Nomico Journal
E-ISSN : 3046-6318
https://ejournal-nawalaedu.com/index.php/nj
Vol.3.No.2 March 2026
DOI : https://doi.org/10.62872/tdabdg04

Complexity-Based Economic Growth: Integrating Productivity, Industrial Structure, and National Competitiveness

Moh. Zaini
STIE Bakti Bangsa

Email: zaini@stieba.ac.id

Entered : January 12, 2026
Revised : February 26, 2026
Accepted: March 17, 2026
Published : March 31, 2026

ABSTRACT

Economic growth is increasingly understood as a complexity-based process that integrates productivity, industrial structure, and national competitiveness within a unified system. This study aims to analyze how complexity-driven economic growth emerges through the interaction of these key dimensions. The research employs a qualitative approach with a descriptive-analytical design using a literature-based method. Data were collected from reputable scholarly journals and international reports and analyzed using content and thematic analysis to identify patterns related to economic complexity, productivity dynamics, and structural transformation. The findings reveal that economic complexity significantly enhances productivity by fostering diversified, interconnected, and knowledge-intensive industrial structures. Structural transformation from low-productivity sectors to advanced manufacturing and services plays a crucial role in increasing total factor productivity and strengthening global competitiveness. In addition, innovation, institutional quality, and industrial linkages are identified as key drivers of sustainable growth. However, challenges such as limited technological capacity, structural rigidity, and policy misalignment remain critical, particularly in developing economies. The discussion highlights the importance of integrated and capability-based industrial strategies to overcome these constraints. In conclusion, complexity-based economic growth provides a comprehensive framework for achieving sustainable and competitive development when supported by innovation, institutional strength, and strategic policy alignment.

Keywords: *Economic Complexity, Productivity, Industrial Structure, National Competitiveness, Economic Growth*

INTRODUCTION

In recent decades, the understanding of economic growth has undergone a significant transformation, shifting from traditional factor-based models toward a more comprehensive perspective grounded in economic complexity. Classical growth theories, which emphasize capital accumulation and labor expansion, are increasingly considered insufficient to explain long-term development trajectories in a globalized and knowledge-driven economy. Instead, contemporary approaches highlight the importance of structural transformation, technological capabilities, and the diversification of productive activities as key drivers of sustainable growth. Within this paradigm, economic complexity emerges as a central concept that integrates productivity, industrial structure, and national competitiveness into a unified analytical framework. This perspective views economic growth not merely as an increase in output but as a process of upgrading the productive structure toward more sophisticated and interconnected industries (Balland et al., 2022; Hidalgo, 2021).

The phenomenon of uneven economic development across countries further underscores the relevance of complexity-based growth. Many developing economies

remain trapped in low-productivity sectors, particularly in primary commodities and low-value-added industries, which limits their ability to achieve sustained economic growth and global competitiveness. Despite efforts to industrialize, these economies often face structural constraints such as limited technological capabilities, weak industrial linkages, and insufficient diversification. As a result, economic growth tends to be volatile and vulnerable to external shocks, particularly in commodity-dependent countries. The economic complexity approach provides a valuable lens for understanding these challenges by emphasizing the role of productive knowledge and capability accumulation in enabling structural transformation and long-term development (Hoeriyah et al., 2022; Ahmed et al., 2022).

Economic complexity, typically measured through the diversity and sophistication of a country's export structure, has been empirically shown to be a strong predictor of economic growth and income levels. Countries that produce and export a wide range of complex products tend to have higher levels of productivity, innovation, and competitiveness. This is because complex production requires a broad set of capabilities, including advanced skills, technological knowledge, and institutional support. As these capabilities accumulate, they create positive spillover effects that enhance productivity across sectors and facilitate further diversification. Consequently, economic complexity is not only an outcome of development but also a driver of future growth, making it a critical component of modern development strategies (Hidalgo, 2021; Markaki & Economakis, 2022).

