THE SYSTEM OF DETERMINANTS OF CHINA'S SMART ECONOMY DEVELOPMENT IN THE CONTEXT OF GLOBAL DIGITAL TRANSFORMATION

СИСТЕМА ДЕТЕРМІНАНТ РОЗВИТКУ СМАРТ-ЕКОНОМІКИ КИТАЮ В УМОВАХ ГЛОБАЛЬНОЇ ЦИФРОВОЇ ТРАНСФОРМАЦІЇ

Natsvlishvili Tymur
PhD Student (4th year),
Kyiv National Economic University named after Vadym Hetman
ORCID: https://orcid.org/0000-0003-1686-8296

Нацвлішвілі Тимур Мєрабович
Київський національний економічний університет імені Вадима Гетьмана

The study examines the system of determinants shaping the development of China's smart economy in the context of global digital transformation. The aim of the research is to identify and systematize the key factors influencing the formation of China's smart economy. The research methodology is based on a systemic and comparative approach that allows the analysis of structural-technological, institutional-policy, social, and external determinants. The results indicate that China's smart economy development is driven by the interaction of digital infrastructure expansion, strategic state coordination, human capital development, and innovation policy. The study contributes to the understanding of smart economy formation and provides insights for designing digital transformation strategies in emerging economies.

Keywords: smart economy; digital transformation; determinants; China; innovation policy; structural development.

У статті досліджено систему детермінант розвитку смарт-економіки Китаю в умовах глобальної цифрової трансформації. Актуальність теми зумовлена зростаючою роллю цифрових технологій у формуванні нових моделей економічного розвитку, підвищенні ефективності виробничих систем та забезпеченні довгострокової конкурентоспроможності національних економік. У сучасних умовах цифрова трансформація розглядається як один із ключових факторів структурних змін у світовій економіці, що сприяє формуванню нових економічних інститутів, розвитку інноваційних екосистем та поширенню інтелектуальних технологій. Китай виступає одним із найбільш масштабних прикладів формування смарт-економіки, оскільки країна поєднує швидкий розвиток цифрової інфраструктури, активну державну координацію інноваційної політики та модернізацію промислових секторів. Метою дослідження є визначення та систематизація ключових детермінант розвитку смарт-економіки Китаю в умовах глобальної цифрової трансформації. Методологічною основою дослідження є системний та порівняльний підходи, що дозволяють розглядати смарт-економіку як складну соціально-економічну систему, сформовану внаслідок взаємодії технологічних, інституційних, соціальних та зовнішніх факторів. У межах дослідження здійснено якісний аналіз структурно-технологічних, інституційно-політичних, соціально-демографічних та зовнішніх детермінант розвитку смарт-економіки. Інформаційною базою роботи стали аналітичні звіти міжнародних організацій, статистичні матеріали, а також результати сучасних наукових досліджень у сфері цифрової трансформації економіки. У результаті дослідження встановлено, що розвиток смарт-економіки Китаю забезпечується комплексною взаємодією кількох груп детермінант. Ключову роль відіграють розвиток цифрової інфраструктури, ефективна державна координація стратегічних напрямів цифрової трансформації, формування висококваліфікованого людського капіталу та адаптація економічної системи до глобальної технологічної конкуренції. Виявлено, що поєднання технологічного розвитку з інституційною підтримкою інноваційної діяльності сприяє підвищенню продуктивності економіки та формуванню стійкої моделі економічного зростання. Практичне значення отриманих результатів полягає у можливості використання запропонованого підходу для розроблення стратегій цифрової трансформації та формування політики розвитку смарт-економіки в країнах з перехідною економікою.

Ключові слова: смарт-економіка; цифрова трансформація; детермінанти розвитку; Китай; інноваційна політика; цифрова економіка.

Statement of the problem. The global diffusion of digital technologies has fundamentally reshaped economic development patterns, leading to the emergence of smart economy models based on data-driven decision-making, digital infrastructure, and innovation ecosystems. In this context, smart economy development is increasingly viewed as a key determinant of national competitiveness and long-term economic sustainability. Countries that successfully integrate digital technologies into production, governance, and social systems gain structural advantages in the global economy.

China represents a distinctive and large-scale case of smart economy development. Over the past decade, the country has combined rapid digital infrastructure expansion, strong state coordination, and intensive investment in high-technology sectors, enabling a transition from an industrial-based growth model toward a digitally driven economy. National strategies such as *Digital China* and *Made in China 2025* illustrate the systemic nature of this transformation, which extends beyond the technology sector and affects education, public administration, and social inclusion.

