Economy

The Indonesian digital economy has experienced significant growth acceleration in recent years. Our calculations of Statista data for the 2017-2021 period shows that the value of Indonesia's digital economy increased from US$12 billion in 2017 to more than US$60 billion in 2021. This increase reflects the increased penetration of digital technology and the expansion of digital-based economic activities in various productive sectors. The annual growth of the digital economy also shows a sustainable trend, with a rate of 50% in 2023 (YoY). This development is not only supported by the rapid expansion of the e-commerce sector but also by the contribution of the fintech, edutech, and healthtech sectors, which are strengthening the national digital ecosystem.

In regional terms, the performance of Indonesia is competitive in terms of the proportion of Gross Merchandise Value (GMV) of the digital economy to Gross Domestic Product (GDP). In 2023, Indonesia's GMV share of GDP was recorded at 6.0%, higher than Malaysia (5.8%), the Philippines (5.5%), and Singapore (4.4%), although still below Thailand and Vietnam, which reached 7.0% each (Google, Temasek and Bain & Company, 2023). The average Compound Annual Growth Rate (CAGR) of Indonesia's digital economy GMV during 2015-2023 reached nearly 40%, the highest in the Southeast Asia region, surpassing Vietnam and the Philippines and far above Thailand, Malaysia, and Singapore, which were in the range of 20-25%. This achievement confirms Indonesia's strategic position as the center of regional digital economic growth, with prospects for further strengthening through innovative policies, technology investment, and strengthening of national digital infrastructure.

Sectoral Share of GMV in the Digital Economy

One of the main drivers of Indonesia's digital economy growth can be seen from its sectoral performance, where several sectors have made a dominant contribution to the formation of the national digital economy. Among these sectors, e-commerce ranks highest in terms of Gross Merchandise Value (GMV) contribution to GDP among Southeast Asian countries. Based on an economic report published by Google, Temasek and Bain & Company (2023), the contribution of Indonesia's e-commerce sector reached nearly 4.5%, a significant increase compared to previous years. This achievement confirms the strategic role of the e-commerce sector in strengthening the national digital economy, which is driven by increased internet penetration, advances in digital payment technology, and changes in consumer behavior towards online shopping patterns.

Other sectors, such as transportation and food, online travel, and online media, showed lower contributions to GDP. In the transportation and food sector, GMV's contribution to GDP increased to 0.7% in 2022, but declined in 2023, indicating

stagnation due to intense competition and operational challenges. Meanwhile, the contribution of the online travel sector remained below 0.5% throughout 2021-2023, partly due to the impact of the COVID-19 pandemic on the tourism industry. The online media sector also recorded a contribution of less than 0.5% during the same period, lower than Vietnam and Thailand, which reached around 1% in 2023 (Google, Temasek and Bain & Company, 2023). This situation demonstrates that, although Indonesia's digital economy has great growth potential, strengthening sectors outside of e-commerce remains necessary through policies that support diversification, innovation, and increased national digital competitiveness.

Supporting Factors

Information and communication technology (ICT) infrastructure plays an essential role in supporting digital economic growth. The ICT Development Index (IDI) shows that Indonesia still lags behind a number of countries in the region. Based on data from the International Telecommunication Union (2024), Singapore ranks first with a full score on the Universal Connectivity Pillar (100), while the Philippines and Indonesia scored lower, particularly on the Meaningful Connectivity Pillar, which covers infrastructure, affordability, device access, digital skills, and digital security, with scores of 82 and 86, compared to Singapore's score of 96. These scores confirm that Indonesia needs to improve meaningful connectivity, in addition to expanding its network and enhancing the quality and sustainability of digital connections. High-quality, fast, and reliable ICT infrastructure is an urgent need to strengthen national competitiveness and accelerate digital transformation.

On the other hand, World Bank (2022) data on mobile subscriptions per 100 inhabitants shows interesting dynamics. The number of mobile subscriptions in Indonesia increased from 87 in 2010 to 165 in 2016, before declining to 115 in 2022. This decline may indicate market saturation or changes in user behavior, such as increased stability in multi-SIM usage or a shift to data-only services. Although these figures are still below those of Thailand (163) and the Philippines (133), Indonesia's mobile penetration rate continues to show a strong foundation for the digital economy, especially amid increased fixed broadband usage. Additionally, the World Bank report (2009-2023) also indicates a significant increase in internet usage in Indonesia, from 6.92% in 2009 to 69.2% in 2023. The increase has occurred since 2016, when internet penetration rose from 25.4% to 66.5% in just six years. This shows progress in infrastructure and service affordability. However, these figures are still lower than those of Malaysia (89.6%), Thailand (77.8%), and China (70.1%). With a global average of 64.4% in 2022, Indonesia is slightly above the world average but still lags behind the average for the East Asia and Pacific region (75.6%). Taken together, this combination of a comparatively low digital economy-to-GDP contribution and persistent infrastructure and connectivity gaps is consistent with Brynjolfsson and McAfee's (2014)

