UDC 330.4:330.34:330.35
DOI: https://doi.org/10.32782/2415-3583/40.5

Illyash Olha
Doctor of Economic Sciences, Professor,
Head of the Sector for Macroeconomic Analysis and Forecasting
Research Centre for Industrial Problems of Development of the National Academy of Sciences of Ukraine
ORCID: https://orcid.org/0000-0002-7882-3942

Kravchenko Olha
Doctor of Economic Sciences, Professor,
Professor of the Department of Economic Cybernetics
National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"
ORCID: https://orcid.org/0000-0002-2258-2828

Vovk Olha
Doctor of Economic Sciences, Professor,
Professor of the Department of Economic Cybernetics
National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"
ORCID: https://orcid.org/0000-0002-1680-1959

DIGITAL TRANSFORMATION AND STRUCTURAL CHANGES IN INNOVATION INFRASTRUCTURE IN THE CONTEXT OF NEO-INDUSTRIAL DEVELOPMENT[1]

The article examines the evolution of scientific approaches to digital transformation in the context of neo-industrial development and substantiates its role as a system-forming factor of structural modernisation of the economy. The research reveals the transition from informatisation to a platform-ecosystem model of value creation based on the integration of digital technologies, artificial intelligence, data and network interactions. It is demonstrated that digital transformation changes the architecture of markets, business models and innovation processes, strengthening the role of data as a strategic resource. The study highlights the asymmetrical nature of digital development between countries and sectors, as well as the growing importance of institutionalisation of digital strategies. It is substantiated that the integration of Industry 4.0 technologies contributes to productivity growth and the formation of new value chains, while simultaneously increasing environmental challenges. The results confirm that digital transformation acts as a complex multi-level process that determines the trajectory of innovation infrastructure development and long-term competitiveness of the economy.

Keywords: *digital transformation, neo-industrial development, innovation infrastructure, platform economy, digital ecosystems, Industry 4.0, data, institutional policy, structural modernisation, sustainable development.*

Statement of the problem. In the current context of global technological restructuring and intensifying competition for innovative resources, digital transformation is becoming crucial for the structural modernisation of the economy, the creation of new sources of added value, and the development of innovation infrastructure. The spread of digital technologies, artificial intelligence, platform solutions, big data and networked models of interaction is changing not only the technological basis of economic activity, but also market architecture, management mechanisms, the nature of business processes and the logic of institutional support for development. In these conditions, digital transformation goes beyond the automation of individual functions and emerges as a comprehensive mechanism for restructuring production, management and innovation systems.

At the same time, the current stage of digital development is characterised by significant disparities between countries, sectors and institutional environments, leading to asymmetrical access to digital technologies, industrial policy instruments, innovation infrastructure and digital skills. Under such conditions, traditional approaches to understanding digitalisation as a predominantly technological process no longer provide an adequate theoretical basis for explaining the profound structural changes taking place in the economy under the influence of

[1] This publication was prepared as part of the research project 'Transmission Models of Digitalisation and Neo-Industrial Renewal of Innovative Infrastructure' (project No. 2908f, state registration number 0126U001339), carried out in accordance with Order No. 23 of the Ministry of Education and Science of Ukraine dated 9 January 2026 and Order No. NON/47/26 of Igor Sikorsky Kyiv Polytechnic Institute dated 26 January 2026 for the period 2026–2028.

platformisation, the development of digital ecosystems, the integration of Industry 4.0 technologies and the growing role of data as a strategic resource.

In the context of neo-industrial development, there is a particular need to summarise the evolution of academic approaches to digital transformation, to identify the logic behind the transition from informatisation to a platform-ecosystem model of value creation, as well as identifying the key technological, institutional and economic factors shaping the new trajectory of structural modernisation. This necessitates a deeper exploration of the theoretical foundations of research into digital transformation as a systemic driver of neo-industrialisation, capable of determining the competitiveness of the economy, the effectiveness of the innovation infrastructure and the prospects for sustainable development.

Analysis of recent research and publications. In recent years, the issue of digital transformation as a key factor in neo-industrial development has been actively researched by both international organisations and leading scholars. In particular, OECD reports [1] substantiate the systemic nature of digital transformation, its impact on changing market architecture, the formation of platform models, and the strengthening of the role of data as a strategic resource. World Bank studies [5] emphasise the significant contribution of digital technologies to economic growth and, at the same time, the persistence of digital development asymmetries between countries. A significant contribution to elucidating the role of digitalisation as a component of modern industrial policy has been made in UNIDO's works [6], which highlight its importance for boosting productivity and forming new value chains. In turn, analyses by the European Commission [22], as well as UNCTAD [23] and the IEA [25], reflect the institutional and environmental aspects of digital transformation, in particular its integration into sustainable development policies and its impact on resource efficiency. Additionally, the study by O. Ilyash, S. Hrynkevych, L. Ilich, S. Kozlovskyi, N. Buhaichuk [27] examines the relationship between infrastructure development and quality of life, providing an important basis for assessing the socio-economic effects of digital transformation.