The growing recognition of economic complexity as a key determinant of development has led to its adoption by major international institutions such as the World Bank, OECD, and World Economic Forum. These organizations increasingly use complexity-based indicators to diagnose economic performance, identify growth opportunities, and design policy interventions. By mapping the "product space" and identifying feasible pathways for diversification, policymakers can develop more targeted and effective industrial strategies. This represents a paradigm shift from traditional development models toward a more nuanced and data-driven approach that emphasizes structural transformation and capability building (Balland et al., 2022; Ferraz et al., 2021).

A central aspect of complexity-based growth is the interconnection between industrial structure and productivity. The reallocation of labor and capital from low-productivity sectors, such as agriculture and extractive industries, to higher-productivity sectors, such as manufacturing and modern services, is a key mechanism through which economies achieve sustained growth. This structural transformation enhances total factor productivity (TFP) by enabling more efficient use of resources and fostering innovation. Moreover, recent developments in the concept of "new quality productivity," which emphasizes innovation-driven and environmentally sustainable production, further highlight the importance of upgrading industrial structures toward high-tech and green sectors. These transitions not only improve productivity but also contribute to more sustainable and inclusive growth (Hassan et al., 2025; Shao et al., 2024).

In addition to its impact on productivity, industrial structure and economic complexity play a crucial role in shaping national competitiveness. Competitiveness in the global economy is increasingly determined by a country's ability to produce and export complex, high-value-added goods and services. Countries with diversified production structures and strong domestic linkages are better positioned to compete in international markets and to move up the global value chain. The Economic Complexity Index (ECI) has been shown to correlate strongly with per capita income, export

performance, and overall economic resilience, highlighting its relevance as a measure of structural competitiveness (Balland et al., 2022; Markaki & Economakis, 2022).

Furthermore, the integration of productivity, industrial structure, and competitiveness into a single analytical framework provides a more comprehensive understanding of economic development. Rather than analyzing these elements in isolation, the complexity-based approach emphasizes their interdependence and mutual reinforcement. For example, increased productivity enables the development of more complex industries, which in turn enhance competitiveness and generate further opportunities for growth. This dynamic process creates a virtuous cycle of development that is difficult to achieve through isolated policy interventions. Therefore, a holistic perspective that integrates these dimensions is essential for designing effective development strategies (Sun et al., 2022; Hou et al., 2025).

Despite the growing body of literature on economic complexity and its implications for development, several important research gaps remain. One of the most significant gaps is the fragmentation of existing studies, which often examine economic complexity, industrial policy, and productivity dynamics separately without adequately addressing their interconnections. This fragmentation limits the ability to develop a coherent theoretical framework that captures the complexity of economic transformation processes. As a result, policymakers may struggle to translate theoretical insights into practical strategies that address multiple dimensions of development simultaneously (Ferraz et al., 2021; Balland et al., 2022).

Another critical gap lies in the lack of integrative theoretical models that explicitly link economic complexity with productivity dynamics, industrial structure, and national competitiveness. While numerous studies have demonstrated the individual importance of these factors, there is limited research that combines them into a unified analytical framework. Such a framework is necessary to understand how different elements of economic development interact and to identify the mechanisms through which complexity-driven growth can be achieved. The absence of such integrative models represents a significant limitation in the current literature and highlights the need for further research in this area (Hidalgo, 2021; Hassan et al., 2025).

Moreover, much of the existing research on economic complexity is based on cross-country panel data, which may not adequately capture the specific challenges and opportunities faced by individual countries, particularly in developing contexts. Factors such as institutional capacity, technological absorption, and the role of small and medium enterprises (SMEs) can vary significantly across countries and influence the effectiveness of complexity-based development strategies. Therefore, there is a need for more context-specific studies that consider the unique characteristics of different economies and provide tailored policy recommendations (Ngqoleka et al., 2025; Hoeriyah et al., 2022).

In addition, there is a growing recognition of the need to incorporate environmental and social dimensions into the analysis of economic complexity. Traditional measures of economic performance often overlook issues such as environmental sustainability, income inequality, and employment quality, which are increasingly important in the context of sustainable development. Integrating these dimensions into complexity-based frameworks can provide a more comprehensive understanding of development and ensure that growth is both inclusive and environmentally sustainable. This aligns with recent calls in the literature to expand the scope of economic complexity analysis to include green and social considerations (Ahmed et al., 2022; Adebayo, 2023).

