



The Concept of Industrialization and Structural Transformation in the Economy

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Abstract: Industrialization and structural transformation are the main drivers of Indonesia's economic development, but the challenges of regional inequality and premature deindustrialization hamper inclusive growth. This study aims to analyze the role of technology in industrialization, its impact on socio-economic inequality, and the influence of structural transformation on economic growth. Using a qualitative descriptive approach through a systematic literature review, the population comprised indexed academic sources on Indonesian industrialization, with a purposive sample of 20-30 of the most relevant documents from 2021-2025. Secondary documents were analyzed through content analysis with source triangulation. The results show that technology improves production efficiency and human resource quality but widens inequality due to industrial concentration in Java and the emergence of the informal sector. Structural transformation has been slow, marked by a decline in the manufacturing contribution to GDP since 2013. In conclusion, technology-based inclusive policies are needed for sustainable growth.

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Introduction

Industrialization is the process of economic change from a traditional, human-powered production system to a modern system that utilizes technology, machinery, and efficient labor, thus becoming the main foundation of economic development by increasing productivity and reducing dependence on the agricultural sector. Countries that successfully industrialize often attract foreign investment due to the availability of a large workforce and developed

infrastructure, which accelerates overall modernization (Todaro, 2006; Azizah & Yasin, 2024). This process is not only an economic transformation, but also a social one, where society shifts from a pre-industrial stage with low per capita income to a more advanced stage of industrialization (Susila, 2019; Yosse Putra Oentoro et al., 2024).

Structural transformation involves a shift in the contribution of economic sectors from primary sectors such as agriculture, fisheries, and forestry to secondary sectors such as manufacturing and tertiary sectors such as services, finance, and technology, reflecting the shift from a traditional to a modern economy with increased value-added and resource efficiency. In Indonesia, this phenomenon is characterized by mass urbanization, where rural labor migrates to cities for jobs in manufacturing and services, fueling the growth of industrial estates, trade centers, and urban services (Hanifah & Yasin, 2024; World Bank, 2020). However, this transformation has made Indonesia less dependent on agricultural commodities, with diversification into manufacturing, services, and digital industries such as e-commerce and fintech, accelerating the shift of MSMEs from traditional to digital and making the digital economy sector one of the fastest-growing (Azizah & Yasin, 2024).

However, industrialization in Indonesia faces serious challenges in the form of the concentration of industrial activity in certain regions, such as Java, which widens inter-regional and income inequality because the modern sector is only accessible to skilled workers. The phenomenon of premature deindustrialization since around 2013, marked by a decline in the manufacturing contribution to GDP from 23.96% in 2012 to 18.34% in 2022, hampers inclusive and sustainable structural transformation (Yosse Putra Oentoro et al., 2024). Furthermore, excessive urbanization has given rise to an informal sector with unstable incomes, while dependence on commodity exports makes the economy vulnerable to global fluctuations, resulting in unequal national development (Susila, 2019).

The problem is further complicated by the fact that technology, while driving production efficiency and innovation, has not been fully distributed, leading to unequal access to education and workforce skills. This exacerbates social vulnerability in urban areas and delays the achievement of the 2015-2019 National Medium-Term Development Plan (RPJMN) target of escaping the middle-income trap by 2030, where structural transformation fails to significantly contribute to economic growth (World Bank, 2020). Consequently, Indonesia's economic growth tends to be non-inclusive, with the risk of increasing unemployment and poverty if deindustrialization is not addressed through reindustrialization policies (Hanifah & Yasin, 2024).

This study aims to analyze the role of technology in industrialization, the impact of industrialization on socio-economic inequality in Indonesia, and the influence of structural transformation on economic growth. The urgency of this research lies in the urgent need for inclusive, technology-based policies to address deindustrialization and regional inequality, as emphasized in the National Medium-Term Development Plan and recent reports highlighting the decline of the manufacturing sector (Azizah & Yasin, 2024; Yosse Putra Oentoro et al., 2024). The novelty of this study is the integration of contemporary qualitative analysis with post-2020 deindustrialization data, complementing previous studies that focused more on basic concepts without highlighting the urgency of digital reindustrialization amidst the challenges



of globalization (Susila, 2019; World Bank, 2020).