The theoretical foundations for studying the evolution of digital transformation are outlined in the works of E. Brynjolfsson and A. McAfee [10], who demonstrate that digital technologies are a driver of radical changes in productivity and the structure of employment, shaping a new economic reality dominated by intangible assets and platform-based solutions. Further development of these approaches is presented in the works of T. Hess [12], where digital transformation is viewed as the systemic integration of technologies into business strategies, which determines long-term competitiveness. The conceptualisation of digital transformation as a comprehensive process of organisational change was carried out by G. Vial [13], whilst P. K. Verhof [14] substantiates the formation of new mechanisms for value creation through digital channels and customer ecosystems. At the same time, S. Nambisan [15] emphasises the transformation of innovation activities towards open network models based on platform solutions. In the context of Industry 4.0, significant contributions have been made by F. De Felice [16], S. Yasko, T. Ruppert [17], and M. Hencher [18], who view digital transformation as a factor in the integration of production and information systems and the formation of a new architecture for industrial processes, whilst H. Ortega-Gras [20] emphasises its role in enhancing the circularity and sustainability of enterprises. Furthermore, the study by M. Osińska, M. Kyzym, V. Khaustova, O. Ilyash, T. Salashenko [28] explores the alignment of the Ukrainian electricity market with the European model, highlighting the importance of digitalisation and institutional reforms in transforming infrastructure sectors. At the same time, despite the considerable volume of research, there is still a lack of a comprehensive approach that integrates the evolution of theoretical concepts, institutional mechanisms of digital policy and their impact on structural modernisation within the neo-industrial paradigm.

The purpose of this article is to summarise and systematise the evolution of scientific approaches to digital transformation in the context of neo-industrial development, as well as to substantiate its role as a systemic factor in the structural modernisation of the economy and innovative infrastructure.

Summary of the main research material. In the current context of global technological restructuring, digital transformation is acquiring the status of a system-forming factor in the structural modernisation of the economy, as its impact extends beyond the implementation of individual digital solutions and is realised as an integrated process of interaction between digital technologies, artificial intelligence, data, digital skills, cybersecurity and public services, which facilitates the formation of new approaches to the organisation of economic activity and the development of innovative infrastructure. (Fig. 1).

Unlike previous stages of informatisation, which were primarily aimed at automating individual functions, the current stage is characterised by the integration of digital technologies into all levels of the economic system,

Figure 1 – The role of innovation and artificial intelligence in the digital transformation of the economy according to the structure of policy initiatives

Source: OECD Digital Economy Outlook 2024 [1, p. 17]

forming a new logic for creating added value, organising business processes and the functioning of innovative infrastructure, in particular through the spread of platform-based business models, digital ecosystems and data-driven management [2–4].

According to the OECD, digital transformation is changing not only the technological foundation of the economy but also the architecture of markets, giving rise to platform models, network effects and new forms of cooperation, which reinforces the role of data as a key productive resource. By 2023, among the 38 OECD countries and partner economies, over 90% already had or were developing national digital strategies, indicating its institutionalisation as a systemic area of economic policy (Fig. 2).

At the same time, the proportion of countries where responsibility for their formulation lies with the highest levels of government rose from 12% in 2016 to 42% in 2023, whilst the proportion of strategies implemented through dedicated digital ministries increased from 24% to 47%, reflecting a combination of centralisation and institutional specialisation in governance. Of the nearly 1,200 digital policy initiatives, around a third are aimed at improving the effective use of technology, innovation and social welfare, with digital governance, infrastructure and skills dominating. At the same time, the 'data' category cuts across all seven dimensions of digital policy, and in the Innovation and Trust areas, it is mentioned more than once per initiative, confirming its role as a strategic resource. According to World Bank estimates, digital transformation accounts for 15–20% of global economic growth; however, over 99% of generative AI usage is concentrated in high- and middle-income countries, whilst in low-income countries it accounts for less than 1%, reflecting the asymmetrical nature of digital development [5]

In this context, digital technologies act as a catalyst for structural shifts, altering sectoral proportions and value chains. UNIDO analysis confirms that digital transformation is a key component of modern industrial policy, ensuring the integration of innovation into production and productivity growth [6]. At the same time, around 95 industrial policy instruments are implemented in high-income countries, compared with just 18 in low- and middle-income countries, representing a more than fivefold advantage and a concentration of over 80–85% of policy interventions in developed economies. This confirms the asymmetrical nature of digital-industrial development and demonstrates that digital transformation is a complex mechanism of structural modernisation that determines the trajectory of neo-industrial development.

A synthesis of contemporary scientific approaches demonstrates that digital transformation takes shape as a multi-level system of interrelated technological, institutional and economic elements that determine the logic of the economy's structural modernisation and the development of innovative infrastructure (Fig. 3).

As shown in Fig.3, digital transformation is realised through the interaction of digital technologies, institutional mechanisms and innovative processes, which ensures the formation of a platform economy, the development of digital ecosystems and the strengthening of the role of data as a strategic resource. At the same time, the integration of these components determines the economy's capacity for structural modernisation, forms new value chains and creates the preconditions for neo-industrial development.