Analysis of Recent Research and Publications. Recent academic studies increasingly focus on the development of the digital and smart economy in China. In particular, Tsymbal L. I. and Natsvlishvili T. M. [1] analyze the key determinants influencing the formation of China's smart economy, emphasizing the role of digital infrastructure, innovation policy, and institutional coordination. A comparative perspective on smart economy development is presented in the research of Verdenhof O. V., Tsymbal L. I., and Natsvlishvili T. M. [2], where the authors examine differences in digital transformation trajectories among Southeast Asian economies and highlight the importance of government coordination and technological capacity. International analytical reports also contribute significantly to the understanding of digital transformation processes. In particular, the World Bank [3; 6] analyzes the global diffusion of digital technologies and their impact on productivity and global value chains, while the OECD [4; 7] examines methodological approaches to measuring digital transformation and identifies key policy areas necessary for digital economy development.

At the same time, several studies emphasize the importance of technological change and structural transformation for economic development. For example, Natsvlishvili T. M. [5] investigates the determinants of smart economy development in China, highlighting the interaction between technological capabilities, institutional frameworks, and human capital. In a broader theoretical context, Lee K. and Malerba F. [8] analyze catch-up cycles and technological windows of opportunity that allow late-developing economies to accelerate industrial and technological development. However, despite the growing number of studies, existing research remains largely fragmented, as most works focus on individual aspects such as digital platforms, innovation policy, or industrial digitalization without providing an integrated framework explaining how multiple determinants interact to ensure sustainable smart economy development.

Highlighting previously unresolved parts of the overall problem. Despite the growing number of studies on digital transformation and smart economy development in China, the systemic interaction between technological, institutional, social, and external determinants remains insufficiently explored. Existing research mainly focuses on individual elements of digital transformation rather than examining the integrated mechanism through which these determinants jointly shape the development of China's smart economy.

Formation of the objectives of the article (task statement). The aim of this paper is to identify and systematize the key determinants of China's smart economy development in the context of global digital transformation. By applying a systemic and comparative approach, the study seeks to contribute to the literature by proposing an integrated determinant framework that captures technological, institutional, social, and external factors shaping China's smart economy. The structure of the paper includes a review of relevant literature, an explanation of the research methodology, an analysis of the determinant system, and a discussion of the key findings.

Summary of the main research material. This study applies a systemic and comparative research design to identify and structure the key determinants of China's smart economy development. The methodological framework is based on the premise that the smart economy emerges as a result of the interaction between technological capabilities, institutional arrangements, human capital, and external economic conditions rather than isolated technological advances.

The core research method is system analysis, which enables the examination of the smart economy as an integrated socio-economic system composed of interdependent elements. This approach is widely used in studies of digital and smart economy development, as it allows identification of causal linkages and synergistic effects between digital infrastructure, innovation policy, state regulation, and human capital development [1]. On this basis, the determinants of China's smart economy are grouped into four interconnected categories: structural–technological, institutional–policy, social–human capital, and external–geopolitical determinants.

A comparative analysis is employed to position China's smart economy model within the broader Asian context. The analysis compares China with India and Singapore using selected indicators of digital infrastructure availability, human capital readiness, innovation capacity, and the role of government in steering digital transformation. This method makes it possible to identify both shared regional patterns and country-specific trajectories of smart economy development [2].

The empirical foundation of the research relies on secondary data obtained from authoritative international organizations and official policy documents. These include analytical reports and statistical databases published by the World Bank, the International Monetary Fund, the OECD, and UNCTAD, as well as official strategic documents of the Government of the People's Republic of China related to digital transformation and innovation-driven development [3–6]. In addition, peer-reviewed academic studies focusing specifically on China's smart economy and digital transformation are used to ensure analytical validity and theoretical consistency [1; 5].

The main limitation of the study lies in the absence of econometric modeling, as the research focuses on qualitative systematization and comparative assessment rather than quantitative estimation of causal effects. However, the application of a systemic analytical framework combined with internationally comparable indicators enhances the explanatory power of the results and provides a solid basis for further quantitative research.

The results of the study indicate that China's smart economy development is driven by a system of interrelated determinants, the effectiveness of which depends on their coordinated interaction rather than on the dominance of any single factor. This finding is consistent with earlier research emphasizing the systemic nature of smart economy formation in China, where technological advancement, institutional governance, and human capital development evolve in parallel [1; 5].

The systemic analysis makes it possible to structure the determinants of China's smart economy into four main groups: structural–technological, institutional–policy, social–human capital, and external–geopolitical determinants. This classification reflects the internal logic of China's digital transformation model and allows identification of synergetic effects arising from the interaction of these factors.