Theoretical Basis

Industrialization is when a country or region transforms its economy from an agricultural to an industrial one, encompassing increased production of goods and services through the introduction of new technologies and increased production capacity (Yosse Putra Oentoro et al., 2024). Structural transformation is the process of fundamentally changing the economic structure of a country or region by shifting from one economic sector to another (Azizah & Yasin, 2024).

The implementation of this industrialization strategy was based on two important considerations. First, at that time, countries around the world were also implementing industrialization projects in their respective countries, supported by sound economic development theories. Second, countries that have successfully developed their economies throughout history have always gone through stages of industrialization. This strategy was deemed successful because it gradually shifted economic activity from a focus on primary industries (agriculture) to secondary industries (industry/services) (Hanifah & Yasin, 2024).

In Indonesia, the industrialization process began to become significant during the New Order era, with import-substitution-based industrialization policies and a subsequent shift to export orientation. A 2020 World Bank study emphasized that value-added and technology-based industrialization policies are crucial for accelerating inclusive and sustainable structural transformation.

Research methods

This research uses a qualitative descriptive approach focused on an in-depth literature review of development economic theory, the concept of industrialization, and structural transformation in Indonesia, as applied to the analysis of contemporary economic phenomena. This qualitative research method was chosen because it allows for an in-depth exploration of the role of technology, the impact of socio-economic inequality, and the influence of structural transformation on economic growth through the interpretation of secondary data, in accordance with holistic and contextual principles (Sugiyono, 2022; Creswell & Poth, 2021). This method aligns with the approaches of Azizah and Yasin (2024) and Yosse Putra Oentoro et al. (2024) in describing the structural dynamics of the industrial sector.

The research instruments consisted of secondary documents such as scientific journals, World Bank reports, and national policy documents such as the 2015-2019 RPJMN, collected through a systematic search in the Google Scholar database using relevant keywords such as "Indonesian industrialization" and "deindustrialization structural transformation." Data collection techniques involved literature selection based on the criteria of 2021-2025, DOI activity, and relevance to the problem formulation. While data analysis was conducted content-wise with source triangulation to ensure validity through reduction, presentation, and drawing conclusions (Emzir, 2022; Sudaryono, 2021). This approach strengthens the findings of Susila (2019) and Hanifah and Yasin (2024) by integrating a descriptive qualitative perspective.

The research population encompasses all credible literature on industrialization and structural transformation in Indonesia from indexed academic sources, while the sample was purposively determined from 20-30 of the most relevant, representative, and highly influential primary documents based on citations in Google Scholar, including publications from the World Bank (2020). This purposive sampling technique ensures a focus on primary sources such as Azizah and Yasin (2024) and Yosse Putra Oentoro et al. (2024) to support in-depth analysis without the constraints of a limited population (Sugiyono, 2022; Creswell & Poth, 2021).



The research procedure was carried out in stages: first, problem identification from the introduction and problem formulation; second, literature data collection through database searches; third, data reduction and categorization based on themes such as the role of technology and inequality; fourth, interpretive analysis with triangulation; and fifth, validation of conclusions through comparison with recent studies such as Hanifah and Yasin (2024). This process followed a systematic flow to produce a cohesive narrative, as recommended in qualitative literature study designs (Emzir, 2022; Sudaryono, 2021).

Results and Discussion

What is the role of technology in industrialization?

As technology advances, it functions not only as a means of production but also as a system for regulating and controlling industrial processes. Technology is a key driver in industrialization because it can increase production efficiency. During the industrialization stage, simple machines replace human labor. Technology accelerates production innovation; in the digital era, companies can conduct research and development using simulation and data analysis software.

From a development economics perspective, technology enables the transformation from traditional systems based on manual labor to modern production systems based on machines and automation. This change not only increases industrial output but also drives the diversification of the economic structure from the primary sector to the secondary and tertiary sectors. Technology also plays a role in driving product and process innovation, a key characteristic of modern industrialization.

The role of technology in industrialization is also reflected in the development of human resource quality. Technology-based industrialization demands a workforce with high technical skills and adaptability. Therefore, technological advancements encourage increased investment in education, training, and workforce competency development, ultimately improving the quality of human capital and supporting long-term industrial growth.

What is the impact of industrialization on socio-economic inequality in Indonesia?

Industrialization concentrated in urban areas and certain industrial zones has led to increasing inequality between regions and income groups. This occurs because the modern industrial sector offers higher wages than traditional sectors, but is only accessible to workers with specific skills and education. Some positive and negative impacts of industrialization on Indonesia's socio-economic inequality.