The genesis of approaches: from informatisation to the digital economy. The genesis of scientific approaches to digital transformation reflects the transition from informatisation – as the automation of individual operations – to the formation of the digital economy as a system based on the integration of technologies, data and network interactions. In the 1990s and 2000s, information and communication technologies were viewed primarily as a tool for improving the efficiency of business processes, whereas the further development of digital technologies led to their transformation into a key factor in economic growth and changes in value creation models.

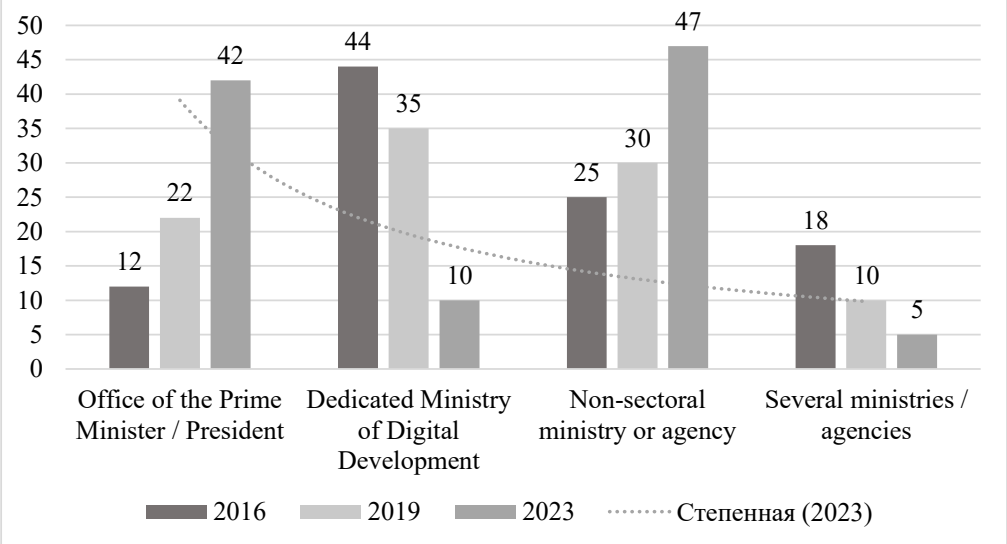

Figure 2 – Distribution of responsibility for the formulation of national digital strategies in OECD countries (2016–2023), %

Source: compiled by the authors based on [1]

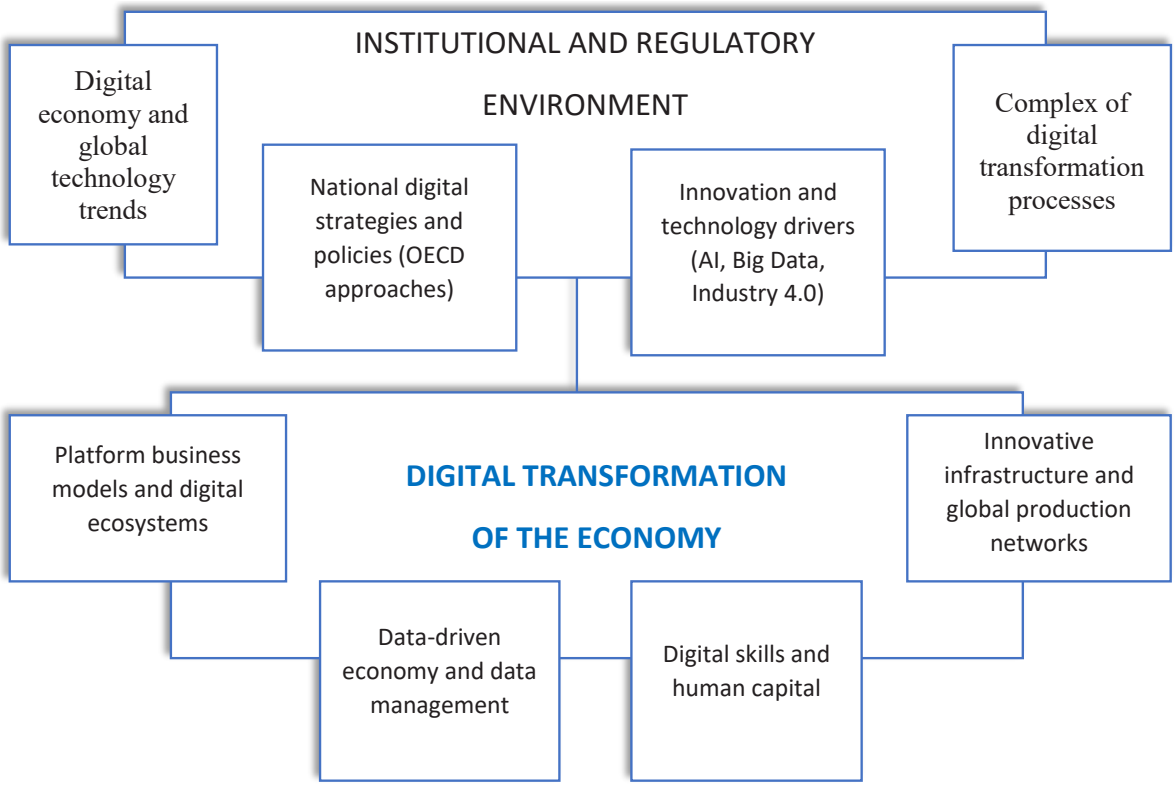

Figure 3 – Structural model of the digital transformation of the economy in the context of neo-industrial development