Based on these gaps, the novelty of this study lies in its effort to develop an integrative framework that connects economic complexity, productivity, industrial

structure, and national competitiveness within a single analytical model. Unlike previous studies that focus on individual components, this research emphasizes the interdependence of these elements and their collective impact on economic growth. Furthermore, the study incorporates environmental and social dimensions into the analysis, providing a more holistic perspective on development. By doing so, it contributes to the advancement of complexity-based growth theory and offers practical insights for policymakers seeking to design effective development strategies.

In line with the background and identified research gaps, the objective of this study is to analyze how complexity-based economic growth can be achieved through the integration of productivity dynamics, industrial structure transformation, and national competitiveness within a comprehensive and context-sensitive framework. This objective reflects the need to move beyond fragmented approaches and toward a more integrated understanding of economic development, which can better address the challenges of globalization, technological change, and sustainability in the modern era.

METHODS

This study employs a qualitative research approach with a descriptive-analytical design to examine complexity-based economic growth through the integration of productivity, industrial structure, and national competitiveness. The qualitative approach is considered appropriate as it allows for a comprehensive and in-depth exploration of theoretical constructs, empirical findings, and policy implications related to economic complexity. The research adopts a library research strategy, focusing on the systematic review of scholarly literature, including peer-reviewed journal articles, reports from international organizations (such as the World Bank, OECD, and World Economic Forum), and conceptual studies on economic complexity, structural transformation, and competitiveness. Data collection is conducted through a structured literature search using academic databases such as Scopus, Web of Science, and Google Scholar. The inclusion criteria include relevance to the research topic, publication within the last ten years, and indexing in reputable or accredited journals. The collected data encompass studies discussing Economic Complexity Index (ECI), Total Factor Productivity (TFP), industrial upgrading, green productivity, and competitiveness indicators across different countries and regions.

The data analysis technique used in this study is qualitative content analysis combined with thematic analysis to identify patterns, relationships, and key insights across the selected literature. The analysis process begins with data reduction, where relevant information is categorized into major themes such as economic complexity, productivity dynamics (TFP and green TFP), industrial structure transformation, and national competitiveness. This is followed by data display, in which findings are organized into conceptual frameworks to facilitate synthesis and interpretation. The final stage involves drawing conclusions and constructing an integrative analytical framework that explains how these variables interact to drive complexity-based economic growth. To ensure the validity and reliability of the findings, the study applies source triangulation by comparing multiple scholarly sources and cross-validating theoretical and empirical evidence. This approach enables the development of a comprehensive and coherent understanding of the mechanisms through which economic complexity contributes to sustainable and competitive economic growth.

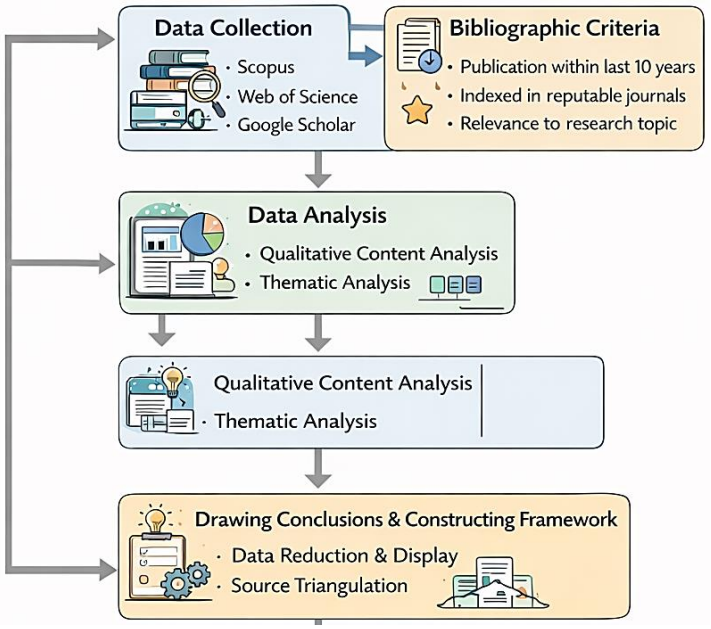

Figure 1. Diagram Conceptual Research

RESULTS AND DISCUSSION

The following table presents the research findings by summarizing the key dimensions of complexity-based economic growth through the integration of productivity, industrial structure, and national competitiveness, along with their impacts and associated challenges.

