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Prospects for Technological Catch-up in Resource-Rich Economies: A Comparative Analysis of Nigeria and Indonesia

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Abstract

Technological catch-up has long been regarded as one of the central challenges of economic development, yet sustained catch-up has historically been limited to only a small number of cases. This study examines how contrasting development patterns in two resource-rich economies, Indonesia and Nigeria, shaped their structural and social conditions for technological catch-up between 1970 and 2020. Drawing on the transformation and inclusion dimensions of Andersson and Palacio's (2017) social capability framework, the study assesses whether the two countries developed the productive and social foundations associated with sustained technological development. The findings suggest that Indonesia developed stronger conditions for technological catch-up over the study period through broader structural transformation and more inclusive development.

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1. Introduction

In an era defined by the rapid expansion of artificial intelligence and deepening globalization, a critical question emerges: which countries are well positioned to benefit from these transformations, and which risk falling further behind? Historically, sustained technological catch-up has been confined to only a small number of cases: first Europe and its offshoots following the Industrial Revolution, and later the East Asian economies during the second half of the twentieth century (Rodrik, 2016). For much of the developing world, there has instead been, as Pritchett (1997) famously described it, “divergence, big time.” As production technologies become increasingly complex and knowledge more specialized, the challenge of catch-up has intensified rather than diminished. Many developing economies have struggled to realize their catch-up potential not because advanced technologies are inaccessible, but because the capacity to adopt and use them productively remains unevenly distributed (Fagerberg & Godinho, 2003). Comin and Mestieri (2018) illustrate this distinction clearly, showing that while the time lag in technology adoption between poor and rich countries has narrowed over time, the intensity with which poorer economies use these technologies relative to advanced economies has continued to diverge. In other words, developing countries are gaining access to modern technologies earlier than ever before, yet extracting progressively less value from them, which is a pattern that not only points to unequal access, but to deeper differences in social and structural capacity.

Early neoclassical growth theory explained development primarily through capital accumulation and suggested that poorer economies would gradually converge toward richer ones in terms of income levels (Solow, 1956). However, later scholars argued that catch-up is not automatic. Gerschenkron (1962) emphasized that late-developing economies could benefit from an ‘advantage of backwardness’ by adopting technologies already developed in advanced economies, while Abramovitz (1986; 1995) argued that successful catch-up depends on the broader social and institutional conditions that enable countries to absorb and utilize new technologies productively. The only region to have achieved sustained technological catch-up in the post-war period is East Asia, making its experience particularly important for understanding the conditions under which catch-up becomes possible.

The literature has long identified structural transformation as a central driver of this process (Kaldor, 1967; Kuznets, 1966; McMillan & Rodrik, 2011), and the East Asian experience illustrates how the productive reallocation of labor toward manufacturing, combined with broad-based investment in human capital, created the structural and social foundations necessary for sustained technological progress. Yet similar dynamics have failed to emerge across much of the developing world. In many resource-abundant economies, natural resource wealth has distorted productive structures while weakening the inclusive investments required for long-run development, undermining the very conditions on which technological catch-up depends. Nigeria and Indonesia, two oil-dependent economies that entered the 1970s from broadly similar starting points, nevertheless followed sharply different development trajectories, making them a particularly interesting case for a comparative analysis (Babagana, 2025; Pinto, 1987). While the existing literature attributes this divergence to differences in development strategy, macroeconomic management, human capital formation, and institutional quality, it has paid less attention to how structural transformation and inclusion interacted over time to shape each country's social capability for technological catch-up. This thesis seeks to address that gap.

1.1 Aim of The Study

Using the social capability framework developed by Andersson and Palacio (2017), and more specifically its transformation and inclusion dimensions, this study aims to assess whether Nigeria and Indonesia developed the structural and social conditions associated with technological catch-up potential between 1970 and 2020. The aim is not to measure whether either country has achieved technological catch-up directly, but rather to evaluate whether the productive and social foundations that the theories and literature identify as necessary preconditions for catch-up were built over the study period. To capture these two dimensions empirically, a set of indicators has been selected for each dimension, as outlined in Table 1. These indicators are analyzed through a comparative historical approach that combines descriptive statistics with secondary literature, allowing long-run trends to be interpreted within the historical contexts that shape each country's trajectory. Rather than establishing statistical correlations between variables, the analysis seeks to identify the mechanisms through which differences in structural transformation and inclusion contributed to determining the social and structural conditions in 2020 and assessing whether they seem conducive for technological-catch-up. In doing so, it aims to move beyond documenting developmental outcomes and

toward an explanation of how the interaction between structural and social conditions shaped the conditions of 2020. Through an analysis of the years between 1970 and 2020, this thesis aims to address the following research question:

How do the contrasting trajectories of structural transformation and inclusion in Indonesia and Nigeria between 1970 and 2020 shape each country's social capability for technological catch-up?

1.2 Scope and Relevance

While the comparative historical approach adopted in this study is well suited to identifying long-run structural and social processes, it does not allow for formal statistical inference or the establishment of direct causal relationships between structural transformation as well as inclusion and technological catch-up. The aim of this study is therefore not to measure technological catch-up directly or establish causal links between individual variables, but rather to assess whether Nigeria and Indonesia developed the structural and social conditions necessary for technological catch-up between 1970 and 2020.

The research contributes directly to the growing literature applying the social capability framework to developing-country contexts, particularly to the strand of the literature that identifies structural transformation and inclusion as central dimensions of catch-up potential. Andersson and Andersson (2019), in their comparative study of Senegal and Côte d'Ivoire between 1930 and 1980, demonstrate that broad-based access to productive economic opportunities is necessary for sustained development, and that agricultural performance alone is insufficient in the absence of structural transformation. Till (2022) extends this argument to Ethiopia, showing that catch-up depends not simply on economic growth, but on the productive absorption of labor into higher-value activities. This study builds on these contributions by applying a similar analytical framework to Nigeria and Indonesia, two resource-abundant economies whose diverging trajectories over a longer and more recent historical period provide a comparative perspective on how transformation and inclusion interact to shape the development of these countries. In doing so, the study seeks to deepen understanding of the conditions under which resource-rich developing economies can build the structural and social foundations necessary for sustained technological catch-up.

1.3 Historical Background

Nigeria and Indonesia began the 1970s with strikingly similar socio-economic characteristics. According to Pinto (1987) and Babagana (2025), both countries had large populations, were ethnically diverse, had emerged from colonial rule, and relied on oil and primary exports. The growing importance of oil exports in both countries contributed to making them prominent developing nations of the Global South, possessing abundant natural resources. Yet despite these shared characteristics, neither country possessed a clear developmental advantage at the outset of the period.

Indonesia went through the turmoil of serious political and economic instability in its last years under the leadership of Sukarno (Bevan et al. 1999). After the turbulent period of civil strife in 1965–1966, the country was faced with rampant inflation, lack of food supplies, and financial collapse (Henley, 2015). By 1968, Indonesia was considered "the number one economic failure among the major underdeveloped countries" (Henley, 2015, p.23). In contrast, Nigeria appeared comparatively more politically stable and administratively coherent in the late 1960s, despite the escalating civil conflict that resulted in the Nigerian–Biafran Civil War between 1967 and 1970 (Bevan et al. 1999; Lewis, 2007).

In institutional terms, however, both countries faced underlying constraints shaped by ethnic diversity and weak bureaucratic capacity, which affected the ability of the state to coordinate development policy and manage revenue distribution (Bevan et al. 1999; Pinto, 1987). The Nigerian state was organized around competition among three major ethnic groups: the Hausa-Fulani (approximately 29% of the population), the Yoruba (21%), and the Igbo (18%) (Lewis, 2007). Indonesia, by contrast, faced comparable challenges of heterogeneity across a geographically fragmented archipelago, with a population dominated by the Javanese (approximately 42%), alongside large Sundanese (15%), and Madurese (3%) communities (Henley, 2015). In both cases, these structural conditions shaped patterns of political bargaining and contributed to clientelism, patronage distribution, and uneven bureaucratic performance (Henley, 2015).

The oil shocks of 1974 and 1979 served as a critical juncture for both nations, as high petroleum prices generated substantial state revenues and created opportunities for economic modernization and industrial development (Bevan et al., 1999; Pinto, 1987). Yet the two

countries diverged sharply in their strategies to utilize these windfalls, and the different results that were obtained in spite of these similar starting points have made it especially valuable to study the reasons why some late-developing countries are able to develop technology and production capacity while other countries rely on primary goods (Bevan et al. 1999).

In Indonesia, the administration under the emerging New Order regime, driven by a fear of rural insurgency and the need for food self-sufficiency, channeled oil rents into a broad-based rural development strategy (Henley, 2015). Through programs such as BIMAS, which combined subsidies for agricultural inputs, improved irrigation, and extension services, Indonesia invested heavily in enhancing the productive capacity of rural farmers, alongside sustained investment in rural infrastructure, education, and export-oriented industry (Henley, 2015; Pinto, 1987; Lewis, 2007). Overall, these policies not only increased agricultural productivity but also expanded access to education, infrastructure, and productive employment across society (Lewis, 2007).

In contrast, the Nigerian approach has been much more fragmented and consumption based. Revenue derived from the oil industry was diverted towards the development of urban infrastructure, imports-based consumption, and massive public investment programs that did not create productive impacts (Pinto, 1987). Poor coordination of fiscal policies and rent-seeking behavior at the federal and regional levels weakened the impact of public investments and this has led to the creation of minimal job opportunities and failure to create a solid industrial sector (Lewis, 2007; Pinto, 1987). In addition, the growth of the oil industry resulted in the neglect of agriculture, making Nigeria more dependent on oil exports (Lewis, 2007; Henley, 2015).

By the early 1980s, deindustrialization, mounting debt, and deepening oil dependency had become defining features of the Nigerian economy, and in the following decades the development trajectories of the two countries diverged further (Lewis, 2007; Pinto, 1987). Indonesia managed to develop labor-intensive manufacturing, integrate into international production chains, and reduce poverty between the 1970s and 1990s (Henley, 2015). Nigeria, by contrast, remained unable to diversify its economy, with growth episodes remaining tightly coupled to fluctuations in global oil prices (Babagana, 2025).

Another significant juncture occurred in the late 1990s. The Asian Financial Crisis (1997-1998) contributed to the downfall of the Suharto regime in Indonesia, while the death of Sani Abacha in 1998 and the subsequent political transition under General Abdulsalami Abubakar brought about democratization in Nigeria (Hill, 1999; Lewis, 2007). The Asian Financial Crisis also had serious impacts on Indonesia, which include reduced productivity, devaluation of the local currency, high unemployment rates, and increased levels of poverty (Hill, 2007; Stern, 2004). These negative impacts helped reveal serious institutional problems in the political economy of the country under Suharto and led to the eventual downfall of his regime. Subsequently, both Indonesia and Nigeria entered a period of political liberalization in 1998–1999, but the outcomes differed considerably. Indonesia retained much of its productive export capacity and recovered quickly from the crisis, whereas Nigeria continued to struggle with corruption, institutional fragility, and limited industrial development (Lewis, 2007).

The contrasting experiences of Indonesia and Nigeria provide a useful basis for the comparative analysis. Although both countries entered the 1970s with similar structural characteristics and resource wealth, they adopted vastly different development strategies regarding agriculture, industrialization, education, and the management of oil revenues. These choices shaped the extent to which each country was able to build the broad productive and social foundations necessary for technological adoption.

1.4 Thesis Outline

The next section reviews the literature on why structural transformation and inclusion are considered central to economic growth and technological catch-up, drawing particularly on the experience of East Asia, the only developing region to achieve sustained catch-up in the post-war period. It then examines the constraints identified in the literature that may limit these processes in resource-rich economies, focusing especially on resource dependence and institutional weaknesses, before reviewing the existing explanations for the diverging development trajectories of Nigeria and Indonesia. The subsequent section introduces and motivates the theoretical framework used in the study, followed by a discussion of the methodology and data. This includes an explanation of the comparative historical approach adopted in the thesis, the data sources used in the analysis, and the main methodological and data-related limitations of the study. The final sections present and discuss the findings. Due to the word limit, the discussion and conclusion have been combined into a single section.

2 Literature Review

This section first examines the role of structural transformation and inclusion in sustaining catch-up, drawing on the East Asian experience as the clearest and most extensively documented example of this process unfolding successfully. It then considers the constraints that have limited the emergence of similar dynamics in many resource-abundant economies, focusing on resource dependence and weak institutions. Finally, the section reviews the existing explanations for the diverging development trajectories of Nigeria and Indonesia.