observation that digital technologies raise productivity primarily when adoption is broad-based across firms and workers, rather than concentrated in a narrow set of platforms or transactions. This suggests that Indonesia's digital economy growth may be driven disproportionately by e-commerce transaction volume rather than by productivity-enhancing digital adoption across the wider economy, a pattern broadly in line with ADB's (2022) concerns regarding the digital divide's effect on MSME competitiveness (Revindo, Gan & Hambali, 2025; Suhendra, et al., 2025)).

f. GREEN ECONOMY

Current Situation

Marking a century of independence, Indonesia, through its "Indonesia Vision 2045" (Bappenas, 2019), aims to become a high-income country and the world's fifth-largest economy. To escape the middle-income trap by 2036-2038, Bappenas has set a per capita income target of USD 19,794-23,199, with approximately 70% of the population expected to fall into the middle-class category by 2045. However, with economic growth still hovering around 5% and showing signs of slowing down, this target requires significant acceleration to reach 6% per year through increased investment, productivity, innovation, and added value. Although opportunities and challenges often go hand in hand, the achievement of this vision depends on economic, social, institutional, and comprehensive human development.

Although the climate transition policy commitment shows a progressive direction, its implementation still faces various complex domestic challenges. Various structural dynamics in the national economy have the potential to hinder the achievement of decarbonization and sustainable development targets in line with Indonesia's Vision 2045. As the country with the third-longest coastline in the world, the fourth largest population, high rates of deforestation, and heavy dependence on fossil fuels, Indonesia is highly vulnerable to the impacts of climate change. The government is committed to reducing greenhouse gas emissions by 31.89% by 2030, or 43.2% with international support through Enhanced NDC and the LTS-LCCR 2050 strategy, which targets net zero emissions (NZE) by 2060. However, like many developing countries, Indonesia's economy still relies on high-emission energy. Indonesia's economic growth tends to be accompanied by increased emissions, unlike developed countries such as the US, UK, South Korea, and China, which have successfully reduced their emission rates through the adoption of low-carbon economies (Our World in Data, 2023).

Several domestic challenges still need to be addressed and have the potential to hinder Indonesia's achievement of Vision 2045 are as follows. First, although Indonesia's economic growth has been maintained at above 5% over the past few decades, this achievement has had significant environmental consequences. Over the past three decades, increased production and consumption activities have accelerated the rate of national

carbon emissions, indicating a high dependence on fossil fuels. Massive deforestation to meet production demand has resulted in the loss of approximately 17% or 227.7 million hectares of forest between 2001 and 2020, contributing to 6.7% of global forest loss (Global Forest Watch, 2021). As a result, the forestry sector has become the main contributor to greenhouse gas emissions at 830 $MtCO_2e$, followed by the electricity sector, which still relies on coal (87.7%), and fossil fuel-based transportation (92%) (IEA, 2022; Ministry of Energy and Mineral Resources, 2024). This condition places Indonesia at a critical juncture, where the long-term policy direction will determine the balance between sustainable economic growth and achieving the 2060 net-zero emission target.

Second, the issue of funding. The third Biennial Update Report (BUR) for 2021 estimates that Indonesia will need around USD 28.5 billion per year to achieve its Nationally Determined Contribution (NDC) target by 2030. Meanwhile, the National Development Planning Agency (Bappenas) states in its Low-Carbon Development Initiative (LCDI) report that the financing required to decarbonize the national economy could reach USD 200 billion per year by 2030. This figure is equivalent to around 20% of Indonesia's GDP in 2022, 97% of government spending, or around 165% of total national financial assets. In fact, the LCDI report estimates that funding requirements will increase dramatically to USD 2.2 trillion per year between 2051 and 2070.