Table 1. Complexity-Based Economic Growth: Integration of Key Dimensions

No	Dimension & Key Findings	Impact and Challenges
1	**Economic Complexity (ECI)**: Reflects diversity and sophistication of production and exports	Enhances long-term growth and structural upgrading; challenges include limited capability accumulation in developing economies
2	**Productivity Dynamics (TFP & Green TFP)**: Innovation-driven and efficiency-based growth	Increases economic efficiency and sustainability; challenges include technological gaps and low innovation capacity
3	**Industrial Structure Transformation**: Shift from low-value to high-value sectors	Accelerates economic growth and avoids low-productivity traps; challenges include structural rigidity and dependence on primary sectors
4	**National Competitiveness**: Strength of export structure and global positioning	Improves global market position and income levels; challenges include weak industrial linkages and low export sophistication
5	**Industrial Upgrading & Innovation**: Development of high-tech and knowledge-based industries	Supports sustainable and inclusive growth; challenges include limited R&D investment and institutional barriers
6	**Green and Inclusive Growth Dimension**: Integration of environmental and social aspects	Promotes sustainable development and reduces inequality; challenges include policy inconsistency and implementation gaps

7	**Institutional & Policy Support**: Strategic industrial policies and governance frameworks	Strengthens coordination and long-term development planning; challenges include weak policy alignment and governance issues

Based on Table 1, it can be interpreted that complexity-based economic growth is a multidimensional process that integrates economic complexity, productivity dynamics, industrial transformation, and competitiveness into a unified system. The interaction among these dimensions creates a reinforcing cycle in which higher complexity leads to improved productivity, which in turn supports industrial upgrading and enhances national competitiveness. However, the effectiveness of this growth model is influenced by several structural and institutional challenges, particularly in developing economies, such as limited technological capabilities, weak industrial linkages, and inadequate policy support. Therefore, achieving sustainable and competitive economic growth requires an integrated and context-sensitive approach that combines capability development, innovation, structural transformation, and strong governance frameworks.

Discussion

The findings presented in Table 1 confirm that complexity-based economic growth is fundamentally driven by the interaction between economic complexity, productivity dynamics, and industrial structure. In line with the research objective, this study demonstrates that high productivity emerges from an industrial structure that is diverse, interconnected, and technologically advanced. The concept of economic complexity provides a comprehensive framework for understanding how countries accumulate productive capabilities and translate them into sustainable economic growth. Unlike traditional growth models that emphasize factor accumulation, the complexity approach highlights the importance of knowledge, innovation, and structural transformation as the core drivers of long-term development (Markaki & Economakis, 2022; Kudrov, 2023).

At the core of this framework is the idea that economic development is a process of capability accumulation, where countries progressively expand their productive knowledge and diversify into more sophisticated industries. This accumulation is reflected in the diversity and complexity of products that a country can produce and export. The findings suggest that economies with higher levels of economic complexity tend to exhibit stronger productivity performance, as they are able to combine multiple capabilities to produce high-value goods and services. This is consistent with previous studies indicating that economic complexity is closely linked to total factor productivity (TFP), as more complex production systems enable more efficient allocation of resources and greater innovation potential (Xue et al., 2023; Pintar & Scherngell, 2021).

Furthermore, the relationship between industrial structure and productivity is a central mechanism in complexity-based growth. The transition from low-productivity sectors, such as agriculture and extractive industries, to higher-productivity sectors, such as manufacturing and advanced services, is essential for achieving sustained economic growth. The findings show that structural transformation not only increases productivity but also enhances the resilience and adaptability of the economy. Empirical evidence from various contexts, including regions such as Hebei, Russia, and India, demonstrates that economies that successfully shift toward more complex industrial structures experience faster and more stable growth (Hou et al., 2025; Thomas & Chakraborty, 2026).