Source: summarised by the authors based on [7–9]

As E. Brynjolfsson and A. McAfee note, digital technologies are driving radical changes in productivity and the structure of employment, shaping a new economic reality in which the role of intangible assets and digital platforms is growing [10]. At the same time, contemporary approaches emphasise that digital transformation goes beyond technological change and encompasses the restructuring of organisational models and strategies, in particular through the development of enterprises' dynamic capabilities for adaptation and innovation [11]. As T. Hess et al. emphasise, the formation of the digital economy is linked to a systemic transformation of business strategies that integrate digital technologies into all levels of activity, determining long-term competitiveness and the capacity for innovative development [12].

The evolution of theoretical approaches to digital transformation. The evolution of theoretical approaches to digital transformation is characterised by a shift from technological determinism to a systemic perspective, within which digital technologies are viewed as a factor in the comprehensive transformation of economic and organisational systems. Early research focused on the impact of ICT on efficiency and productivity, whereas contemporary approaches emphasise changes in business models, the development of digital ecosystems, and the use of data as a key resource for value creation. As G. Vial notes, digital transformation is a process of profound restructuring of organisational activity under the influence of digital technologies, encompassing both internal processes and interaction with the external environment [13] . At the same time, P. K. Verhof et al. emphasise that digital transformation creates new mechanisms for value creation through the integration of digital channels, platforms and customer ecosystems [14]. As noted by S. Nambisan et al., digital technologies are changing the logic of innovation, transforming it into a networked and open form based on the interaction of various economic agents and platform solutions [15].

A review of the evolution of academic approaches to digital transformation allows us to identify successive stages in the evolution of value creation models – from informatisation to platform-based and ecosystem-based forms of organising economic activity. Such a transformation reflects the shift from the local use of digital technologies to their systematic integration into production, management and institutional processes, which defines a new logic of economic functioning. A systematisation of the key stages of this evolution and their characteristics is presented in Fig. 4.

The concept of digital transformation in the context of Industry 4.0 reflects the transition to a new stage in the development of production systems, based on the integration of the Internet of Things, artificial intelligence, big data, digital twins and cloud technologies. Unlike previous industrial models, this approach involves the creation of flexible and networked production systems, within which increased efficiency, adaptability to change and opportunities for product customisation are combined. As noted by F. De Felice et al., digital transformation in manufacturing ensures the integration of information systems and production processes, which contributes to