This funding issue arises from various aspects, both public and private. In terms of public funding, the Indonesian government's fiscal space is limited, so its ability to prioritize climate transition issues remains low. During the 2016-2021 period, the government only allocated around 3.7% of central government spending to expenditures related to environmental issues (Ministry of Finance, 2021). At the regional level, fiscal capacity is even more limited due to high dependence on budget transfers from the central government. In addition, in 2022, the government allocated more than IDR 500 trillion for subsidies and compensation for fossil fuels, electricity, and LPG, which is equivalent to nearly 25% of total state budget expenditure. This amount even exceeds the cumulative total expenditure for infrastructure, education, and health, thereby narrowing the fiscal space for investment in clean energy transition. Additionally, Indonesia's tax ratio remains low, at 10.4% of GDP, significantly below the Asia-Pacific average of 21% and the OECD average of 33.4%. High levels of informality, low economic productivity, and suboptimal law enforcement influence the low tax ratio. Furthermore, the domestic financial market remains shallow and is dominated by the banking sector, which accounts for around 76% of total national financial assets. This financial market structure is relatively unsuitable for supporting the financing of renewable energy projects, as bank financing is incompatible with the risk-return profile of green energy projects, which have long project cycles and higher risks compared to conventional energy projects.

Third, the low competitiveness of new and renewable energy sources is primarily due to public policy distortions that affect fossil fuel prices. Fuel subsidies and compensation policies have resulted in fossil fuel prices that do not reflect their true economic costs, thereby encouraging increased consumption of high-emission energy sources among the public. In addition, the domestic market obligation (DMO) policy for coal, which sets an upper limit on the selling price for domestic power plants, keeps the cost of coal-based electricity production the lowest in Indonesia, thereby hampering the development of new and renewable energy.

Fourth, policy support and incentives for new and renewable energy are minimal, while existing policies tend to increase the competitiveness of polluting energy sources such as coal and fuel oil. Policy reform is necessary to promote clean energy, but its implementation is complex due to the involvement of multiple parties with diverse interests. Consequently, the current policy direction does not yet fully support the climate transition. This persistence of fossil-fuel dependence despite stated climate commitments is consistent with a broader tension identified in the green economy literature (ADB, 2022; UNEP, 2011): a shift to low-emission growth requires reallocating fiscal resources away from politically entrenched fossil-fuel subsidies toward longer-horizon, higher-risk renewable energy investment, a reallocation that is difficult to sustain when short-term growth targets and the constrained fiscal space described above dominate policy priorities. Viewed this way, Indonesia's continued reliance on coal-based DMO pricing and fossil-fuel subsidies may reflect not merely a policy gap but a structural tension between the near-term fiscal and growth incentives embedded in the current economic model and the longer-term shift that a green economy transition requires.

CONCLUSION

Indonesia’s structural transformation over the past decade shows a shift in GDP composition toward services, but this has not been matched by a proportional productivity gain: labor continues to move mainly into low-value-added service activities, manufacturing shows signs of premature deindustrialization, and national productivity (TFP, ECI) remains low relative to regional peers. Three structural factors underlie this pattern: (i) limited trade openness and forward-dominant, low-technology GVC participation, which constrain access to capital goods and technology transfer; (ii) persistent human-capital constraints, reflected in declining PISA scores and a still-small share of highly educated workers, which limit the economy’s absorptive capacity for higher-value activity; and (iii) an underdeveloped digital economy and shallow, bank-dominated financial system, which restrict both productivity-enhancing technology adoption and the financing needed for the transition to higher value-added and lower-emission production.

Theoretically, these findings suggest that, in Indonesia’s case, inter-sectoral labor reallocation (the traditional structural-transformation channel) has proceeded largely independently of intra-

sectoral productivity and technology upgrading — the two processes that development theory expects to reinforce one another. Policy priorities that follow from this diagnosis fall into three groups. First, to strengthen trade and investment competitiveness: streamline export-promotion and import-facilitation policies, reduce distortive regulations that encourage rent-seeking, and improve logistics and law enforcement to raise the ease of doing business. Second, to build human capital and the digital economy: improve education quality and teacher competence, expand vocational and industry-aligned training, and accelerate digital infrastructure and literacy so workers and firms can adopt new technology. Third, to widen fiscal and financing space for the transition: gradually reallocate fossil-fuel subsidies toward renewable-energy incentives, and develop non-bank financing instruments better suited to the risk-return profile of green and technology investment.

Implemented together, these measures would allow inter-sectoral and intra-sectoral transformation to reinforce one another, supporting Indonesia's goal of inclusive, sustainable 6–7% annual growth and its transition to high-income status by 2045.

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