2.1 Structural Transformation: Evidence from East Asia

Scholars of economic development have long regarded structural transformation as a defining feature of economic development, functioning both as a driver and outcome of economic growth (Kaldor, 1967; Kuznets, 1966; McMillan & Rodrik, 2011). One of the earliest and most influential contributions was Kuznets' (1966) analysis of modern economic growth, which identified technological progress as the primary driver of this process. According to him, technological progress increases productivity in traditional sectors, particularly agriculture, releasing labor and resources that can shift toward more productive activities. Over time, this generates a gradual restructuring of the economy, initially from agriculture into manufacturing and later toward more advanced service sectors. Building on this perspective, McMillan and Rodrik (2011) argue that because sectors differ significantly in productivity and technological sophistication, the movement of labor from low-productivity to high-productivity activities can generate rapid increases in aggregate productivity. However, they emphasize that this process is not automatic. In many developing economies, structural change has been growth-reducing rather than growth-enhancing, suggesting that the manner and sequencing through which transformation occurs matter as much as structural change itself. Literature has highlighted the East Asian economies as one the clearest historical example of this process unfolding successfully.

What distinguished East Asia from other developing regions was not simply that structural transformation occurred, but that it followed a productive sequence rooted in agricultural development before industrial expansion (ADB, 2020; Vos, 2019; Sawada, 2022). During the post-war period, successful East Asian economies experienced rapid agricultural productivity

growth, production diversification, expansion of the rural non-farm economy, and sustained investment in rural infrastructure (ADB, 2020; Sawada, 2022). Vos (2019) argues that these developments released labor and savings into more productive sectors while also increasing rural demand for manufactured goods. Sawada (2022) documents this shift in resources, showing a long-term decline in agriculture's share of output and employment across the region, together with the rise of manufacturing and services.

The shift towards manufacturing has been proposed as the principal mechanism through which structural transformation translates into sustained economic progress. Scholars argue that manufacturing differs fundamentally from agriculture and many service activities because it offers greater opportunities for technological innovation and learning, increasing returns to production, and the absorption of labor into high-productivity activities (Sawada, 2022). As a result, it has been referred to as the 'engine of growth' (Kaldor, 1967). Rodrik (2013) further argues that manufacturing industries produce tradable goods and are therefore exposed to international competition, creating pressures for continuous upgrading, technology transfer, and productivity improvement. Within East Asia, this transition toward manufacturing became central to broader export-led development strategies, as industrial expansion enabled economies to finance imports of increasingly sophisticated machinery, capital goods, and intermediate inputs necessary for further industrial upgrading (Felipe, 2018; Sawada, 2022). The expansion of manufacturing progressively reshaped the productive and export structures of East Asian economies toward more technologically sophisticated and higher-productivity activities (Sawada, 2022). The East Asian experience therefore illustrates that catch-up depends not only on structural change itself, but on the sequencing and direction of that transformation.

2.2 Inclusion: Evidence from East Asia

While structural transformation provides the mechanism through which economies upgrade their productive structures, the extent to which this process translates into sustained development depends critically on whether its benefits are broadly shared across society. Inclusion is central to the catch-up process because it shapes how much societies can absorb and sustain technological progress. While access to modern technologies is important, their productive use depends on whether broad segments of the population possess utilize capabilities required to adopt and utilize them effectively. Human capital formation is therefore widely regarded as a key mechanism through which societies enhance their capacity for technological learning and diffusion (Schultz, 1961; Becker, 2002). Nelson and Phelps (1966)

argue that higher levels of education increase a country's ability to adapt technologies developed elsewhere. As a result, technological progress is difficult to sustain when access to education and economic opportunities remains concentrated among elites. Elevated levels of inequality can undermine sustained growth by limiting the productive use of human capital, weakening social stability, and shortening growth periods (Smythe et al. 2024). In contrast, inclusive and pro-poor growth expand economic opportunities and raise the incomes of poorer households, contributing to the development of a broader domestic market that can support industrialization and technological upgrading over time (Palacio, 2018). The East Asian experience provides an illustration of how improvements in inclusion can reinforce and sustain economic growth.

Central to the region's inclusive development was a deliberate and sequential investment in education. The World Bank (1993) argued that East Asian economies entered their high-growth period already characterized by elevated levels of human capital compared to other developing countries, and that governments across the region actively built on this advantage through sustained and sequential investment in schooling. The government provided universal access to education first at the primary level and progressively through secondary and tertiary education, leading to rapid human capital accumulation (World Bank, 1993). Morris (1996) highlighted the importance of this sequential approach, arguing that universal primary education was critical not only for establishing the basic literacy and numeracy required for early industrialization, but also for fostering the social cohesion that enabled broader segments of society to be gradually integrated into the modern economy and to share in the benefits of growth. Birdsall, Ross and Sabot (1995) provide the most detailed account of the mechanisms through which this educational expansion translated into sustained economic growth, arguing that rising education levels drove labor productivity gains, shifted household behavior toward higher rates of savings and investment, and critically enhanced the capacity of firms and workers to absorb, adapt, and build upon foreign technologies. Literature suggests that the productivity gains were broadly distributed across the workforce rather than concentrated among a narrow segment of the population, increasing their overall contribution to growth and technological absorption.

The reduction of income inequality and poverty constitutes a further dimension of inclusion that the literature identifies as central to East Asia's sustained catch-up. A defining feature of the region's development trajectory was that growth was not only rapid but broadly shared,

which the literature partly attributes to the foundational role played by agricultural development in generating inclusive development at an early stage of the process (ADB, 2020; Vos, 2019). Vos (2019) noted that growth in agricultural productivity carries a larger poverty reduction effect than growth in industry or services, which helps explain why the early agricultural transformation documented in the previous section had such pronounced distributional consequences across the region. Productive agricultural development is therefore widely identified in the literature as a key driver of inclusive development, not only by raising rural incomes directly but by reducing the structural inequality between rural and urban areas that has constrained inclusive growth in many other developing regions (ADB, 2020). The poverty reduction generated through these channels contributed in turn to maintaining the political and social stability that sustained long-run investment in both physical and human capital (ADB, 2020).

The literature on East Asia's successful catch-up suggests that sustained growth depended not only on rapid structural transformation, but also on the extent to which its benefits were broadly distributed across society. Inclusion and structural transformation reinforced one another by expanding productive capabilities, distributing benefits of rapid growth broadly across the society, and supporting wider technological absorption. What the East Asian case does not explain, however, is why these mutually reinforcing dynamics did not emerge in other developing countries. As the following section shows, resource dependence and weak institutions can distort structural transformation while also limiting the inclusive investments that made East Asia's development path distinctive.

2.3 Resource Dependence and Institutional Barriers to Transformation and Inclusion

The resource curse has been identified as a central barrier to sustained development in resource-abundant economies. First introduced by Auty (1993) and later developed by Sachs and Warner (1995), it argues that natural resource abundance can hinder rather than promote long-run economic development. Two closely related mechanisms commonly associated with this process are Dutch Disease and resource dependence. Dutch Disease, originally conceptualized by Corden and Neary (1982), refers to the tendency for resource booms to appreciate the real exchange rate, thereby undermining the competitiveness of the tradeable sector, particularly manufacturing industry. Resource dependence, by contrast, describes the growing reliance on resource revenues and primary commodity exports, which weakens incentives for economic diversification and increases vulnerability to fluctuations in global commodity prices (Auty,

1993; Sachs & Warner, 1995). These processes are mutually reinforcing as manufacturing competitiveness declines, opportunities for diversification narrow further, deepening dependence on primary exports (Krugman, 1987).

Within the literature on structural transformation, manufacturing is widely regarded as a central site of learning, economies of scale, technological diffusion, and capability accumulation (Kaldor, 1967; Rodrik, 2013). Deindustrialization therefore precisely undermines those sectors that are most important for sustained productivity growth and technological upgrading. Matsuyama (1992) further argues that in open economies, comparative advantages in natural resources can discourage industrialization by reducing the relative profitability of manufacturing. This dynamic implies that over time, this reinforces export structures concentrated in primary commodities rather than manufactured goods. Consequently, this has important implications for technological development and absorptive capacity. Hausmann et al. (2013) argue that economic complexity reflects a country's ability to absorb and utilize productive knowledge, expressed through the sophistication and diversity of its productive structure. Economies that remain heavily dependent on primary commodities therefore face greater difficulties in developing the productive capabilities and knowledge structures necessary for technological upgrading and sustained catch-up growth.

The literature further emphasizes that there is substantial distributive inequity produced from resource dependence that inhibits the inclusivity of growth. There tends to be an accumulation of rents in an enclave economy, and more importantly, within the apparatus of the state, resulting in economic dualism where a majority of the people reside in low productivity agricultural and service activities whereas opportunities for advanced technological occupations are highly restricted (Gelb, 1988; Lewis, 2007; Ross, 2012). Moreover, rent allocations through patronage, subsidies, and politically driven transfers in lieu of extensive investments in public goods like education and health care, along with rural infrastructure development, have been a norm in most resource dependent nations (Robinson et al. 2006). These are precisely the methods followed by the East Asian states that led to the formation of a broad human capital base that enabled their transformation into developed economies. Additionally, Ross (2012) highlights that resource endowments weaken the social contract between the states and its citizens since it takes away the fiscal incentives of governments to promote productivity through human capital formation.

Whether resource dependence produces these distributional outcomes, however, is not predetermined, the institutional literature increasingly emphasizes that what matters is not resource wealth itself but the quality of institutions through which rents are collected and allocated (Robinson et al. 2006). Acemoglu et al. (2005) note that institutions, as conceptualized by North (1990), encompass the informal and formal institutions which structure incentives within an economy. Institutions are considered by Acemoglu and Robinson (2012) to be key intermediates, determining whether resource rents are invested in economic development or captured through rent-seeking. The authors divide institutions into two broad categories: extractive and inclusive. Extractive institutions limit broad participation and capture wealth as well as political power in ways which hinder development, while inclusive institutions encourage wider participation and broader distribution of economic benefits (Acemoglu & Robinson, 2012). In the context of the resource curse, this implies that developmental outcomes depend less on natural resource abundance than on the institutional structures governing how resource revenues are allocated. Inclusive institutions can support industrialization and broad-based development, while extractive institutions tend to reinforce enclave forms of growth and long-term dependence on primary commodities.

2.4 The Nigeria–Indonesia Divergence: Existing Explanations and Their Limits

There is extensive literature comparing Nigeria and Indonesia due to their similar starting positions and diverging development trajectories. The literature proposes several explanations for this divergence, one of the most prominent focusing on differences in structural transformation and development strategy. According to Pinto (1987) and Lewis (2007), Indonesia underwent a process of diversification of its productive structure, relying on export-oriented manufacturing and engaging in the regional and international production chain, while Nigeria's growth was characterized by an excessive reliance on the export of oil and low industrialization. A similar approach has been adopted by the literature on agricultural and rural development policies. Henley (2015) and Lewis (2007) argued that Indonesia invested a considerable part of the income generated from the oil exports in agriculture development, focusing in particular on investments in irrigation systems, subsidies for fertilizers, and other rural infrastructure projects, which improved rural productivity, alleviated poverty, and created a broader base for participation in the productive sectors of the economy. Nigeria followed an urban-industrial development strategy, capital-intensive and labor-saving, which created fewer jobs and weaker productive linkages with the rest of the economy (Pinto, 1987; Lewis, 2007).

Such a difference is very well reflected in the transformation component of social capability, with Indonesia pursuing a more diverse productive transformation strategy, while Nigeria is locked into a narrowly specialized economy of the oil industry (Henley, 2015; Lewis, 2007).

The second literature stream looks at the importance of human capital and social infrastructure in explaining different patterns of development. Lewis (2007) and Babagana (2025) suggest that due to Indonesia's commitment to education, health care, and other rural services, the country has managed to build a labor force that can provide diversification and adapting technologies. At the same time, poor performance in such fields in Nigeria resulted in an absence of skills and an inability to develop productivity (Henley, 2015; Lewis, 2007).. In the late 1990s and early 2000s, Indonesia possessed adequate human capital for producing manufactured goods and technology adoption, whereas Nigeria remained particularly vulnerable to changes in international oil prices because of a lack of alternatives for production (Lewis, 2007; World Bank, 1993). Such differences illustrate the inclusion part of the concept of social capability. While Indonesia's larger investments into social infrastructure increased participation and access to productive activities, those in Nigeria did not help its population to become involved in a modern productive system (Henley, 2015; Lewis, 2007).