Structural and technological factors constitute the material foundation of China's smart economy. Extensive investments in digital infrastructure, including broadband networks, data centers, and digital platforms, have created favorable conditions for the large-scale diffusion of digital technologies across both industrial and service sectors [3]. According to international assessments, the availability and quality of digital infrastructure remain a key prerequisite for smart economy development, particularly in large economies with significant regional heterogeneity [3].

An important feature of China's model is the integration of digital infrastructure development with domestic electronic manufacturing and the IT sector. Previous studies highlight that this integration reduces dependence on imported technologies and supports endogenous innovation processes [1]. As a result, China is able to move beyond technology adoption toward the creation of its own digital solutions, which strengthens the structural sustainability of its smart economy.

Institutional and policy determinants play a central role in shaping the trajectory of China's smart economy. Unlike market-driven digitalization models, China relies on a state-coordinated approach, where strategic planning, public investment, and regulatory mechanisms are closely aligned. Research shows that such coordination enhances the effectiveness of digital transformation by ensuring consistency between industrial, innovation, and digital policies [1; 5].

National development strategies provide long-term priorities and reduce uncertainty for private investors, thereby stimulating innovation activity. Comparative studies confirm that economies with a strong institutional framework and active government involvement demonstrate higher levels of smart economy maturity than those relying exclusively on market mechanisms [2].

Human capital is an essential factor that drives the growth of a smart economy. High levels of basic education, expanding digital skills training, and the growing supply of STEM professionals facilitate the adoption of smart technologies across economic sectors. International evidence suggests that digital infrastructure alone does not ensure smart economy outcomes without adequate human capital support [3].

In the Chinese context, the interaction between education policy and labor market demand contributes to the formation of a workforce capable of operating in digitally intensive environments. Comparative analysis indicates that countries with weaker human capital foundations, even when possessing advanced technologies, achieve more limited results in smart economy development [2].

External determinants, particularly those related to global economic and technological dynamics, increasingly influence China's smart economy development. Intensifying global competition and restrictions on technology transfer have accelerated domestic innovation efforts and strengthened the focus on technological self-reliance. These external pressures act as a catalyst for internal resource mobilization and strategic prioritization of key digital sectors [5].

At the same time, China remains integrated into global economic and digital networks, which supports access to international markets and knowledge flows. International development reports emphasize that the combination of strategic autonomy and selective global integration represents a distinctive feature of China's smart economy model and contributes to its long-term resilience [3].

The analysis conducted in this study indicates that China's smart economy development cannot be explained solely through technological progress or digital infrastructure expansion. Instead, the results suggest that China has formed a developmental configuration in which digital technologies are embedded within broader industrial, institutional, and strategic transformation processes. This distinguishes China's trajectory from narrowly defined digital economy models and supports the interpretation of smart economy development as a long-term structural shift rather than a short-term technological upgrade.

To structure the results of the analysis and present the determinants of China's smart economy development in a coherent manner, it is necessary to systematize the identified factors according to their functional roles and development effects. This approach allows for a clearer understanding of how different groups of determinants interact within a unified smart economy framework.

Table 1 demonstrates that the development of China's smart economy is shaped by the interaction of structural-technological, institutional-policy, social, and external determinants, each performing a distinct but complementary function. The combined effect of these determinants forms a systemic development model in which

Table 1

System of Determinants of China's Smart Economy Development

Determinant Group	Key Components	Functional Role in Smart Economy	Expected Development Effect
Structural–Technological Determinants	Digital infrastructure; industrial digitalization; platform technologies	Provide the material and technological basis for smart economy formation	Acceleration of digital diffusion; productivity growth; industrial upgrading
Institutional–Policy Determinants	Strategic state coordination; industrial and innovation policy; long-term planning	Ensure coherence between digital, industrial, and innovation strategies	Reduction of structural fragmentation; scalability of digital transformation
Social and Human Capital Determinants	Digital skills; workforce adaptation; education system	Enable effective adoption and utilization of smart technologies	Increased innovation capacity; workforce readiness; inclusive growth
External and Developmental Determinants	Global competition; catch-up opportunities; technological sovereignty	Shape strategic priorities and responses to external challenges	Strengthening of technological autonomy; long-term competitiveness

Source: formed by the author based on [1; 2; 6; 8]

digital technologies, governance mechanisms, and human capital mutually reinforce long-term economic transformation.