In addition to structural transformation, the interconnectedness of industries plays a crucial role in enhancing productivity. The presence of strong linkages between sectors facilitates the diffusion of knowledge, technologies, and skills, creating positive spillover effects that benefit the entire economy. These interconnections enable firms to access complementary inputs, share innovations, and improve efficiency, thereby contributing to higher levels of TFP. The findings of this study support the argument that economies with well-developed input–output linkages and diversified industrial bases are better positioned to achieve sustainable growth and avoid the "low-productivity trap" often observed in less diversified economies (Markaki & Economakis, 2022; Hou et al., 2025).

Another important dimension highlighted in this study is the role of economic complexity in shaping national competitiveness. Countries with diversified and sophisticated production structures tend to occupy higher positions in the global economic hierarchy, as they are able to produce goods and services that are less easily replicated by other countries. This competitive advantage is reflected in higher export performance, increased income levels, and greater economic resilience. The findings indicate that the Economic Complexity Index (ECI) is a strong predictor of both economic growth and competitiveness, reinforcing its relevance as a key indicator of development (Stojanović, 2021; Xue et al., 2023).

Moreover, the relationship between complexity and competitiveness extends beyond economic performance to include social outcomes, such as income distribution. The study finds that economies with higher levels of complexity tend to exhibit lower levels of income inequality, as they provide more opportunities for skilled employment and inclusive growth. This is consistent with previous research suggesting that diversified and knowledge-intensive industries create more equitable labor markets and contribute to broader socio-economic development (Hartmann & Pinheiro, 2022; Pintar & Scherngell, 2021). Therefore, complexity-based growth not only enhances economic performance but also supports social inclusion and sustainability.

The role of knowledge, research and development (R&D), and innovation is another critical factor in the complexity–productivity–competitiveness nexus. The findings indicate that innovation-driven growth is essential for upgrading industrial structures and increasing the technological content of exports. Investments in R&D, human capital, and technological capabilities enable countries to move into more complex industries and improve their competitive position in global markets. This aligns with existing literature emphasizing that innovation is a key driver of structural transformation and economic complexity (D'Ingiullo et al., 2024; De Cunzo et al., 2022).

In addition to technological factors, institutional quality plays a significant role in supporting complexity-based growth. Effective institutions provide the regulatory framework, governance structures, and policy support necessary for fostering innovation and industrial development. The findings suggest that countries with strong institutions are better able to implement industrial policies, coordinate economic activities, and create an environment conducive to investment and innovation. Conversely, weak institutional frameworks can hinder the development of economic complexity by limiting access to resources, reducing policy effectiveness, and increasing uncertainty (Kang et al., 2022; Tian & Zhang, 2024).

The policy implications of these findings are particularly relevant for developing economies seeking to achieve sustainable and competitive growth. The study highlights the importance of adopting capability-based industrial strategies that focus on building productive knowledge, promoting diversification, and strengthening industrial linkages. Such strategies should prioritize the development of high-value manufacturing and

modern service sectors, as well as the integration of domestic industries into global value chains. By doing so, countries can enhance their economic complexity and create a foundation for long-term growth (Kudrov, 2023; Harahap et al., 2023).

However, the findings also reveal that the process of structural transformation is not without challenges. One of the key challenges is the risk of technological mismatch, where countries attempt to adopt advanced technologies without having the necessary absorptive capacity. This can lead to inefficiencies and even negative impacts on productivity, particularly in contexts where human capital and institutional support are limited. For example, studies have shown that in some developing countries, including Indonesia, technological complexity may have a negative effect on growth if it is not accompanied by adequate capacity building and institutional development (Maulidar et al., 2025; Hassan et al., 2025).

Another important challenge is the persistence of structural rigidities, such as dependence on primary commodities and limited diversification. These constraints can hinder the development of economic complexity and reduce the effectiveness of industrial policies. To address these issues, policymakers must adopt a gradual and context-specific approach to structural transformation, taking into account the unique characteristics and capabilities of their economies. This includes identifying feasible pathways for diversification based on existing capabilities and investing in areas where the potential for upgrading is highest (Ngqoleka et al., 2025; Hou et al., 2025).