A third explanation relates to economic policy management during the oil boom years. According to Pinto (1987) and Bevan et al. (1999), Indonesia conducted its economic policy with greater prudence and managed to minimize the impact of the Dutch disease problem caused by the inflow of oil-related revenues. As a result, the country maintained its competitive position in tradable goods other than oil. At the same time, Nigeria encountered macroeconomic instability, heavy borrowing, and real exchange rate appreciation, factors that undermined manufacturing competitiveness. As Henley (2015) and Bevan et al. (1999) suggest, Indonesia adopted a more balanced growth strategy, including both prudence in economic management and investment in social needs, compared to the prestige-oriented industrialization program implemented by Nigeria.

The fourth theme in the relevant literature concerns the role of political economy and institution-building in determining the varying results. According to Lewis (2007), Indonesia's greater success during the regime of Suharto was attributed to a more stable interaction between the political elite, technocrats, and the private investors. This created an environment in which productive investment could continue, despite the rampant level of corruption, a systemic

alignment that Lewis defines as a ‘centralized’ rent seeking regime. In contrast, Nigeria had a divided political competition, an unstable institutional arrangement, and fierce elite competition for resource rent extraction which inhibited developmental policy formulation over time (Lewis, 2007; Robinson et al. 2006). Similarly, Henley (2015) and Bevan et al. (1999) stress the need for political cohesion to allow for sustainable development policies. Indeed, the varying consequences of democracy introduced after 1998-1999 confirm this claim. According to Lewis (2007) and Babagana (2025), although both countries adopted political democratization, the competition between different parties within the government increased significantly in Nigeria, compared to the ability of Indonesia to maintain productive activities and economic exports even in light of the Asian financial crisis in 1997 and consequent political transition. According to Ross (2001), the oil wealth in Nigeria also inhibits accountability of governments by creating less fiscal reliance on the population. Finally, other scholars attribute the role of geography and regionality, where Indonesia had a comparative advantage as compared to Nigeria because of its proximity to East and Southeast Asia’s booming regional economy (Henley, 2015; Lewis, 2007).

2.5 Research Gap and Motivation

The preceding sections have shown that structural transformation and inclusion are crucial to a country’s capacity for sustained catch-up and development, while resource dependence and weak institutions have often restricted the emergence of these dynamics in resource-rich economies. Yet, as the historical background demonstrates, Nigeria and Indonesia entered the 1970s from broadly similar structural and institutional starting points, conditions that existing resource curse and institutional theories would predict to produce comparable developmental constraints. Instead, the two countries followed sharply different developmental paths, suggesting that these broad explanations alone are insufficient to fully account for the differences in their long-run development outcomes.

Comparative literature offers several important explanations for this divergence. Pinto (1987) and Lewis (2007) emphasize differences in development strategy and productive diversification, while Henley (2015) highlights the role of agricultural policy and rural investment. Bevan et al. (1999) focuses on macroeconomic management and the handling of oil revenues, whereas Lewis (2007) and Babagana (2025) stress the importance of human capital formation and social infrastructure. Other scholars, including Ross (2001) and

Acemoglu and Robinson (2012), point to political institutions and the management of resource rents as the deeper determinants of long-run development outcomes. While these contributions provide important insights, they examine structural transformation, inclusion, institutions, and macroeconomic management as separate explanatory factors. As a result, the literature explains what differed between the two countries but provides less insight into how these structural and social conditions interacted over time to shape their capacity for technological catch-up. This study seeks to address this gap by applying the transformation and inclusion dimensions of Andersson and Palacio's (2017) social capability framework to a comparative historical analysis of Nigeria and Indonesia between 1970 and 2020. Rather than treating structural transformation and inclusion as separate processes, the study examines how their interaction shaped each country's ability to develop the productive and social conditions necessary for sustained technological catch-up.

3 Theoretical Framework

This section presents the theoretical framework guiding the study. It begins by assessing the limitations of the neoclassical growth theory and then discusses the social capability approach. It then examines the challenges associated with operationalizing social capability and outlines the justification for applying Andersson and Palacio's (2017) framework to the study.

3.1 Limitations of the Neoclassical Growth Theory

Early neoclassical growth theories explained economic development primarily through capital accumulation and treated technological knowledge as exogenous and equally accessible to all countries. This perspective was formalized in Solow's (1956) neoclassical growth model, which predicts that poorer economies, facing higher returns on capital, should grow faster and gradually converge toward richer ones. Underlying this prediction is the assumption that technology functions as a 'free good', meaning that persistent income differences across countries should gradually disappear as poorer economies gain access to the same technologies over time (Fagerberg, 1994). However, this assumption has been challenged by subsequent research. Lucas (1988) observed that if the model's predictions were correct, the world should appear far more equal than it does. Helliwell and Chung (1992) reinforced this critique by demonstrating that rates of technological change vary significantly across countries, suggesting

that the capacity to translate technology into productivity growth depends heavily on country-specific conditions. Early work by Barro and Sala-i-Martin (1991) identified convergence patterns broadly consistent with the model's prediction, but Quah (1996) demonstrated that these findings reflected convergence among homogenous economies and could not be generalized globally. Taken together, these critiques suggest that technological catch-up is not simply driven by access to capital, but by the broader country-specific conditions shaping economies' abilities to adopt and exploit modern technologies.

3.2 The Social Capability Approach

A more suitable approach therefore appears to be one that considers the country-specific conditions shaping the potential for technological catch-up. An early and influential contribution was Gerschenkron's (1962) theory of the 'advantages of backwardness', which argued that technologically backward countries could industrialize more rapidly than early industrialisers by adopting technologies and organizational practices already developed in advanced economies. However, he emphasized that this process is far from automatic, as late industrialisers often lack institutional and financial prerequisites for development and must therefore compensate through acts of institutional 'substitution'. Building on this insight, Ohkawa and Rosovsky (1973) and later Abramovitz (1986; 1995) developed the concept of social capability, which suggests that even when poorer countries have access to advanced technology, catch-up is not automatic. Rather, its realization depends on a broader set of structural, social, and institutional conditions. As Abramovitz (1986) argued, catch-up potential is strongest when a country is "technologically backward but socially advanced" (p.388). This potential is shaped by factors such as educational attainment, social stability, and state capacity. Although broad, the social capability approach provides an important qualification to neoclassical growth theory by demonstrating that country-specific conditions shape whether technological opportunities can be realized.

The social capability approach has since been applied empirically to explain cross-country differences in growth performance. Temple and Johnson (1998) found that social development indicators from the 1960s were strong predictors of subsequent economic performance, operating through both factor accumulation and total factor productivity, concluding that fast growth is partly the outcome of favorable social arrangements. Hansson and Henrekson (1994) tested this more directly by modelling technological diffusion as an interaction between the

technological gap and a country's social capability, captured through human capital and trade openness. When the technological gap was considered, no significant convergence was found, but once social capability was introduced, a significant catching-up effect emerged. Together, these findings support Abramovitz's (1986; 1995) core argument and demonstrate that the social capability approach offers a more appropriate lens for understanding technological catch-up than the neoclassical growth theory, because it accounts for the structural, social and institutional conditions that determine whether countries can exploit technological opportunities. However, as the following section discusses, operationalizing social capability empirically presents many challenges.

3.3 A Framework for Operationalizing Social Capability

One key challenge in the social capability literature has been the concept's imprecise definition and the corresponding difficulty of measuring it empirically. Abramovitz (1986) acknowledged this ambiguity, noting that "no one knows just what it means or how to measure it" (p. 388). Despite decades of research, no clear consensus seems to have emerged on what the core components of social capability are or how they should be operationalized. While scholars have proposed a range of different indicators to capture the concept (Temple & Johnson, 1998; Putterman, 2013; Hansson & Henrekson, 1994), the literature remains fragmented and lacks a unified conceptual framework. This makes it difficult for empirical studies to apply the social capability concept in a way that is both theoretically grounded and operationalizable.

The lack of conceptual clarity motivates the adoption of Andersson and Palacio's (2017) framework, which offers a more systematic attempt to define and operationalize social capability for developing countries. Drawing on Abramovitz's (1995) later work, the authors identify two basic elements of social capability: the social and political arrangements that create effective incentives for economic activity, and the ability of societies to exploit modern technologies. From these two elements, they derive four interrelated and measurable dimensions. Transformation refers to the shift from low-productivity traditional activities toward higher value-added activities in manufacturing and services. Inclusion captures a process of pro-poor growth in which the benefits of economic development are realized broadly across society. Autonomy refers to the capacity of the state to resist vested interest groups and pursue developmental policies without succumbing to elite capture, while accountability captures the quality of governance and provision of public goods, ensuring that state autonomy

does not translate into arbitrary or wasteful governance. Together, these four dimensions are designed to reflect the deeper forces shaping countries' ability to build resilience and achieve sustained catching up (Andersson & Palacio, 2017).

3.4 Motivation for Using the Framework

The adoption of Andersson and Palacio's (2017) framework is motivated by an important theoretical consideration. The framework views technological adoption as fundamentally shaped by social, structural, and institutional conditions rather than as an automatic process. Building on Abramovitz's (1986; 1995) concept of social capability, Andersson and Palacio (2017, p.15) argue that at the social level, a country's ability to exploit modern technology is 'effectively synonymous' with structural transformation, implying that technological progress and social capability are closely interconnected rather than separate phenomena. By situating technological adoption within a broader institutional, social, and structural context, the framework makes it possible to assess whether the productive structures and wider social conditions of Indonesia and Nigeria possess the conditions necessary to realize their potential for technological catch-up. This is particularly relevant given that the existing literature attributes the divergence between Nigeria and Indonesia primarily to differences in these underlying institutional, structural, and social conditions.

A further motivation for adopting the framework is that it represents one of the most systematic and theoretically grounded attempts to operationalize social capability within the literature. Earlier contributions either recognized social capability as important but left it conceptually broad (Abramovitz, 1986; 1995) or relied on individual indicators without a clear theoretical foundation (Temple & Johnson, 1998; Hansson & Henrekson, 1994). In contrast, Andersson and Palacio (2017) develop four interrelated and measurable dimensions that are explicitly grounded in both theory and empirical evidence, providing a more coherent basis for comparative analysis. Furthermore, the framework is developed specifically with developing countries in mind, recognizing that their developmental paths and institutional conditions differ from those of advanced industrial economies (Andersson & Palacio, 2017). Finally, the framework's focus on a limited number of dimensions for which data can be collected makes it well suited to contexts such as Nigeria and Indonesia, where data availability across all dimensions of development cannot always be guaranteed (Till, 2022). For these reasons, this

framework provides the most appropriate theoretical framework for the comparative assessment of Nigeria and Indonesia's technological catch-up potential.

Recent applications of the social capability framework have increasingly emphasized the importance of inclusivity and structural transformation in sustaining long run catch-up growth, a perspective that is directly relevant to the analytical approach of this thesis. Andersson and Andersson (2019), in their comparative study of Senegal and Côte d'Ivoire between 1930 and 1980, argue that the absence of broad-based access to productive economic opportunities constituted a major constraint on sustained development. Their findings suggest that strong agricultural performance was insufficient to create long-run growth unless accompanied by structural transformation capable of creating productive employment opportunities beyond agriculture. Till (2022) extends this argument in the context of modern economic growth in Ethiopia, showing that rapid agricultural and economic growth is unlikely to produce transformative catch-up unless it generates productive absorption of labor into non-agricultural sectors or higher-value agricultural activities.

This study will focus on the two interrelated dimensions: transformation and inclusion, proposed by Andersson and Palacio (2017). The reasons for this are the following. Transformation and inclusion most directly align with this study's focus on technological catch-up potential. Transformation is the dimension most directly related to a country's ability to exploit modern technologies and achieve structural transformation, while inclusion captures whether the benefits of this process are broadly shared across society, which Andersson and Palacio (2017) argue is essential for sustaining catch-up in the long run. By contrast, autonomy, and accountability, while important dimensions of state capacity and governance, are more closely related to the political and institutional arrangements that shape the conditions for economic activity than to a country's ability to exploit technological opportunities. As a result, they function primarily as enabling conditions for transformation and inclusion rather than as direct indicators of technological catch-up potential and are considered beyond the scope of this study. Focusing on transformation and inclusion therefore allows for a more coherent and manageable analysis while remaining consistent with the theoretical foundations of the framework.

4. Methodology

In this section, the methodology used and data collected will be explained and motivated.

Limitations of the study and data are discussed at the end of the section.