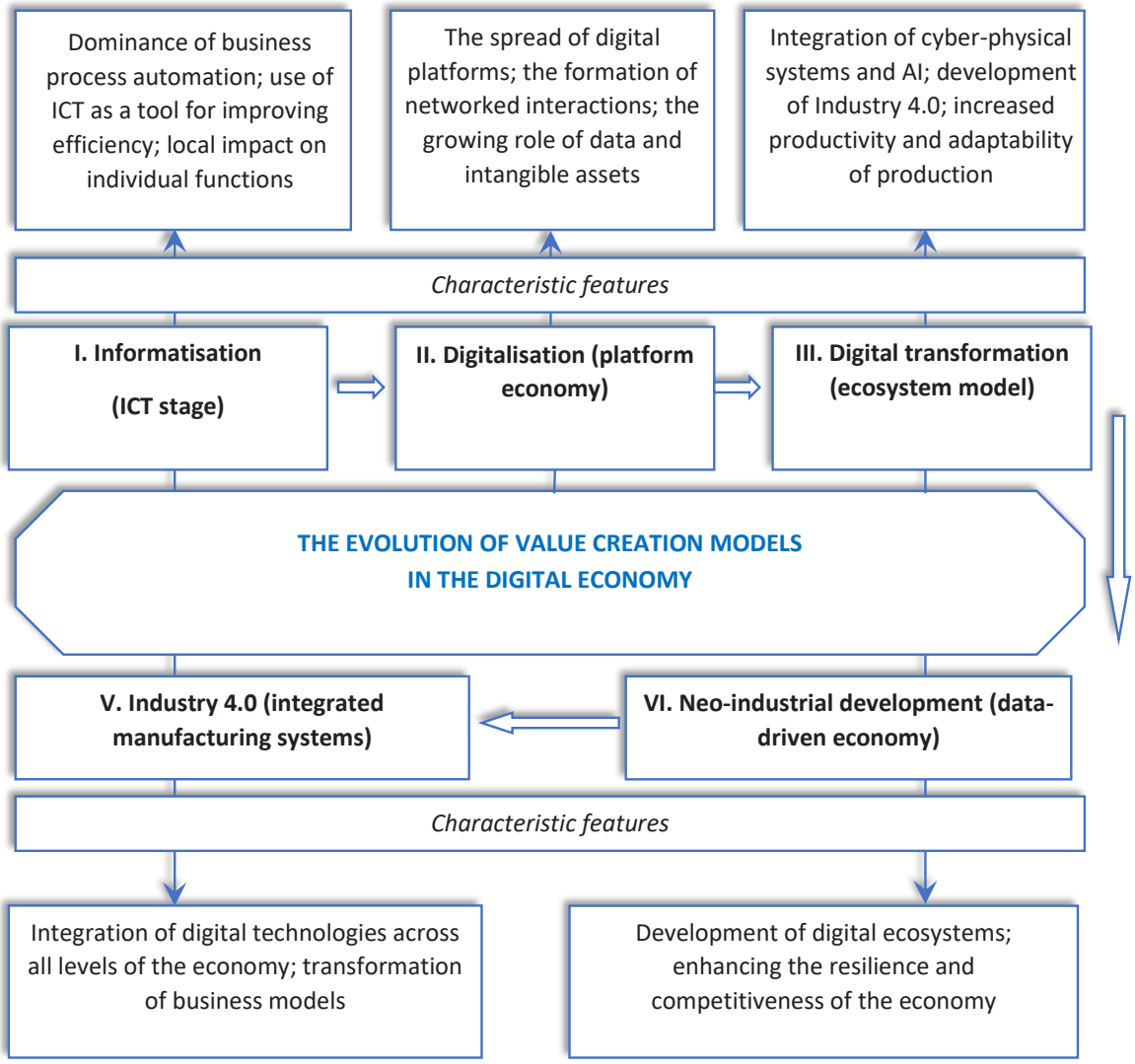

Figure 4 – Staged evolution of value creation concepts in the context of digital transformation and the neo-industrial development of the economy

Source: summarised by the authors based on [10–20]

the restructuring of industrial landscapes and increased operational efficiency [16].

Scholars S. Yasko and T. Ruppert emphasise that the development of Industry 4.0 is defined by the introduction of intelligent manufacturing systems and digital technologies that transform traditional models of production organisation [17]. As noted by M. Hencher et al., digital transformation involves comprehensive changes to the organisational and technological parameters of organisations' activities, shaping a new architecture of business processes and management [18]. At the same time, contemporary research emphasises that the implementation of Industry 4.0 technologies contributes to increased productivity, resource optimisation and the creation of new competitive advantages in production systems [19]. Furthermore, according to estimates by H. Ortega-Gras et al., the integration of digital technologies into production enhances the circularity and sustainability of enterprises, thereby expanding the functional role of digital transformation in the direction of neo-industrial development [20][2]. Thus, the integration of digital technologies, data and platform solutions facilitates the formation of new value chains and strengthens the economy's innovative capacity, which determines its trajectory of neo-industrial development.

Digital transformation in the paradigm of neo-industrialisation. In the modern paradigm of neo-industrialisation, digital transformation acts as a systemic driver of the modernisation of production systems, ensuring the integration of innovation, process automation and the formation of new value chains. According to UNIDO estimates, the adoption of advanced digital production (ADP) technologies is characterised by significant

[2] Ortega-Gras, J.-J., Bueno-Delgado, M.-V., Puche-Forte, J.-F., Garrido-Lova, J., & Martínez-Fernández, R. (2025). *Exploring Industry 4.0 Technologies Implementation to Enhance Circularity in Spanish Manufacturing Enterprises.* Sustainability, 17(17), 7648. https://doi.org/10.3390/su17177648

cross-country asymmetry, manifested in unequal access to industrial policy instruments and technological modernisation. As evidenced by data from the World Economic Forum, enterprises implementing Industry 4.0 solutions within the Global Lighthouse Network (201 manufacturing sites across more than 30 countries) demonstrate, on average, a 40% increase in labour productivity and a 48% reduction in production cycles, with the use of AI and genAI in key solutions reaching up to 50%. In addition, a 41% reduction in product defects, a 28% reduction in energy consumption and a 44% reduction in production cycle time have been recorded, confirming the decisive role of digital technologies in improving efficiency and transforming industrial systems towards digital-industrial development [6; 21].

The shift from linear digitalisation models to a network-based ecosystem approach Modern approaches to digital transformation are characterised by a shift from linear models of technology implementation to a network-based ecosystem approach, within which economic activity is organised through platforms, digital services and integrated data. According to the European Commission (DESI), digital transformation in EU countries is being implemented through large-scale investment and institutional mechanisms: in particular, under the Recovery and Resilience Facility, €127 billion has been allocated to digital reforms and investments, with Member States allocating an average of 26% of funding to digitalisation, exceeding the set threshold of 20%. However, a number of countries (notably Austria, Germany, Ireland, Luxembourg and Lithuania) are directing over 30% of their national recovery plans towards digital transformation, reflecting a systemic shift towards an ecosystem-based development model. At the same time, as the DESI results show, despite the dynamic growth of digitalisation, structural gaps persist in the development of digital skills, the transformation of SMEs and the roll-out of 5G infrastructure, confirming the uneven development of digital ecosystems within the EU [1; 22].

Principles of sustainable growth in contemporary approaches to digital transformation. In contemporary concepts of digital transformation, the principles of sustainable development are integrated as a key element in achieving long-term economic efficiency and resource balance. According to UNCTAD, the digital economy is experiencing rapid growth, which simultaneously intensifies its environmental impact: annual smartphone shipments have more than doubled since 2010, reaching 1.2 billion units in 2023, whilst the volume of businesse-commerce in 43 countries, accounting for around three-quarters of global GDP, grew by almost 60% between 2016 and 2022 to reach US$27 trillion, whilst the number of IoT devices is projected to reach 39 billion by 2029 (Fig. 5).