Furthermore, the integration of environmental and social dimensions into complexity-based growth strategies is essential for achieving sustainable development. The transition to green and inclusive growth requires the adoption of environmentally friendly technologies, the promotion of sustainable industries, and the reduction of inequality. The findings suggest that economic complexity can support this transition by facilitating the development of green technologies and creating opportunities for inclusive growth. However, this requires coordinated policy efforts and strong institutional support to ensure that economic transformation is aligned with sustainability goals (Ahmed et al., 2022; Adebayo, 2023).

In relation to the research objective, this study provides strong evidence that productivity is closely linked to the structure and complexity of the economy. High productivity is not merely the result of technological advancements but also the outcome of a well-diversified and interconnected industrial system that enables efficient resource allocation and continuous innovation. The integration of economic complexity, productivity, and industrial structure into a unified framework offers valuable insights into the mechanisms of economic growth and highlights the importance of adopting a holistic approach to development.

Overall, this study contributes to the literature by demonstrating that complexity-based economic growth is a dynamic and multidimensional process that requires the integration of various factors, including industrial structure, innovation, and institutional quality. The findings underscore the importance of moving beyond fragmented approaches to economic development and adopting integrated strategies that address the interdependence of these factors. By doing so, countries can enhance their productivity, strengthen their competitiveness, and achieve sustainable and inclusive growth in an increasingly complex global economy.

CONCLUSIONS

Based on the findings and discussion, it can be concluded that complexity-based economic growth is fundamentally driven by the integration of economic complexity, industrial structure, and productivity dynamics, where high productivity emerges from a

diversified, interconnected, and technologically advanced industrial system. The accumulation of productive capabilities, reflected in the diversity and sophistication of industries, enables more efficient resource allocation, fosters innovation, and strengthens national competitiveness in the global economy. Moreover, structural transformation from low-productivity sectors to high-value manufacturing and modern services plays a critical role in sustaining long-term growth and avoiding development traps. However, the effectiveness of this growth model depends on the presence of strong institutional support, innovation capacity, and policy alignment, particularly in developing countries with limited absorptive capacity. Therefore, achieving sustainable and competitive economic growth requires an integrated and context-sensitive strategy that combines industrial upgrading, capability development, innovation investment, and institutional strengthening within a comprehensive complexity-based framework..

REFERENCE

Adebayo, T. (2023). Towards unlocking the chain of sustainable development in the BRICS economies: Analysing the role of economic complexity and financial risk. *Geological Journal, 58*, 1810–1821. https://doi.org/10.1002/gj.4694

Ahmed, Z., Can, M., Sinha, A., Ahmad, M., Alvarado, R., & Rjoub, H. (2022). Investigating the role of economic complexity in sustainable development and environmental sustainability. *International Journal of Sustainable Development & World Ecology, 29*, 771–783. https://doi.org/10.1080/13504509.2022.2097330

Balland, P., Broekel, T., Diodato, D., Giuliani, E., Hausmann, R., O'Clery, N., & Rigby, D. (2022). The new paradigm of economic complexity. *Research Policy, 51*. https://doi.org/10.1016/j.respol.2021.104450

Balland, P., Broekel, T., Diodato, D., Giuliani, E., Hausmann, R., O'Clery, N., & Rigby, D. (2022). Reprint of the new paradigm of economic complexity. *Research Policy*. https://doi.org/10.1016/j.respol.2022.104568

D'Ingiullo, D., Odoardi, I., Quaglione, D., & Di Berardino, C. (2024). Exploring the nexus between exports' economic complexity and institutional quality: Insights from Italian provinces. *Regional Studies, Regional Science, 11*, 667–695. https://doi.org/10.1080/21681376.2024.2405580

De Cunzo, F., Petri, A., Zaccaria, A., & Sbardella, A. (2022). The trickle down from environmental innovation to productive complexity. *Scientific Reports, 12*. https://doi.org/10.1038/s41598-022-25940-6

Ferraz, D., Falguera, F., Mariano, E., & Hartmann, D. (2021). Linking economic complexity, diversification, and industrial policy with sustainable development: A structured literature review. *Sustainability, 13*, 1265. https://doi.org/10.3390/su13031265