Positive impact

1. Opening up employment opportunities and social mobility

Industrialization creates new jobs and can increase people's incomes, especially if supported by skills training and fair wage policies. In the long term, this has the potential to reduce inequality. With industrial development, people have the opportunity to improve their socioeconomic status by working in the formal sector. This paves the way for social mobility, especially for the younger generation in rural areas. Improved infrastructure and economic access

2. Structural transformation of the economy

According to Lewis and Kuznets' structural transformation theory, industrialization shifts the economic structure from low-productivity sectors (agriculture) to high-productivity sectors (industry and services). In Indonesia, this



process increases the added value of the national economy and expands the middle class, which plays a crucial role in social stability and economic equality.

Negative impact

1. The emergence of the informal sector and social vulnerability

In Indonesia, industrialization is not always accompanied by adequate formal employment. As a result, many rural-to-urban migrant workers are absorbed into the informal sector, where incomes are unstable. This situation widens the welfare gap and increases the risk of poverty in urban areas.

2. Regional inequality and income inequality

Industrialization in Indonesia tends to be concentrated in certain regions, such as Java and major urban areas. This industrial concentration creates a development gap between developed and underdeveloped regions. Consequently, income distribution between regions becomes unequal and triggers excessive urbanization. Industrialization often favors groups with capital, education, and high skills. Less educated workers tend to be trapped in informal, low-wage jobs in the industrial sector.

The influence of structural transformation on economic growth

Structural transformation significantly influences economic growth and is often a key factor determining whether growth is rapid, sustainable, and inclusive. Structural transformation in Indonesia is characterized by a shift from the primary sector (agriculture) to the secondary (industry) and tertiary (services) sectors. Economic growth in Indonesia depends not only on the number of workers, but also on how productive that workforce is. Structural transformation encourages the use of modern technology, machinery, and management systems, especially in the manufacturing and modern service industries. Structural transformation plays a crucial role in increasing labor productivity. The development of the modern industrial and service sectors encourages technology adoption, production efficiency, and innovation, which directly contribute to increasing Gross Domestic Product (GDP). However, structural transformation also affects the quality of economic growth; growth driven by high-productivity sectors tends to result in increased per capita income and job creation.

Structural transformation in Indonesia has received considerable attention. In this regard, structural transformation is one of the targets listed in the 2015-2019 National Medium-Term Development Plan (RPJMN), which aims to help Indonesia escape the middle-income country trap by 2030. However, structural transformation in Indonesia is currently progressing relatively late, where the transformation slowdown occurred after Indonesia was hit by the 2008 economic crisis, specifically starting in 2013, which was marked by deindustrialization or the decreasing contribution of the secondary sector in supporting Indonesia's GDP, so that structural transformation has not made a significant contribution to the goal of increasing economic growth.

Conclusion

Based on an in-depth analysis of the concepts of industrialization and structural transformation in Indonesia, the main findings of this study confirm that technology plays a central role as the main driver of industrialization through increasing production efficiency, process innovation, and developing the quality of human resources, as seen in the shift from manual systems to automation that drives economic diversification (Azizah & Yasin, 2024; Yosse Putra Oentoro et al., 2024). However, industrialization has actually widened socio-economic inequality due to the concentration of industry in regions such as Java, excessive



urbanization that has given rise to the informal sector, and limited access of low-skilled labor to formal opportunities. Meanwhile, structural transformation towards economic growth has been hampered by premature deindustrialization since 2013 with a decline in the contribution of manufacturing to GDP (Hanifah & Yasin, 2024; World Bank, 2020).

However, this research has limitations as a qualitative descriptive study based on secondary literature, which does not include quantitative empirical data or recent sectoral case studies to statistically measure causal impacts. For future research, it is recommended to adopt a mixed-methods approach with econometric analysis or field surveys to validate the findings and explore post-2025 dynamics (Susila, 2019; Sugiyono, 2022). Practically, the research implications recommend that government policies focus on inclusive, digital-based reindustrialization, equitable investment distribution across regions, and mass vocational training to integrate MSMEs into global value chains, thereby supporting sustainable economic growth and realizing the RPJMN vision of escaping the middle-income trap (Creswell & Poth, 2021).

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