At the same time, digitalisation is accompanied by an increase in environmental impact: in 2020, the ICT sector generated between 0.69 and 1.6 gigatonnes of CO_2 equivalent, corresponding to 1.5–3.2% of global greenhouse gas emissions, whilst the volume of waste from screens and small IT equipment rose by 30% between 2010 and 2022, reaching 10.5 million tonnes. In this context, as highlighted in the World Bank report, for middle-income countries, ensuring sustainable growth increasingly depends on a combination of investment, technological upgrading and innovation, as well as on improving energy efficiency and reducing the resource intensity of the economy.

Taken together, this indicates that modern approaches to digital transformation must combine technological modernisation with environmental responsibility, the development of circular business models, and the alignment of digital and environmental policies [23; 24].

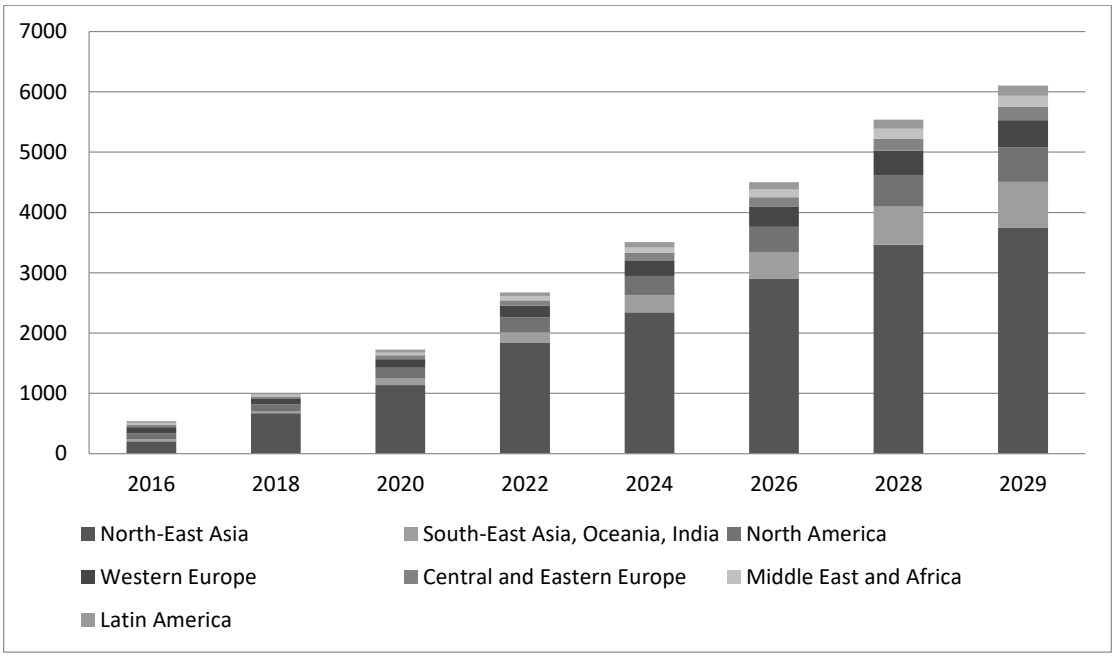

Figure 5 – Regional trends in IoT connections as a component of the digital infrastructure of the economy (2016–2029)

Source: compiled by the authors based on: UN Conference on Trade and Development (UNCTAD). (2024). Digital Economy Report 2024 (Ericsson Mobility Report, November 2023)

A synthesis of theoretical approaches as the basis for analysing structural changes in innovation infrastructure. A synthesis of contemporary theoretical approaches to digital transformation enables the formation of a coherent methodological framework for analysing structural changes in innovation infrastructure within the context of neo-industrial development. The combination of platform, ecosystem and industrial approaches makes it possible to view innovation infrastructure as a dynamic system of interaction between technological, institutional and organisational components. According to OECD estimates, digital technologies and data are a fundamental driver of innovation across a wide range of sectors, from energy, transport and manufacturing to finance, agriculture and the service sector, confirming their systemic role in the transformation of innovation infrastructure. IEA analysis shows that digitalisation is already significantly changing basic infrastructure systems: global internet traffic has tripled over the last five years, around 90% of all data in the world has been created in the last two years, and global investment in digital infrastructure for the electricity sector and software has grown by more than 20% annually since 2014, reaching US$47 billion in 2016. Taken together, this indicates that structural changes in the innovation infrastructure are driven by the large-scale expansion of data, digital connectivity and investment in digital systems, which forms the basis for sustainable neo-industrial development [25; 26].

Conclusions. The analysis presented has shown that digital transformation, in the context of neo-industrial development, acts as a system-forming factor in the structural modernisation of the economy and innovation infrastructure, transforming not only the technological base but also market architecture, business models and institutional mechanisms of interaction. It has been established that the evolution of scientific approaches from informatisation to the platform-ecosystem paradigm reflects a transition to a networked logic of value creation, within which data, digital platforms and integrated ecosystems play a key role, whilst simultaneously creating asymmetries in digital development between countries and sectors.