4.1 Research Design

The research design of this thesis is guided by the social capability framework and the objectives outlined in the preceding sections. The study adopts comparative historical analysis as its primary methodology in order to assess the development of social capability, specifically its transformation and inclusion dimensions, in Nigeria and Indonesia between 1970 and 2020, and to evaluate how the structural and social conditions of both countries have changed throughout the study period and whether they appear conducive to technological catch-up. Mahoney and Rueschemeyer (2003) define comparative historical analysis through three core characteristics: a concern with causal explanation, an emphasis on processes unfolding over time, and the use of systematic and contextualized comparison. Rather than searching for statistical correlations between variables, it seeks to identify the mechanisms through which proposed causes produce outcomes (Ritter, 2014).

This methodological orientation is especially appropriate for the study of social capability, since the framework itself conceptualizes technological catch-up as the outcome of long-term historical processes shaped by the interaction between institutional, social, and structural conditions. The study draws on descriptive statistics to illustrate long-run trends in transformation and inclusion across the two countries. These quantitative indicators are complemented by secondary literature and linked to the historical contexts that shaped each country's trajectory during the study period. The emphasis on causal relationships in this research design makes quantitative methods less ideal, as the objective is to establish causal relationships rather than correlations between variables (Ritter, 2014). These methodological choices allow the analysis to assess the structural and social conditions of Nigeria and Indonesia as determinants of each country's potential for technological catch-up, rather than simply documenting differences in their developmental outcomes.

4.2 Data Collection and Operationalization

The two dimensions of the social capability framework, transformation and inclusion, are operationalized through a range of indicators intended to capture long-run structural and social change in Nigeria and Indonesia between 1970 and 2020 (see Table 1). Together, these indicators are used to assess whether the countries developed the productive and social conditions associated with potential for technological catch-up.

Table 1: Operationalization of Transformation and Inclusion

Dimension	Indicators
Transformation	Sectoral value-added shares (GDP), sectoral employment shares (% of total employment), and export composition (% of total exports).
Inclusion	Gini coefficient, secondary and tertiary education enrollment and attainment rates, electricity access (% of population), and internet usage.

The transformation dimension is assessed primarily through descriptive statistics that capture changes in the productive structure of the two economies over time. Sectoral value-added shares as a proportion of total GDP were calculated using data from the GGDC 10-Sector Database developed by Timmer et al. (2015). These shares were derived by dividing sectoral value added at constant national prices by total GDP. Sectoral employment shares as a proportion of total employment were also calculated using data from the same database by dividing employment within each sector by total employment. To improve analytical clarity and facilitate comparison between the two countries, different categories of services were aggregated into a single service-sector indicator.

In addition, export composition by sector was illustrated using data from the Atlas of Economic Complexity produced by the Harvard Growth Lab (2026). Sectoral export shares were calculated by dividing the value of exports from each sector by total exports. As with employment and value-added data, some export categories were aggregated to simplify the analysis and improve comparability across countries and over time. Because the GGDC 10-

Sector Database only extends to 2010, supplementary data from the World Development Indicators (WDI) published by the World Bank (2026) were used to capture more current trends in sectoral shares of GDP and employment between 2010 and 2020. However, since these indicators are intended primarily to complement the longer-run trends derived from the GGDC dataset, the additional figures are presented in the appendix rather than in the main body of the analysis (see Appendix A and B).

The inclusion dimension is examined through a range of indicators intended to capture changes in inclusivity in Nigeria and Indonesia during the study period. Income inequality is measured using the Gini coefficient, with data obtained from the World Income Inequality Database (WIID). Human capital development is captured through secondary and tertiary school enrolment rates retrieved from the World Development Indicators published by the World Bank (2026). In addition, data on educational attainment, measured as the percentage of the population aged 25 and above that completed secondary and tertiary education, was obtained for Indonesia from the Barro-Lee Educational Attainment Dataset developed by Barro and Lee (2021). Data on access to electricity and the share of individuals using the internet were retrieved from the World Development Indicators.

4.4 Limitations

This section addresses the potential limitations of the study. Firstly, while the comparative historical approach is well suited to identifying long-run processes and causal mechanisms, it does not allow for formal statistical inference (Ritter, 2014). The conclusions drawn in this study should therefore be understood as theoretically informed interpretations grounded in historical and descriptive evidence. Secondly, although the decision to focus solely on the transformation and inclusion dimensions of Andersson and Palacio's (2017) framework is justified theoretically and empirically, it provides only a limited perspective on social capability. Excluding the autonomy and accountability dimensions means that the role of state capacity, governance quality, and political institutions in shaping technological catch-up is not directly assessed. As a result, this study does not aim to establish a causal relationship between social capability and technological catch-up, but rather to assess how the structural and social conditions captured through the transformation and inclusion dimensions may shape each country's potential for technological catch-up. It should be noted that the dimensions of the framework are endogenous and mutually reinforcing, as Andersson and Palacio (2017) acknowledge. Transformation and inclusion do not operate as separate processes but interact

in ways that together shape a country's capacity to adopt technologies. Although these dimensions are analyzed separately for clarity in the following section, they are treated as closely interconnected in the discussion section.

An additional limitation concerns data availability, a common challenge in research on developing economies such as Indonesia and Nigeria. Limited availability of long-run data on sectoral value added and employment required the use of two different datasets, introducing potential inconsistencies into the analysis. These datasets differ not only in their methodological approaches and measurement techniques, but also in their sectoral classifications. To address this, indicators were expressed as shares rather than absolute values, allowing for the identification of board patterns in structural transformation without relying on direct comparability between the two sources. Data scarcity also affected the inclusion dimension, where the availability of consistent long-run indicators was limited for both countries, particularly in the earlier decades of the study period. This limited the selection of the indicators, for example educational attainment was only available for Indonesia, and we had to rely on school enrollment. This restricted the selection of variables and reduced cross-country comparability. For example, consistent data on educational attainment was only available for Indonesia. However, we addressed this by including additional secondary literature and policy reports to ensure the full study period could be addressed.

5. Analysis

In this section, the 10 indicators presented in Table 1 will be applied to analyze the cases of Indonesia and Nigeria through the social capability framework's two dimensions: transformation and inclusion.

5.1 Transformation

The section below provides an analysis of the transformation dimension of the social capability framework presented by Andersson and Palacio (2017), focusing on the experiences of Indonesia and Nigeria between 1970 and 2020. As mentioned in the previous sections, transformation refers to the transition from a traditional economy to a diversified economy. Andersson and Palacio (2017) argue that a declining role of agriculture reflects successful structural change, as labor and resources move into higher-value sectors. To assess this process,

the analysis focuses on three indicators: sectoral value added, employment shares, and export composition.

5.1.1 Structural Transformation in Indonesia

Figure 1 illustrates the sectoral composition of value added in Indonesia between 1970 and 2010, measured as each sector's share of total GDP, while Figure 2 shows the corresponding share of total employment accounted for by agriculture, manufacturing, and services over the same period. It should be noted that these figures capture the changing relative importance of each sector within the economy rather than absolute growth rates, meaning that a rising share reflects a sector becoming more significant within the overall economic structure.

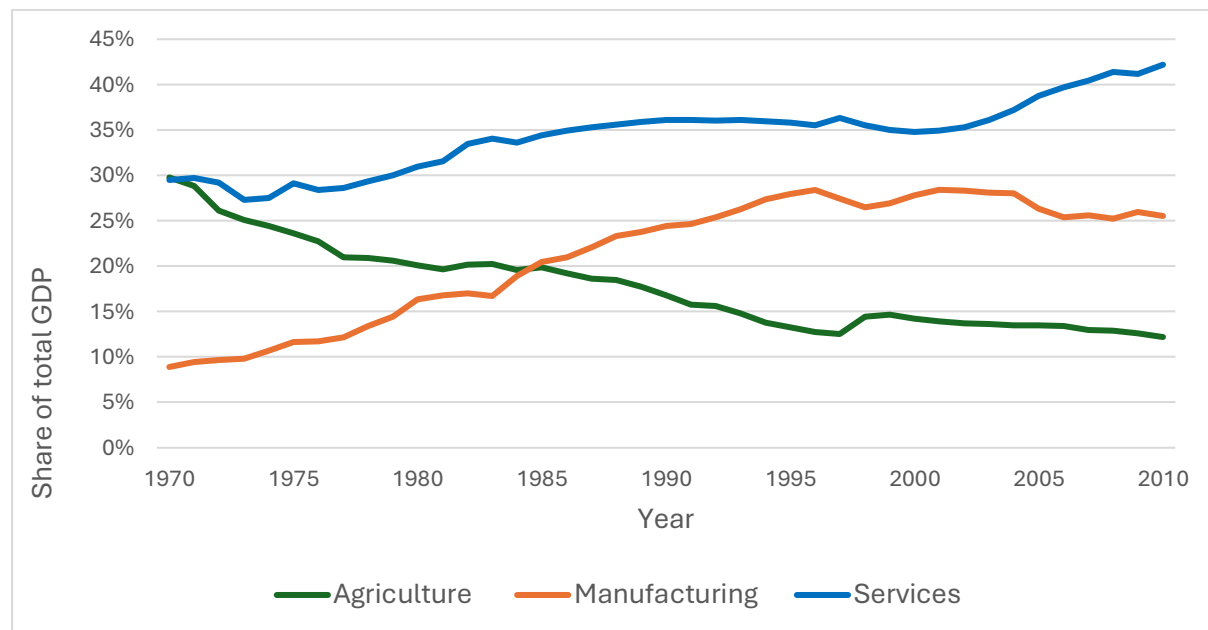


Figure 1: Sectoral Value-Added Shares in Indonesia 1970-2010

Source: Author's calculations based on data from Timmer et al. (2015).

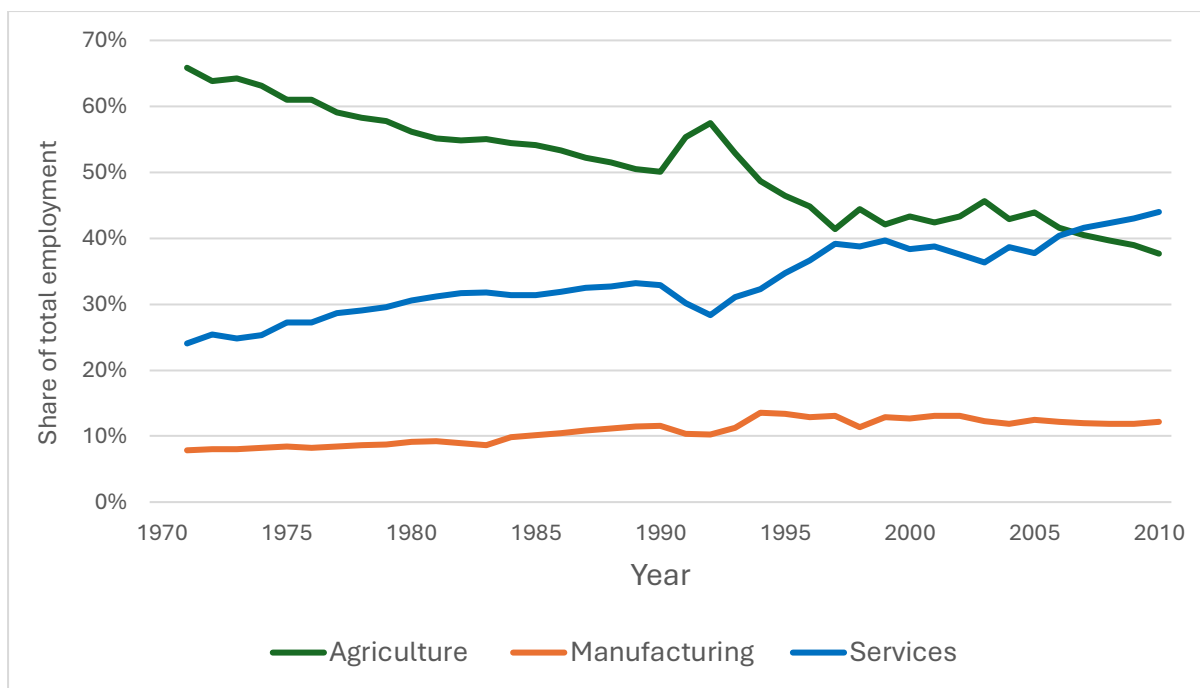


Figure 2: Sectoral Employment Shares in Indonesia, 1990–2010

Source: Author's calculations based on data from Timmer et al. (2015).

The figures indicate that agriculture's relative importance declined steadily from the 1970s onwards in terms of both output and employment. Fuglie (2010) shows that agricultural total factor productivity growth accelerated in the 1970s and 1980s, which can be attributed to the Suharto government's investments in rural infrastructure and agricultural modernization. These investments gradually reduced agriculture's relative importance in the economy and created conditions for a broader sectoral reallocation (Henley, 2015). As labor and resources shifted out of agriculture, both manufacturing and services became more significant components of the Indonesian economy.