Harahap, M., Wurarah, R., Fathurohman, A., Suroso, A., & Iskandar, Y. (2023). Globalization substance and industrial revolution 4.0 and the role of technological innovation for economic development towards entrepreneurship. *Jurnal Bisnisman: Riset Bisnis dan Manajemen*. https://doi.org/10.52005/bisnisman.v4i3.122

Hartmann, D., & Pinheiro, F. (2022). Economic complexity and inequality at the national and regional level. **

Hassan, S., Basumatary, J., & Mishra, B. (2025). Role of governance, resource rents, and economic complexity in economic growth: A BRICS analysis. *Journal of Public Affairs*. https://doi.org/10.1002/pa.70058

Hidalgo, C. (2021). Economic complexity theory and applications. *Nature Reviews Physics, 3*, 92–113. https://doi.org/10.1038/s42254-020-00275-1

Hoeriyah, L., Nuryartono, N., & Pasaribu, S. (2022). Economic complexity and sustainable growth in developing countries. *Economics Development Analysis Journal*. https://doi.org/10.15294/edaj.v11i1.47294

Hou, J., Yu, D., & Song, H. (2025). Evolution of industrial structure and economic growth in Hebei Province, China. *Sustainability*. https://doi.org/10.3390/su17177756

Kang, D., Heo, P., & Lee, D. (2022). Global trade of South Korea in competitive products and their impact on regional dependence. *PLoS ONE, 17*. https://doi.org/10.1371/journal.pone.0267695

Kudrov, A. (2023). The impact of economic complexity and industry specialization on the gross regional product of Russian regions. *Business Informatics*. https://doi.org/10.17323/2587-814x.2023.4.25.40

Markaki, M., & Economakis, G. (2022). International structural competitiveness and the hierarchy in the world economy. *World Review of Political Economy*. https://doi.org/10.13169/worlrevipoliecon.12.2.0195

Maulidar, P., Yulfianti, C., & Prasetyo, F. (2025). Economic complexity as a driver of economic growth in Indonesia: A multidimensional analysis of trade, technology, and research. *Ekonomikalia Journal of Economics*. https://doi.org/10.60084/eje.v3i2.346

Ngqoleka, S., Ncanywa, T., Mpongwana, Z., & Asaleye, A. (2025). Industrial diversification in emerging economies: The role of human capital, technological investment, and institutional quality in promoting economic complexity. *Sustainability*. https://doi.org/10.3390/su17157021

Pankratova, O. (2021). Increasing the role of competitiveness of the national economy as a factor of economic growth in the conditions of globalization. *Market Infrastructure*. https://doi.org/10.32843/infrastruct52-6

Pintar, N., & Scherngell, T. (2021). The complex nature of regional knowledge production: Evidence on European regions. *Research Policy*, 104170. https://doi.org/10.1016/j.respol.2020.104170

Shao, C., Dong, H., & Gao, Y. (2024). New quality productivity and industrial structure in China: The moderating effect of environmental regulation. *Sustainability*. https://doi.org/10.3390/su16166796

Stojanović, V. (2021). Knowledge in the concept of national competitiveness in the era of the fourth industrial revolution. *KNOWLEDGE - International Journal*. https://doi.org/10.35120/kij4701045s

Sun, J., Tang, D., Kong, H., & Boamah, V. (2022). Impact of industrial structure upgrading on green total factor productivity in the Yangtze River economic belt. *International Journal of Environmental Research and Public Health, 19*. https://doi.org/10.3390/ijerph19063718

Thomas, J., & Chakraborty, A. (2026). Economic complexity and regional development in India: Insights from a state-industry bipartite network. **

Tian, X., & Zhang, H. (2024). Analysis of the impact factors of industrial structure upgrading on green total factor productivity from the perspective of spatial spillover effects. *Heliyon, 10*. https://doi.org/10.1016/j.heliyon.2024.e28660

Xue, R., Li, K., Wang, F., & Baron, C. (2023). Research progress and hot-spot analysis of the economic complexity research based on CiteSpace. *Advances in Management and Applied Economics*. https://doi.org/10.47260/amae/14110