It is demonstrated that the integration of Industry 4.0 technologies ensures a significant increase in productivity, resource efficiency and innovative capacity, yet is accompanied by a rise in environmental impact, highlighting the need to combine digital and environmental policies. It is demonstrated that the contemporary transmission mechanisms of the digital economy are realised through the interaction of technological, institutional and innovative components, forming new value chains and determining the trajectory of neo-industrial development.

In conclusion, it has been determined that the key conditions for the effective transformation of innovation infrastructure are the institutionalisation of digital strategies, the development of digital skills, investment in data and infrastructure, as well as ensuring a balance between technological modernisation, innovation dynamics and the principles of sustainable growth, which forms the methodological basis for further analysis of its structural changes.

References:

1. OECD. (2024). *OECD Digital Economy Outlook 2024: Volume 2*. Paris: OECD Publishing. Available at: https://www.oecd.org/en/publications/oecd-digital-economy-outlook-2024-volume-2_3adf705b-en.html

2. Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, no. 122, pp. 889–901. DOI: https://doi.org/10.1016/j.jbusres.2019.09.022

3. Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems*, no. 28 (2), pp. 118–144. DOI: https://doi.org/10.1016/j.jsis.2019.01.003

4. World Economic Forum. (2025). *Future of Jobs Report 2025.* Geneva: WEF. Available at: https://www.weforum.org/reports/the-future-of-jobs-report-2025

5. World Bank. (2025). *Digital Progress and Trends Report 2025.* Washington, DC: World Bank. Available at: https://openknowledge.worldbank.org/server/api/core/bitstreams/d2ac1ea9-b70e-4080-b5de-8b31098e992f/content

6. United Nations Industrial Development Organization (UNIDO). (2024). *Industrial Development Report 2024: Turning Challenges into Sustainable Solutions. The New Era of Industrial Policy.* Vienna: UNIDO. Available at: https://www.unido.org/sites/default/files/unido-publications/2024-06/Industrial%20Development%20Report%202024.pdf

7. Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, no. 122, pp. 889–901. DOI: https://doi.org/10.1016/j.jbusres.2019.09.022

8. Li, F., Nucciarelli, A., Roden, S., & Graham, G. (2016). How smart cities transform operations models: A new research agenda for operations management in the digital economy. *Production Planning & Control*, no. 27(6), pp. 514–528. DOI: https://doi.org/10.1080/09537287.2016.1147096

9. Nambisan, S., Wright, M., & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. *Research Policy*, no. 48 (8), 103773. DOI: https://doi.org/10.1016/j.respol.2019.03.018

10. Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies.* New York: W. W. Norton & Company. Available at: https://wwnorton.com/books/the-second-machine-age

11. Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation. *Long Range Planning*, no. 52 (3), pp. 326–349. DOI: https://doi.org/10.1016/j.lrp.2018.12.001

12. Hess, T., Matt, C., Benlian, A., & Wiesböck, F. (2016). Options for formulating a digital transformation strategy. *MIS Quarterly Executive*, no. 15 (2), pp. 123–139. Available at: https://aisel.aisnet.org/misqe/vol15/iss2/6

13. Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *Journal of Strategic Information Systems*, no. 28(2), pp. 118–144. DOI: https://doi.org/10.1016/j.jsis.2019.01.003

14. Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, no. 122, pp. 889–901. DOI: https://doi.org/10.1016/j.jbusres.2019.09.022

15. Nambisan, S., Wright, M., & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. *Research Policy*, no. 48 (8), 103773. DOI: https://doi.org/10.1016/j.respol.2019.03.018

16. De Felice, F., De Luca, C., Petrillo, A., Forcina, A., Ortiz Barrios, M. A., & Baffo, I. (2025). *The Role of Digital Transformation in Manufacturing: Discrete Event Simulation to Reshape Industrial Landscapes.* Applied Sciences, no. 15 (11), 6140. DOI: https://doi.org/10.3390/app15116140

17. Jaskó, S., & Ruppert, T. (2025). *The Future of Manufacturing and Industry 4.0*. Applied Sciences, no. 15 (9), 4655. DOI: https://doi.org/10.3390/app15094655

18. Gençer, M., Izcan, E., Göçer, A., & Özpeynirci, Ö. (2025). *A digital transformation index for business organisations: reckoning the extraverted change in pillars.* Technology Analysis & Strategic Management, no. 38 (2), pp. 1–15. DOI: https://doi.org/10.1080/09537325.2025.2472235

19. Fonseca, C. V. C., Predo, R. M., & Blikstad, N. M. D. (2025). *Defining a research agenda for Industry 4.0 technologies in corporate strategies: insights from complex networks and machine learning.* International Journal of Production Research, no. 63 (23), pp. 8743–8760. DOI: https://doi.org/10.1080/00207543.2025.2514253

20. Ortega-Gras, J.-J., Bueno-Delgado, M.-V., Puche-Forte, J.-F., Garrido-Lova, J., & Martínez-Fernández, R. (2025). *Exploring Industry 4.0 Technologies Implementation to Enhance Circularity in Spanish Manufacturing Enterprises*. Sustainability, no. 17 (17), 7648. DOI: https://doi.org/10.3390/su17177648