From 1970 until the end of the 1990s, the relative importance of manufacturing rose more rapidly than that of the service sector, as shown in Figure 1. Grabowski (2020) highlights that this growth in manufacturing was highly labor-intensive and, as a result, created a rapid expansion in employment opportunities, though Figure 2 shows only a modest increase in manufacturing's relative employment share over this period. Nevertheless, structural transformation was proceeding in a broadly conventional fashion, with the manufacturing sector increasing relative importance and absorbing labor released from agriculture.

However, this trajectory was disrupted by the Asian Financial Crisis of the late 1990s, which affected several countries across Southeast and East Asia (Grabowski, 2020). As Figure 1 shows, the relative importance of the manufacturing sector declined gradually in the aftermath of the crisis, while the service sector began to gain an increasing share of total GDP. Figure 2 corroborates this, illustrating that employment in manufacturing also stagnated after the late 1990s. Although Indonesia recovered from the crisis rapidly, the character of growth had changed drastically, and manufacturing failed to play a dynamic role in the Indonesian economy.

This shift is further reflected in more recent data on sectoral shares of GDP (see Appendix A). Manufacturing's share of total GDP declined gradually from 22.04 percent in 2010 to 19.87 percent in 2020, while the service sector's share increased from 40.67 percent to 44.41 percent over the same period. A similar pattern is visible in employment data, with the service sector's share rising from 42.97 percent in 2010 to 49.06 percent in 2020 (see Appendix B). Together, these trends suggest that Indonesia's process of structural transformation remains incomplete, as the economy has become increasingly dominated by services rather than manufacturing. Although the service sector has expanded rapidly in recent decades, the International Labour Organization (2020) notes that informal employment continues to account for a substantial share of total employment.

5.1.2 Structural Transformation in Nigeria

Figure 3 illustrates the sectoral composition of value added in Nigeria between 1970 and 2010, measured as each sector's share of total GDP, while Figure 4 shows the corresponding share of total employment accounted for by agriculture, manufacturing, and services over the same period. As with the Indonesian figures, they capture the changing relative importance of each sector within the economy rather than absolute growth rates. The figures reveal a similar trajectory of agricultural decline, but a considerable difference in the role that the manufacturing sector played in each country's structural transformation.

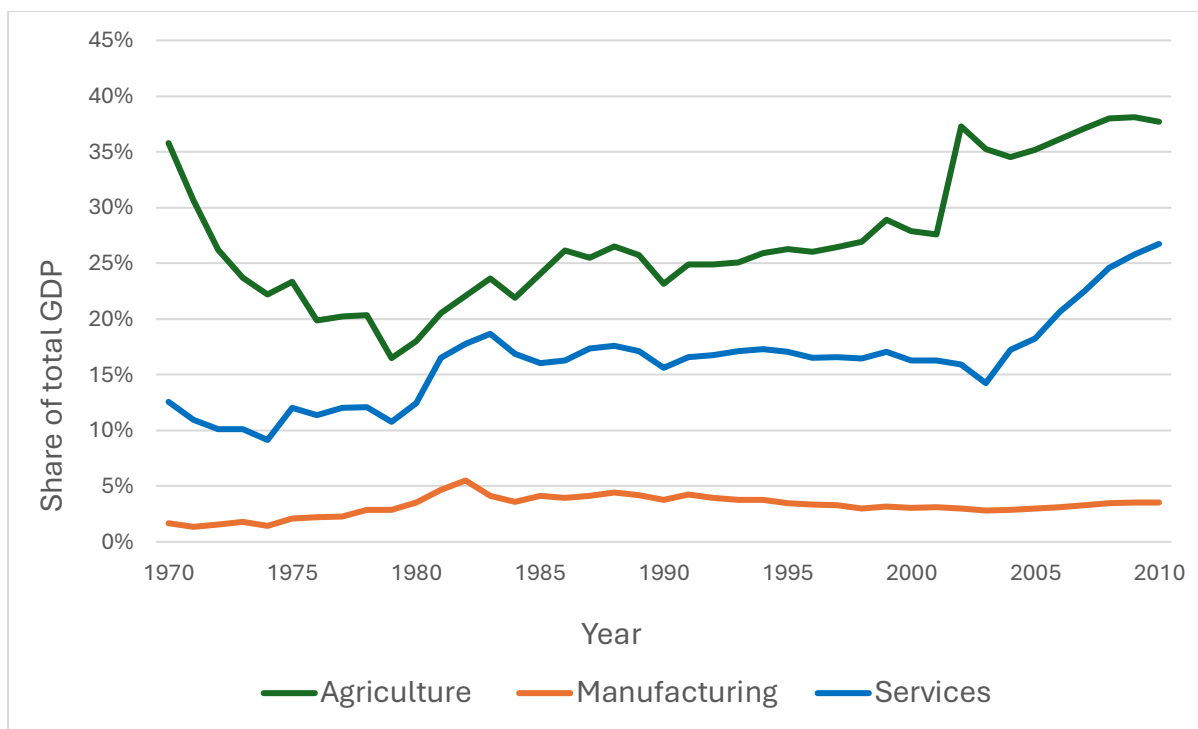


Figure 3: Sectoral Value-Added Shares in Nigeria 1970-2010

Source: Author's calculations based on data from Timmer et al. (2015).

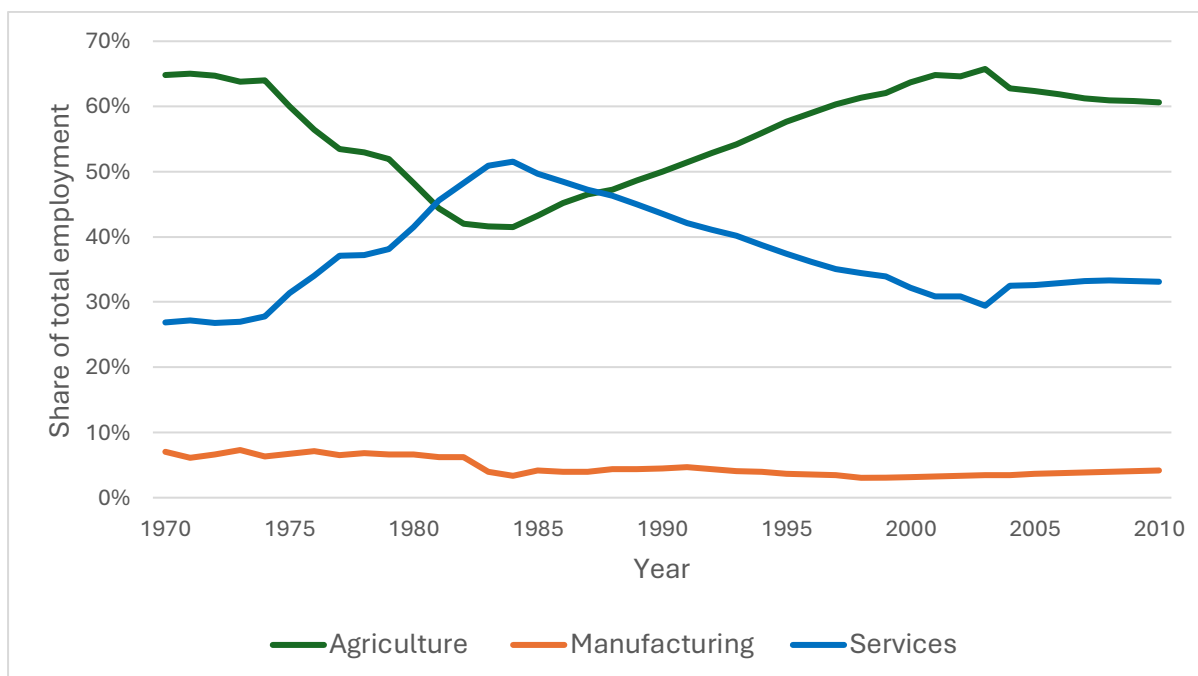


Figure 4: Employment Shares by Sector in Nigeria, 1990–2010

Source: Author's calculations based on data from

Like Indonesia, Nigeria experienced a steady decline in agriculture's relative importance from the 1970s onwards in terms of both output and employment, partly driven by the oil boom. However, in the early 1970s agriculture was a more important part of the Nigerian economy. Figure 4 shows that it accounted for close to 70 percent of total employment, which is a significantly higher share than in Indonesia over the same period. The decline in agricultural employment in Nigeria was consequently more dramatic in absolute terms, though it reflected a similar process of labor reallocation as workers moved into other sectors.

However, the pattern of labor reallocation differed significantly between the two countries. In Indonesia, as discussed above, the period from the 1970s to the late 1990s was characterized by a growing role for manufacturing in both output and employment, reflecting a classic pattern of structural transformation. By contrast, no comparable shift occurred in Nigeria. Figure 3 shows that manufacturing's contribution to GDP remained limited throughout the period, while Figure 4 demonstrates that the sector absorbed only a small share of the labor released from agriculture. Instead, most labor moved into the service sector, whose share of total employment expanded over time. Nigeria therefore largely bypassed the manufacturing-led phase of structural transformation that characterized Indonesia's development trajectory up to the late 1990s.

This divergence in development trajectories can partly be explained by differences in how the two countries utilized their oil revenues. Henley (2015) and Lewis (2007) argue that Indonesia directed a significant share of oil rents toward agricultural development, raising rural productivity and creating broader participation in productive sectors of the economy. In contrast, Nigeria pursued a more urban-industrial strategy that was highly capital-intensive and generated limited employment and weaker linkages with the wider economy (Pinto, 1987; Lewis, 2007). A substantial share of oil revenues was instead channeled into the expanding service sector rather than manufacturing. While this outcome is often associated with the resource curse, Wang (2025) argues that such explanations do not adequately account for why Nigerian governments prioritized service-sector expansion over industrial development. The result was a service-led growth trajectory that lacked the kind of manufacturing expansion Indonesia experienced.

More recent data shows that this pattern has persisted (see Appendix A & B). Nigeria's manufacturing sector accounted for just 6.55 percent of total GDP in 2010, compared to 22.04 percent in Indonesia the same year, and its employment share remained equally low throughout

the following decade. The service sector, by contrast, already dominated Nigeria's output structure in 2010 and continued to expand in both output and employment terms, though its growth was more modest than in Indonesia.

Nigeria's agricultural shares remained persistently high in both GDP and employment, diverging from Indonesia where agricultural shares declined more decisively over the same period. According to the International Labour Organization (2024), informal employment in Nigeria is overwhelmingly dominant, encompassing most of total employment, suggesting that the growth of services has not translated into the kind of productive structural transformation capable of absorbing technology.

5.1.3 Export Composition in Indonesia and Nigeria

Figures 5 and 6 illustrate the export composition of Indonesia and Nigeria between 1970 and 2020, and together they reinforce the different paths of the two countries in structural transformation documented above. In Indonesia, the early dominance of fuel exports gave way progressively from the 1980s onwards to a growing share of manufactured goods, which came to constitute the largest component of total exports by the 1990s. Agriculture and food maintained a modest but consistent presence throughout. This shift in export composition reflects the broader pattern of industrial development discussed above, in which manufacturing gained an increasingly important role in the Indonesian economy prior to the Asian financial crisis, and is consistent with Pinto (1987) and Lewis (2007), who highlight Indonesia's engagement with export-oriented manufacturing and regional production chains as a key driver of its diversification. In Nigeria, by contrast, fuel exports dominated the export structure overwhelmingly throughout the entire period, with manufacturing, services, and agriculture together accounting for only a marginal share of total exports, highlighting the country's dependency on oil. This export composition remained unchanged across the five decades, reflecting the failure of structural transformation to generate a diversified productive base.