A key insight emerging from the results is that China's smart economy operates as an instrument of industrial transformation, rather than as an autonomous digital sector. Digital technologies in China are systematically integrated into manufacturing, logistics, urban governance, and public administration, reinforcing productivity growth and industrial upgrading [6]. This confirms that smart economy development in large late-industrializing countries is most effective when digitalization is aligned with industrial policy objectives rather than treated as a separate policy domain.

From a comparative perspective, the findings highlight that China's model differs fundamentally from other Asian economies not only in scale but also in coordination mechanisms. While smaller advanced economies rely primarily on market-based diffusion of digital technologies, China employs centralized strategic coordination to guide the direction and pace of smart economy development. This approach enables the synchronization of infrastructure investment, innovation incentives, and sectoral priorities, reducing structural imbalances and regional disparities [7].

The results further indicate that China's smart economy development follows a catch-up logic adapted to the digital era. Rather than replicating existing technological leaders, China exploits windows of opportunity created by technological paradigm shifts, particularly in digital platforms, artificial intelligence, and data-driven services. This pattern corresponds to evolutionary theories of industrial development, which emphasize the importance of strategic responses to technological change in determining long-term competitiveness [8].

Overall, the discussion supports the conclusion that China's smart economy represents a hybrid development model, combining elements of state-led industrial transformation with market-driven innovation dynamics. This model expands existing theoretical interpretations of smart economy development by demonstrating how late-developing economies can use digital technologies to restructure production systems, strengthen technological autonomy, and enhance systemic resilience.

Conclusions. This study demonstrates that the development of China's smart economy is determined by a systemic interaction of structural-technological, institutional-policy, social, and external factors. The findings confirm that digital transformation in China is not limited to the expansion of digital infrastructure but represents a broader process of industrial and institutional restructuring. A key feature of China's model is the high degree of strategic coordination between state policy, innovation systems, and human capital development, which ensures scalability and long-term sustainability of smart economy growth.

The analysis shows that China's smart economy follows a catch-up trajectory adapted to the digital era, allowing the country to exploit technological windows of opportunity and strengthen technological autonomy. Unlike fragmented or market-driven models, the Chinese approach integrates digital technologies into traditional industries and public governance, enhancing systemic resilience. This contributes to the theoretical understanding of smart economy development by highlighting the role of coordinated institutional responses in late-developing economies.

The results of the study may be useful for policymakers and researchers in countries seeking to design smart economy strategies under conditions of structural transformation and global technological competition. Future research could focus on quantitative assessment of the relative impact of individual determinants and comparative analysis across different institutional contexts.

REFERENCES:

1. Tsymbal, L. I., & Natsvlishvili, T. M. (2023). Determinants of the formation of China's smart economy. *Economics & Education*, 8(1), 80–88. https://doi.org/10.30525/2500-946X/2023-1-11 (accessed: 09.03.2026)

2. Verdenhof, O. V., Tsymbal, L. I., & Natsvlishvili, T. M. (2024). Comparative analysis of smart economy development in selected countries of Southeast Asia. *Baltic Journal of Economic Studies*, 10(3), 358–365. https://doi.org/10.30525/2256-0742/2024-10-3-358-365 (accessed: 09.03.2026)

3. World Bank. (2016). *World Development Report 2016: Digital Dividends*. Washington, DC: World Bank. https://doi.org/10.1596/978-1-4648-0671-1 (accessed: 09.03.2026)

4. OECD. (2019). *Measuring the digital transformation: A roadmap for the future*. Paris: OECD Publishing. https://doi.org/10.1787/9789264311992-en (accessed: 09.03.2026)

5. Natsvlishvili, T. M. (2025). *Determinants of smart economy development in China* (Doctoral dissertation). Kyiv National Economic University named after Vadym Hetman. https://ir.kneu.edu.ua/ (accessed: 09.03.2026)

6. World Bank. (2020). *World Development Report 2020: Trading for development in the age of global value chains*. Washington, DC: World Bank. https://openknowledge.worldbank.org/entities/publication/e5ffd66c-5de2-57a3-92b0-8c0469880b2a (accessed: 09.03.2026)

7. OECD. (2021). *Digital transformation in the age of COVID-19: Building resilience and bridging divides*. Paris: OECD Publishing. https://img.lalr.co/cms/2020/11/27173400/digital-economy-outlook-covid.pdf (accessed: 09.03.2026)

8. Lee, K., & Malerba, F. (2017). Catch-up cycles and changes in industrial leadership: Windows of opportunity and responses of firms and countries in the evolution of sectoral systems. *Research Policy*, 46(2), 338–351. https://www.sciencedirect.com/science/article/abs/pii/S0048733316301408 (accessed: 09.03.2026)