21. World Economic Forum. (2025). Global Lighthouse Network: Insights Report 2025. Available at: https://www.weforum.org/press/2025/09/global-lighthouse-network-2025-world-economic-forum-recognizes-12-new-sites-driving-holistic-transformation-in-manufacturing/

22. European Commission. (2024). *Digital Economy and Society Index (DESI) 2024*. URL: *Report.* Available at: https://digital-strategy.ec.europa.eu/en/policies/desi

23. UNCTAD. (2024). *Digital Economy Report 2024.* Available at: https://unctad.org/publication/digital-economy-report-2024

24. World Bank. (2024). *World Development Report 2024: Data for Better Lives.* URL: https://www.worldbank.org/en/publication/wdr2024

25. OECD. (2024). *Going Digital Toolkit 2024.* Available at: https://goingdigital.oecd.org

26. International Energy Agency. (2024). *Digitalisation and Energy 2024*. Available at: https://www.iea.org/reports/digitalisation-and-energy

27. Iyash, O., Hrynkevych, S., Ilich, L., Kozlovskyi, S., Buhaichuk, N. (2020). Economic assessment of the relationship between housing and communal infrastructure development factors and population quality of life in Ukraine. *Montenegrin Journal of Economics*, no. 3, pp. 93–108. DOI: https://doi.org/10.14254/1800-5845/2020.16-3.8

28. Osińska, M., Kyzym, M., Khaustova, V., Ilyash, O., Salashenko, T. (2022). Does the Ukrainian electricity market correspond to the European model? *Utilities Policy*, no. 79, 101436. DOI: https://doi.org/10.1016/j.jup.2022.101436

Іляш О.І.
Науково-дослідний центр індустріальних проблем розвитку
Національної академії наук України

Кравченко О.О., Вовк О.М.
Національний технічний університет України
«Київський політехнічний інститут імені Ігоря Сікорського»

ЦИФРОВА ТРАНСФОРМАЦІЯ ТА СТРУКТУРНІ ЗМІНИ ІННОВАЦІЙНОЇ ІНФРАСТРУКТУРИ В УМОВАХ НЕОІНДУСТРІАЛЬНОГО РОЗВИТКУ

Проведено комплексний аналіз еволюції наукових підходів до цифрової трансформації в умовах неоіндустріального розвитку, окреслено її роль як системоутворюючого чинника структурної модернізації економіки та інноваційної інфраструктури. Досліджено трансформацію змісту цифровізації від інформатизації та автоматизації окремих функцій до інтегрованої моделі взаємодії цифрових технологій, штучного інтелекту, даних, цифрових навичок і інституційних механізмів, що формує нову логіку організації економічної діяльності. Висвітлено зміну архітектури ринків під впливом платформних моделей, мережевих ефектів і data-driven управління, а також зростання ролі даних як ключового виробничого ресурсу. Встановлено, що цифрова трансформація інституціоналізується як системний напрям економічної політики, що підтверджується поширенням національних цифрових стратегій та посиленням ролі державних інституцій у їх формуванні. Виявлено асиметричний характер цифрового розвитку, що проявляється у нерівномірному доступі до технологій, інструментів індустріальної політики та використанні генеративного штучного інтелекту між країнами з різним рівнем доходу. Показано, що цифрові технології виступають каталізатором структурних зрушень, змінюючи галузеві пропорції, ланцюги доданої вартості та формуючи нові моделі економічної взаємодії. На основі узагальнення сучасних теоретичних підходів визначено, що цифрова трансформація реалізується як багаторівнева система взаємодії технологічних, інституційних та інноваційних компонентів, що забезпечує формування платформної економіки, розвиток цифрових екосистем і посилення інноваційної спроможності. Доведено, що інтеграція технологій Індустрії 4.0 сприяє зростанню продуктивності, оптимізації ресурсів та формуванню нових конкурентних переваг, водночас супроводжується зростанням екологічного навантаження, що актуалізує необхідність поєднання цифрової трансформації з принципами сталого розвитку. Розкрито перехід від лінійних моделей цифровізації до мережево-екосистемної парадигми, у межах якої економічна діяльність організовується через платформи, інтегровані дані та цифрові сервіси, що визначає нову логіку створення вартості. Обґрунтовано, що ключовими умовами ефективної трансформації є інституціоналізація цифрових стратегій, розвиток цифрових навичок, інвестиції у цифрову інфраструктуру та забезпечення

збалансованості між технологічною модернізацією й екологічною відповідальністю. Результати дослідження мають теоретичне та прикладне значення для формування сучасної індустріальної та цифрової політики, спрямованої на забезпечення структурної модернізації, підвищення інноваційної спроможності та досягнення стійкого неоіндустріального розвитку.

Ключові слова: *цифрова трансформація, неоіндустріальний розвиток, інноваційна інфраструктура, платформна економіка, цифрові екосистеми, Індустрія 4.0, дані, інституційна політика, структурна модернізація, сталий розвиток.*

Дата надходження статті: 23.02.2026
Дата прийняття статті: 16.03.2026
Дата публікації статті: 29.05.2026