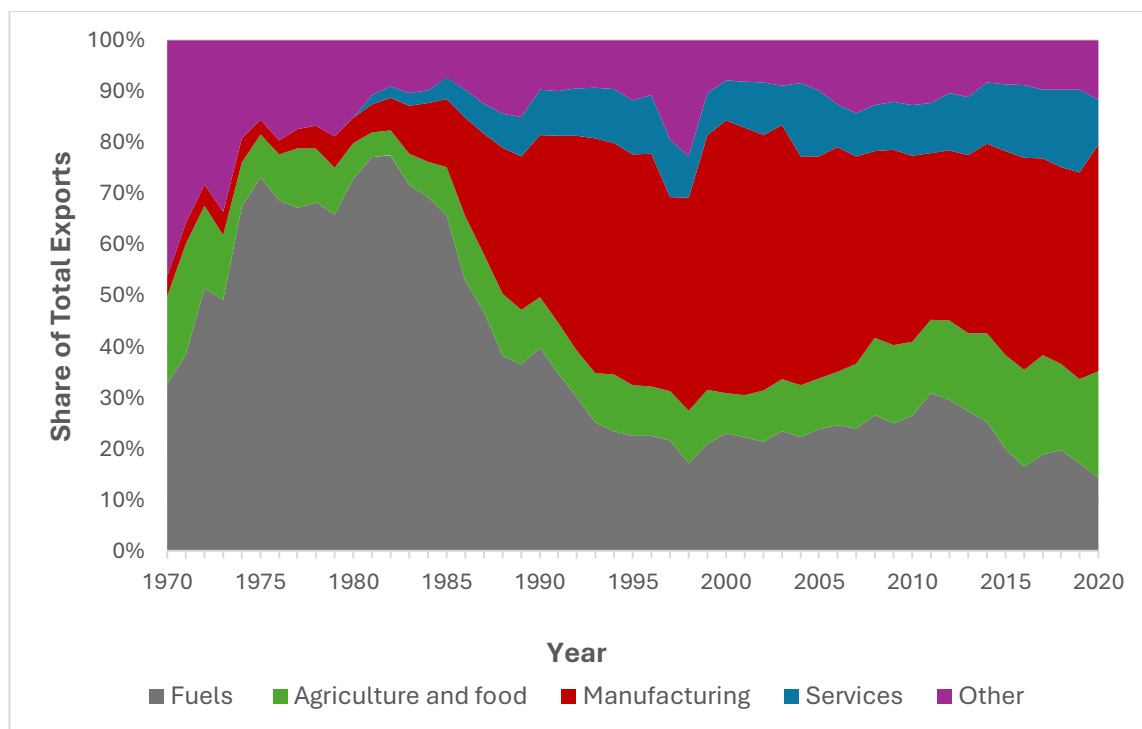


Figure 5. Export Composition of Indonesia, 1970–2020

Source: Author's calculations based on data from Harvard Growth Lab (2026).

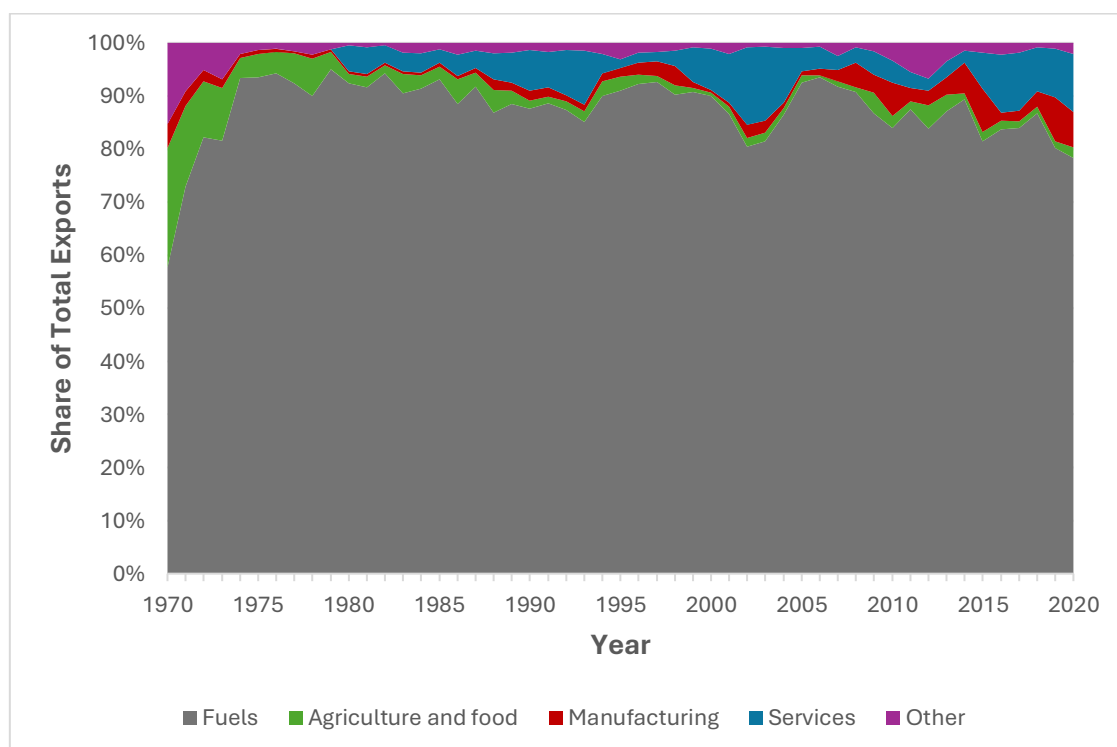


Figure 6. Export Composition of Nigeria, 1970-2020

Source: Harvard Growth Lab (2026).

The analysis reveals that both Indonesia and Nigeria have experienced a broad expansion of the service sector over the past decade, a large share of service sector employment remains informal, which limits the productive and technological potential of growth in the sector. Despite this similarity, the trajectories of structural transformation in the two countries diverged considerably. Up to the 1990s, Indonesia experienced a significant increase in the relative importance of manufacturing in both output and employment, accompanied by a gradual diversification of exports away from fuels and toward manufactured goods. Nevertheless, Indonesia's structural transformation remains incomplete, as manufacturing has lost relative importance in more recent decades. Nigeria, by contrast, bypassed the manufacturing-led phase of structural transformation, never developing a substantial industrial base. Its export structure remained overwhelmingly dominated by fuel exports throughout the entire period, reflecting both a persistent dependence on oil and a failure to develop a diversified and technologically dynamic productive structure.

5.2 Inclusion

The following section contains an empirical study of the inclusion component of the social capability framework put forth by Andersson and Palacio (2017) based on Indonesia and Nigeria in the period from 1970 to 2020. As noted in the literature review above, inclusion entails the degree to which there is a widespread distribution of opportunities for economic development, the accumulation of human capital, and the provision of infrastructure. Previous research on East Asian development suggests that broadly conducted investment in the sphere of education, rural areas, and infrastructure was a critical aspect of structural transformation and catching up in technology (World Bank, 1993; Birdsall et al., 1995; Amsden, 1989; Sawada, 2022). Studies of resource-dependent economies demonstrate that oil wealth results in unequal development, during which only political and economic elites receive gains. This contrast between Indonesia and Nigeria is indicative of the general debate surrounding the issue. As explained in the historical background part above, Indonesia invested a sizable portion of its oil revenue during the decades of the 1970s and 1980s in improving rural development, education, agriculture, and labor-intensive industrialization (Henley, 2015; Lewis, 2007). On the other hand, Nigeria adopted an approach that was more urbanized and capital-intensive while investing less in developing human capital and generating employment (Pinto, 1987; Lewis, 2007). Based on the discussion by Andersson and Palacio (2017), this part explains how such differences affected social capability building through structural

transformation and technological capability building. To measure empirically such inequalities, the succeeding paragraphs will investigate four different measures of inclusion, namely: income inequality (using Gini coefficient), education attainment and enrollment, availability of electricity, and Internet connectivity. All these four measures will reveal if the benefits from modernization have been distributed equitably across society or limited to a few groups only.

Table 2. Gini coefficient for Indonesia and Nigeria for the years 1970-2020

Indonesia		Nigeria	
1970	36.1	1970	52.1
1980	36.4	1980	51.1
1990	34.2	1990	54.1
2000	33.6	2000	47.1
2010	37.0	2010	36.8
2020	37.7	2020	35.6

Source: UNI-WIDER, World Income Inequality Database (2023)

The Gini coefficient is one of the key measures of inclusion since it helps understand whether the positive outcomes of economic growth are fairly shared among the population. The Gini coefficients of Indonesia and Nigeria over the period between 1970 and 2020 have been provided in Table 2 above and illustrate different trends of inequality development within both nations.

The literature on developmental states suggests that structural change and development tend to be inclusive and involve many actors when it comes to production, more specifically, in the initial stages of development (Andersson & Palacio, 2017; Birdsall et al., 1995). Resource-driven economies are characterized by unequal growth due to limited access to natural resources (oil revenues), which is determined by political elites (Gelb, 1988; Ross, 2012).

The Gini coefficient for Indonesia was stable from 1970 to 2000, with the range being about 33% to 36 % (UNI-WIDER, 2023). This period aligns with the discussion of Indonesia's agricultural modernization, infrastructure development, and labor-intensive industry from the literature review (Henley, 2015; Lewis, 2007). With the lower levels of inequality, the model does seem to have contributed more broadly to economic involvement during early industrialization. While inequality increased beyond 2000, reaching 37.7% by 2020, this took place well after the changes were made (UNI-WIDER, 2023).

The case of Nigeria is quite different. The inequality level remained remarkably high in the period from 1970 to 1990, with the Gini coefficient constantly remaining above 50% (UNI-WIDER, 2023). Such trends have been explained by the resource curse literature stating that growth based on natural resources usually results in enclave economies, thus leading to the concentration of economic benefits only in the hands of political elite and city dwellers (Gelb, 1988; Lewis, 2007; Ross, 2012). While inequality was reduced after the year 2000, there was no major structural change taking place (UNI-WIDER, 2023).

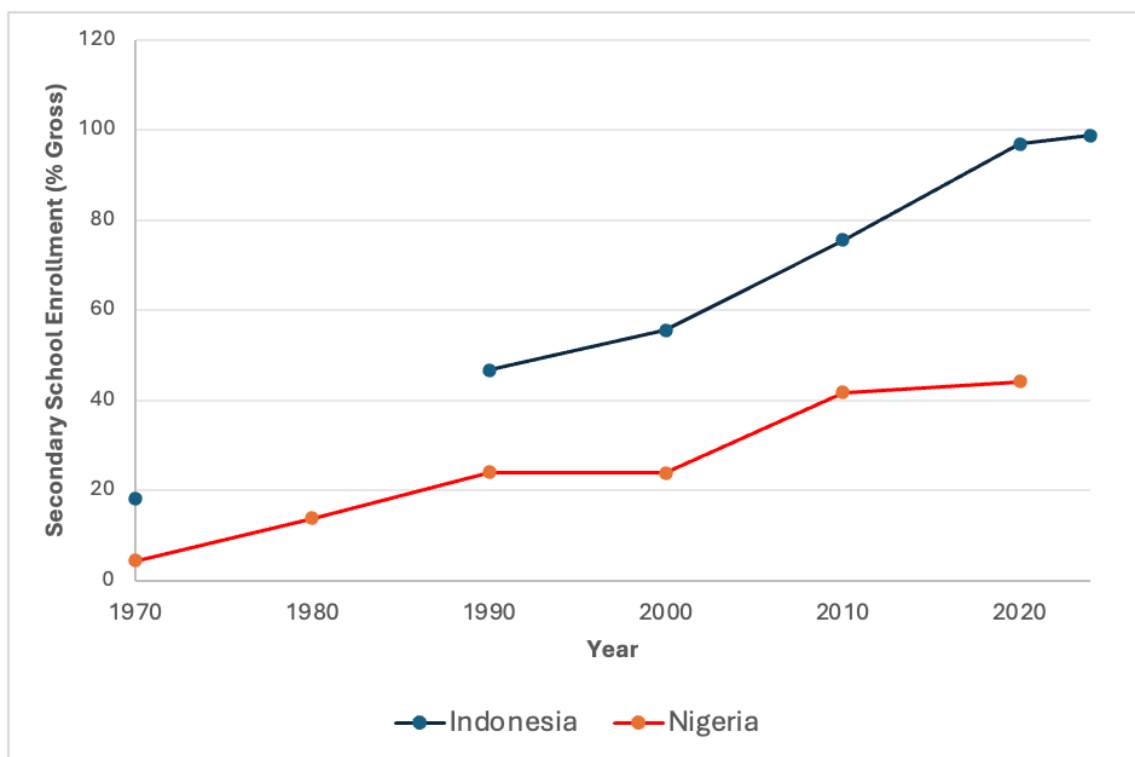


Figure 7. Comparison of Secondary School Enrolment (% Gross) between Indonesia and Nigeria (1970–2020)

Source: World Development Indicators (World Bank, 2026)

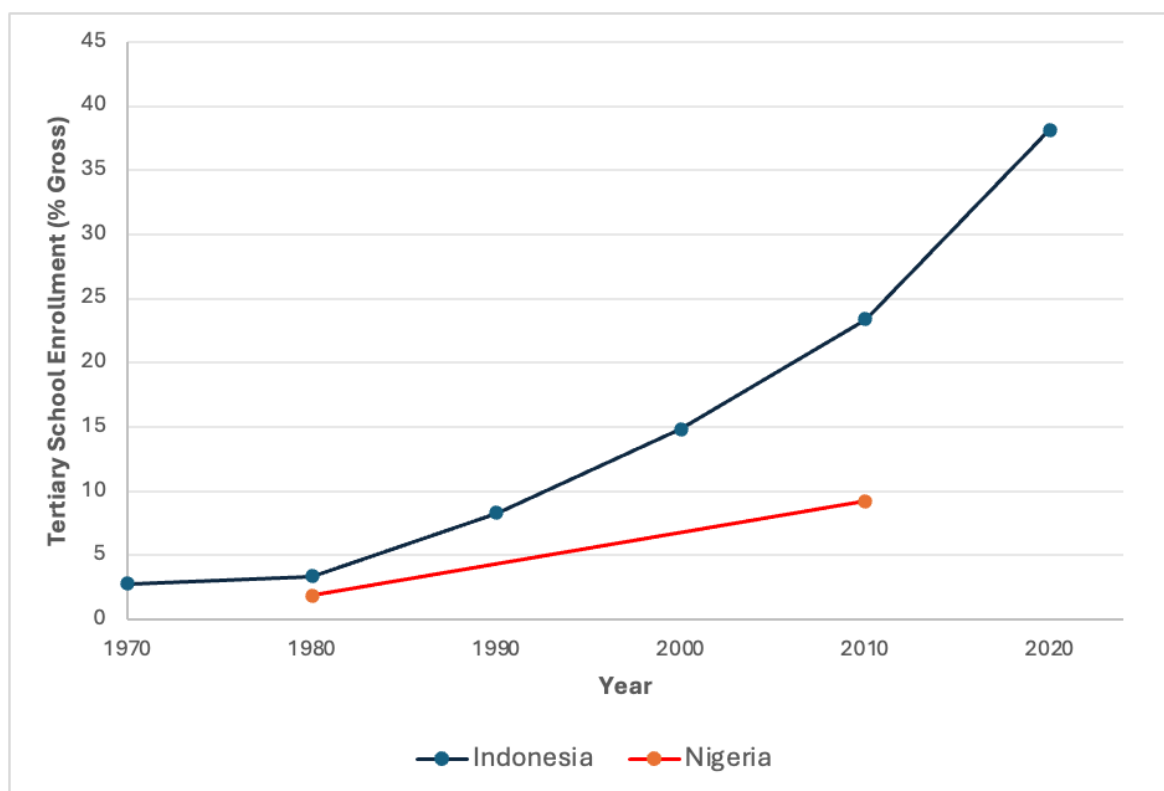


Figure 8. Comparison of Tertiary School Enrolment (%) between Indonesia and Nigeria (1970–2020)

Source: World Development Indicators (World Bank, 2026)

The growth of education is considered by development theorists to be an important pillar of technological catching up and structural change. According to researchers analyzing the development process of East Asia, continued investment in education was necessary for developing the kind of educated labor force needed for industrialization and technological innovations (Birdsall et al., 1995; Nelson, 1996; World Bank, 1993). Furthermore, education remains at the core of Andersson and Palacio's (2017) framework of social capability as it enables parts of society to join in productive activities.

Figures 7 and 8 reveal that throughout the period (1970-2020), Indonesia continued to make gains in terms of increasing participation in secondary and tertiary education (World Bank, 2026). As far as secondary education is concerned, its enrolment increased from 18.5% in 1970 to universal levels by 2020, whereas tertiary education enrolment gradually went up from exceptionally low levels to more than 38% by 2020 (World Bank, 2026). This is an indication that there was indeed a strong focus of Indonesia's development model on human capital building along with industrialization and rural development, as argued by Lewis (2007), Henley (2015), and Babagana (2022). Moreover, it indicates that the country adopted a

sequential development model, whereby it started with increasing primary and secondary education enrolment before expanding to higher education enrolment (Morris, 1996; World Bank, 1993).

The country saw a slower expansion of its education sector. Secondary education enrollment stayed at less than 25% until the 2000s, while the proportion of enrollment in higher education was merely 9.3% as of 2020 (World Bank, 2026). Studies (Lewis, 2007; Pinto, 1987; Ross, 2012) on the political economy of Nigeria attribute such poor performance to chronic underinvestment in the country's education system, fiscal instability due to the structural adjustment policy, and revenue from oil that went into the hands of urban and political elites instead of investments in society.

However, this divergence between the two countries becomes even more significant when considered from the perspective of social capability. Previous literature tends to view education as a product of development rather than a factor leading to development. Yet, the comparative analysis reveals that education became an important productive capability in both cases facilitating technological engagement, labor flexibility, and industrialization.

Table 3. Educational Attainment: Percentage of Population Aged 25+ Completing Secondary and Tertiary Education, Indonesia, 1970–2015

Year	Indonesia Secondary Education	Indonesia Tertiary Education
1970	2.1	0.2
1980	5.6	0.3
1990	11.1	1.2
2000	10.4	1.4
2010	23.9	4.3
2015	26.0	7.6
2020	N/A	N/A

Source: Barro & Lee (2021)

Table 3 represents the human capital through educational attainment in Indonesia, which provides a better representation of the stock of human capital and provides an even clearer picture of the divergence.

Secondary attainment among adults aged 25 and above increased from 2.1% in 1970 to 26% in 2015, while tertiary attainment rose from 0.2% to 7.6% over the same period (Barro & Lee, 2021). The increase in attainment rates is especially important since, according to the literature

on development, technological catch-up depends on education as well as skills acquisition. This is because it involves an increase in the knowledge stock and the productive use of existing knowledge (Abramovitz, 1986; Birdsall et al., 1995). Hence, Indonesian data imply that educational growth resulted in an increase in productive human capital.

Comparable long-run attainment data for Nigeria is limited. However, despite the lack of comprehensive educational attainment figures within the Barro-Lee data set, the available information on enrolment combined with findings from the literature provides some basis for drawing reasonable conclusions about the development of human capital in Nigeria. Indeed, based on findings in the literature, one can note that the less developed approach to education and social investments was characteristic of the Nigerian oil boom era (Henley, 2015; Lewis, 2007). Thus, the low levels of enrolment in Nigeria depicted in Figures 7 and 8 imply the lower levels of educational attainment compared to Indonesia.

From the perspective of social capability, these findings are significant because educational expansion increases the ability of workers to move into more productive sectors and participate in technologically advanced activities. Indonesia's broader investment in education therefore strengthened the country's capacity for long-term structural transformation, while Nigeria's weaker educational expansion constrained productive diversification.

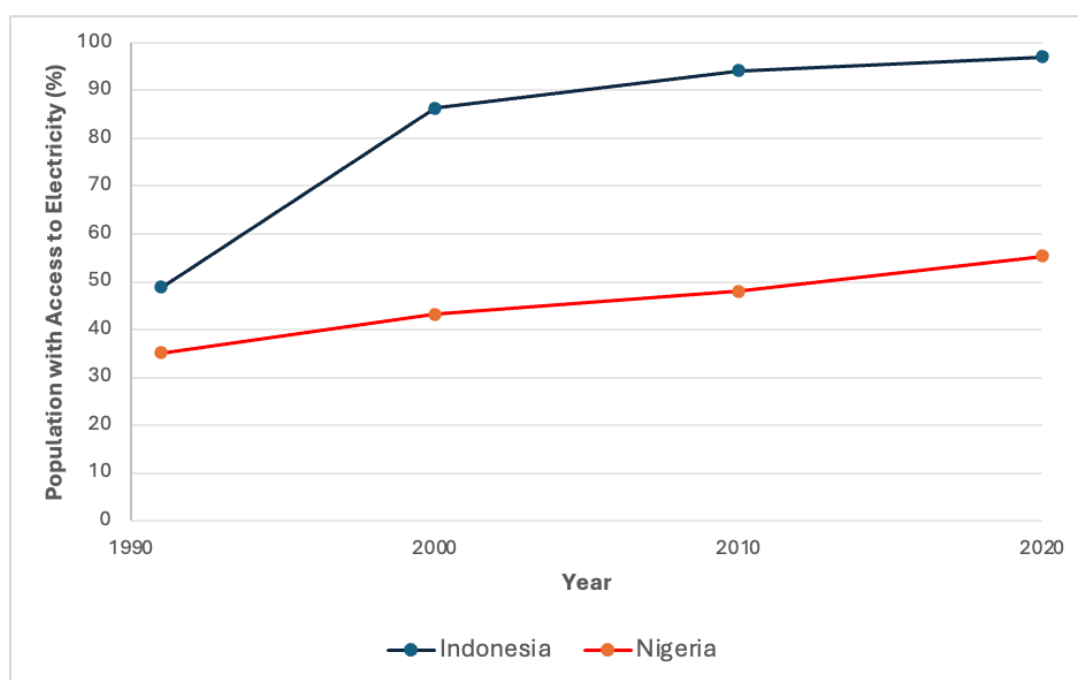


Figure 9. Electricity Access Growth: Indonesia vs Nigeria (1990–2020) % of population with access to electricity

Source: World Development Indicators (World Bank, 2026)

Electricity access can be used as one of the measures of infrastructure in the inclusion dimension, representing the extent to which there is availability among the general population of a basic technology needed to participate in today's economy. As we did not have access to any statistics regarding the 1970s, Figure 9 uses data from the World Bank (2026) to show the percentage of people that had access to electricity in Indonesia and Nigeria from 1992 until 2020. What is found is a clear disparity, and indeed divergence between the two countries that persisted for the whole period under observation. In 1992, approximately 49.5% of Indonesia's population had access to electricity compared to only 35.3% in Nigeria (World Bank, 2026). Over the following decades, Indonesia achieved a rapid expansion in electricity access, reaching more than 95% of the population by 2020 (World Bank, 2026). These differences are strongly linked to the overall development strategies discussed in the literature. As for Indonesia, its focus on rural development and state investment helped to integrate infrastructure broadly within society, while Nigeria had less integration due to insufficient infrastructure expansion because oil revenues were not invested effectively (Henley, 2015; Lewis, 2007). Nigeria also experienced gradual improvement over the same period; however, progress remained significantly slower, with electricity access reaching only around 55% by 2020 (World Bank, 2026). The persistence of limited electricity access in Nigeria reflects broader infrastructural weaknesses that constrained productive activity and technological participation. Overall, the figure suggests that Indonesia was more successful in extending basic infrastructural capabilities across society, strengthening the country's broader process of structural transformation and technological adaptation.

Table 4. Access to Electricity (% of Population): Urban and Rural Areas in Indonesia and Nigeria (2000–2020)

Year	Indonesia urban	Nigeria urban	Indonesia rural	Nigeria rural
2000	95.5	83.8	79.6	21.5
2005	96.6	83.8	74.7	23.1
2010	99.0	79.8	89.4	23.5
2015	99.8	81.5	94.9	25.9
2020	99.6	83.9	93.5	24.6

Source: World Development Indicators (World Bank, 2026)

As depicted in Table 3, it becomes evident that the extent of infrastructural inclusion varied from one country to another depending on whether the country had urban or rural electrification. Whereas both Indonesia and Nigeria started the new millennium with elevated levels of urban electricity, Indonesia did much better in making sure that the entire population gained access to electricity, especially those living in rural settings. The percentage of Indonesia's urban electrification improved from 95.5% in 2000 to full coverage by 2020, while urban electrification in Nigeria remained unchanged at about 80-84% (World Bank, 2026).

The divergence becomes even more significant when examining rural electrification. Indonesia's rural electricity access increased from 79.6% in 2000 to 93.5% in 2020, indicating broad national integration of infrastructure and a reduction in regional disparities (World Bank, 2026). In contrast, Nigeria's rural electrification remained extremely limited, increasing only slightly from 21.5% to 24.6% over the same period (World Bank, 2026). This demonstrates that a large share of Nigeria's rural population remained excluded from access to a basic productive technology necessary for education, communication, and participation in modern economic activities. From the perspective of social capability, these trends suggest that Indonesia was more successful in extending infrastructural inclusion across society, while Nigeria's infrastructural weaknesses continued to limit broad-based participation in economic transformation.

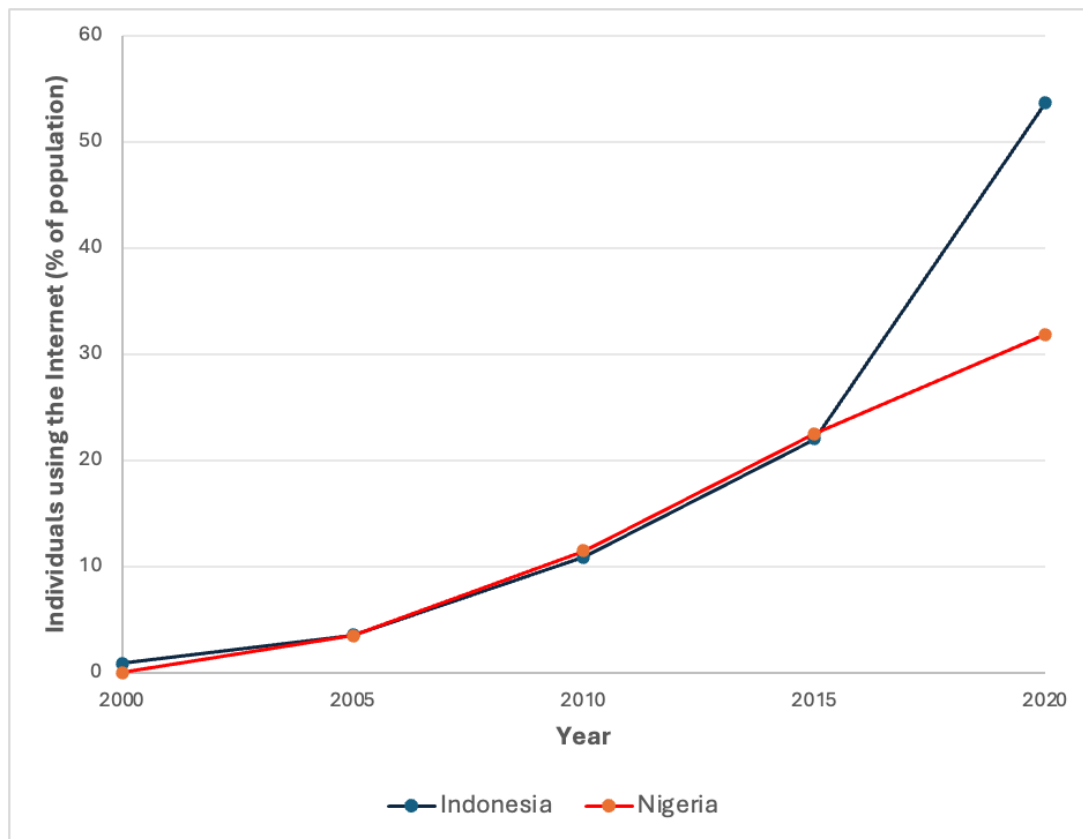


Figure 10. Individuals Using the Internet (% of Population): Indonesia and Nigeria (2000–2020)

Source: World Development Indicators (World Bank, 2026)

Figure 10 illustrates the increase in internet access in both Indonesia and Nigeria from the year 2000 to 2020. Both nations have experienced an increase in the number of internet users because in today's world, internet access is essential for participating economically and technologically in the world. In the year 2000, the use of the internet in both nations was exceptionally low because the number of internet users was below 1% in both nations (World Bank, 2026). The two nations had a similar trend up to the year 2015, whereby their internet users reached 22% (World Bank, 2026).

On the other hand, a significant difference was seen from 2015 onwards (World Bank, 2026). The rate at which internet use grew in Indonesia was significantly higher than that seen in Nigeria. While internet use grew rapidly to reach close to 54% in Indonesia by 2020, it grew only moderately in Nigeria to stand at about 32% (World Bank, 2026). The reason for this lies in the differences noted in their level of infrastructural development, availability of electricity, income level, and human capital formation as explained in the previous sections of this

analysis. This shows how Indonesia's efforts in infrastructural building and human resource development enabled the adoption of digital technologies.

On the other hand, Nigeria had been struggling with infrastructural constraints that made the adoption of digital participation difficult. Even though internet use had grown tremendously during the two decades, there was inequality in its access across the population. Considering social capability theory, the above figure illustrates that Indonesia succeeded better compared to Nigeria in fostering an environment of technological inclusion through infrastructure and human capital development.

6. Discussion and Conclusion

This thesis examined how the contrasting trajectories of structural transformation and inclusion in Indonesia and Nigeria shaped their social capability for technological catch-up between the years 1970 and 2020. Using Andersson and Palacio's (2017) framework, the study analyzed changes in sectoral transformation, export composition, inequality, education, and infrastructure access to evaluate whether the two countries developed the productive and social foundations associated with technological catch-up. The main findings from the analysis are discussed below.

6.1 Discussion of Findings

The results indicate that Indonesia was able to develop stronger structural and social conditions associated with technological catch-up, compared to Nigeria over the time covered by this study. Its process of structural transformation initially followed the sequence identified by Vos (2019) and Sawada (2022) in East Asia, where rising agricultural productivity released labor and resources into more productive sectors of the economy. As a result, manufacturing increased significantly in relative importance within both employment and GDP, while exports gradually diversified away from primary commodities toward manufactured goods. Although manufacturing has lost relative importance in more recent decades and informal employment remains widespread within the service sector, the productive diversification achieved over the study period marked a shift away from the persistent commodity dependence commonly associated as a barrier to catch-up in resource-rich economies

Nigeria, on the other hand, followed a different transformation trajectory. While the relative significance of agriculture did decline, there was little shift towards manufacturing and a significant increase in the service sector instead. Rather than developing a substantial manufacturing base, labor released from agriculture moved primarily into low-productivity service activities, showing a pattern of service-led growth. Manufacturing remained limited throughout the study period, both in terms of output and employment, while export composition continued to be overwhelmingly dominated by fuel exports. This supports Hausmann et al.'s (2013) argument that primary commodity dependence constrains the development of the productive complexity necessary for technological upgrading, as well as Matsuyama's (1992) claim that comparative advantage in natural resources can discourage industrialization.

The inclusion analysis further emphasizes the distinctions made above. For example, Indonesia experienced lower levels of inequality at the initial stages of development and enjoyed greater success in expanding the education system. Secondary school attendance grew consistently throughout the period (1970-2020), whereas a significant expansion of higher education was observed. Moreover, levels of educational attainment rose continuously, as well as electricity and internet usage. It may be argued, therefore, that a significant amount of society was included in the process of transformation and had access to modern technologies and production. Nigeria, by contrast, had experienced high inequality through the research period and low growth in education. While some indicators had improved in the post 2000 period, the level of secondary and higher education was lower compared to Indonesia. In combination with the lack of industrialization and the prevalence of informal sectoral employment, this implied that most of the population had been excluded from productive engagement.

The transformation and inclusion indicators point to a broader pattern of divergence between Indonesia and Nigeria over the study period. While the two dimensions have been assessed separately for analytical clarity, it is worth considering how the trends observed across both dimensions relate to one another, with the important consideration that the data presented in this study does not permit any formal assessment of the direction or strength of the relationship between them. However, what can be observed is that in Indonesia, the trends across both dimensions moved broadly in the same direction during the earlier decades of the study period. The expansion of agricultural productivity, manufacturing employment, and export diversification coincided with comparatively low inequality, rising educational enrollment and attainment, and improving access to infrastructure. Whether these trends reinforced one another

causally cannot be established on the basis of the evidence presented here, but their movement pattern is broadly consistent with the argument made by Andersson and Palacio (2017) that transformation and inclusion are complementary dimensions of social capability rather than independent processes.

In Nigeria, a comparable pattern of movement among the two dimensions is observable, but in the opposite direction. The limited development of manufacturing, persistent commodity dependence, and service-led growth without productive absorption of labor occurred together with high inequality, weaker educational expansion, and more limited access to infrastructure throughout much of the period. However, as already mentioned, whether these trends were causally connected lies beyond what this analysis can demonstrate. What the evidence does suggest, however, is that neither dimension developed sufficiently to compensate for the weakness of the other, and that the conditions associated with successful catch-up remained limited across both dimensions simultaneously.

6.2 Concluding Remarks

Returning to the research question, the findings of this study suggest that the contrasting patterns of structural transformation and inclusion produced different levels of social capability for technological catch-up in Indonesia and Nigeria. Over the study period, Indonesia developed a more diversified productive structure, a broader human capital base, and wider access to infrastructure, placing it in a comparatively stronger position to absorb modern technologies. Although Indonesia's transformation remains incomplete and continues to face important challenges, particularly the declining relative importance of manufacturing and the persistence of informal employment within the service sector, the structural and social foundations developed over the period provide a stronger basis for technological engagement than those observed in Nigeria, which remained considerably more constrained in both dimensions. Persistent dependence on primary commodity exports, the absence of a substantial manufacturing base, high levels of inequality, and weaker educational and infrastructural development limited the emergence of the productive and social conditions associated with broad-based technological participation and catch-up.

These findings broadly align with those of other studies applying the social capability framework. Nigeria's experience shares important similarities with the cases examined by Andersson and Andersson (2019) and Till (2022). In Senegal and Côte d'Ivoire, strong agricultural performance without subsequent structural transformation proved insufficient to

sustain long-run development. Similarly, in Nigeria, the decline in agriculture was not accompanied by the productive reallocation of labor into higher-value industrial activities necessary for broader social capability formation. Till's (2022) findings on Ethiopia further reinforce this argument, suggesting that economic growth alone is insufficient when labor is not absorbed into more productive sectors of the economy. Indonesia's experience differs from these cases in its partial but significant shift toward manufacturing alongside broader social inclusion during the earlier decades of the study period. Although incomplete, this combination of productive diversification and expanding inclusion created stronger structural and social foundations for technological catch-up than outcomes in which neither dimension developed sufficiently.

The findings of this study have several implications for understanding technological catch-up in resource-rich economies. They suggest that natural resource wealth does not determine development outcomes, but rather, what matters is how resource revenues are invested and whether they contribute to the development of productive structures and inclusivity. For policymakers in resource-rich developing economies, this highlights the importance of directing resource revenues toward education, infrastructure, and productive, labor-intensive sectors instead of narrowly concentrated or consumption-oriented activities. The study also highlights several important areas for future research. First, incorporating the autonomy and accountability dimensions of Andersson and Palacio's (2017) framework would allow for a more complete assessment of social capability by considering the role of governance quality and state capacity in shaping transformation and inclusion outcomes. Second, extending the analysis beyond 2020 would help determine whether Indonesia's increasing dependence on the service sector represents a sustainable basis for technological catch-up or a longer-term structural constraint. Finally, applying the same framework to a wider range of resource-rich economies would help assess whether the patterns identified in Nigeria and Indonesia reflect broader trends among the developing countries.

AI Disclaimer: Artificial Intelligence was used to refine academic language and improve grammar, and the summarization of selected texts. However, all written content, analysis, arguments, and conclusions presented in the thesis were produced by the authors.

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Appendix A

Table A1. Sectoral Share of GDP in Indonesia and Nigeria, 2010–2020 (% of GDP)

Country	Sector	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Indonesia	Agriculture	13.93	13.51	13.37	13.36	13.34	13.49	13.48	13.16	12.81	12.71	13.70
	Manufacturing	22.04	21.76	21.45	21.03	21.08	20.99	20.52	20.16	19.86	19.70	19.87
	Services	40.67	40.58	40.87	41.52	42.24	43.31	43.64	43.61	43.40	44.22	44.41
Nigeria	Agriculture	23.89	22.23	21.86	20.76	19.99	20.63	20.98	20.85	21.20	25.73	28.35
	Manufacturing	6.55	7.17	7.72	8.93	9.64	9.43	8.68	8.74	9.65	9.10	8.08
	Services	50.79	49.24	50.19	52.37	54.15	58.12	59.79	55.80	52.02	52.90	52.39

Source: World Bank (2026).

Appendix B

Table B1. Sectoral Employment Share in Indonesia and Nigeria, 2010–2020 (% of total employment)

Country	Sector	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Indonesia	Agriculture	38.73	36.81	35.56	34.69	34.00	32.78	31.56	30.52	29.45	28.46	29.31
	Industry	18.30	19.60	20.66	21.07	21.50	22.12	21.81	22.12	22.38	22.40	21.63
	Services	42.97	43.59	43.78	44.24	44.50	45.10	46.63	47.36	48.17	49.14	49.06
Nigeria	Agriculture	44.97	43.99	42.89	41.55	40.60	40.07	39.98	39.74	39.41	38.99	38.82
	Industry	11.69	12.02	12.84	13.84	14.04	13.94	13.57	13.44	13.40	13.32	14.47
	Services	43.34	43.99	44.27	44.60	45.36	45.99	46.45	46.81	47.19	47.69	46.70

Source: World Bank (2026).