

PART III. DIGITAL TRANSFORMATION, ARTIFICIAL INTELLIGENCE AND TECHNOLOGICAL INNOVATION

DIGITAL TRANSFORMATION AND CHALLENGES OF THE TRANSITION PERIOD FROM INDUSTRY 4.0 TO INDUSTRY 5.0

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Introduction. Digital transformation has become a decisive driver of contemporary economic development, accelerating the diffusion of intelligent technologies and reshaping industrial, managerial and socio-economic systems. The transition from Industry 4.0 to Industry 5.0 represents a structural shift from automation-driven production toward a human-centric paradigm based on artificial intelligence (AI), the Internet of Things (IoT), advanced robotics, cyber-physical systems and data-based decision-making.

The research problem arises from the necessity to evaluate how this technological paradigm shift affects enterprise performance, competitiveness, industrial sustainability and national economic resilience [1]. Industry 5.0 emphasises personalised production, resource efficiency, social responsibility and synergetic cooperation between humans and intelligent systems [2]. These trends create new strategic, financial and organisational challenges for enterprises.

The objective of the study is to analyse the economic implications of digital transformation in the context of the transition from Industry 4.0 to Industry 5.0 and to determine the factors shaping competitiveness and resilience at enterprise and national levels.

Methodology. The research methodology integrates qualitative and quantitative approaches i) analysis of international analytical databases (World Bank, OECD, European Commission) to assess trends in digital development and industrial transformation [3; 4]; ii) review of scholarly publications on Industry 4.0, Industry 5.0, intelligent technologies and digital convergence [5]; iii) case studies of enterprises integrating AI, IoT, robotics and other Industry 5.0 solutions; iv) SWOT analysis to evaluate opportunities and constraints for enterprises during the transition period; v) economic assessment of potential benefits, risks and financial impacts of adopting intelligent technologies; vi) trend analysis and short-term forecasting to identify future vectors of digital transformation.

This methodological framework ensures a comprehensive assessment of digital, technological, organisational and socio-economic implications [6].

Findings. *Technological transformation.* The shift from Industry 4.0 to Industry 5.0 is characterised by: integration of human expertise into intelligent production systems; personalised and adaptive manufacturing; diffusion of AI, IIoT, blockchain and autonomous robotics; increased role of ethical, social and environmental priorities [2]. Enterprises implementing these technologies achieve higher adaptability, faster decision-making, reduced operational risks and improved long-term sustainability [1].

Socio-economic transformation. Digital transformation influences socio-economic structures through rising demand for digital, analytical and interdisciplinary skills; the emergence of new business models and financial strategies; enhanced innovative capacity and resilience; expansion of green technologies and resource-efficient systems [7]. Industry 5.0 reinforces human-centric development, linking technological progress with social welfare and environmental sustainability.

Trends in Ukraine. Ukraine demonstrates progress in public digital services, fintech, telecommunications and cloud infrastructure. However, digitalisation levels across industries remain uneven, digital infrastructure requires substantial investment and the gap with EU industrial digitalisation standards persists. Adopting Industry 5.0 solutions could enhance industrial competitiveness, accelerate post-crisis recovery and strengthen economic resilience.

Significance. The findings highlight i) the transformative role of intelligent technologies in improving productivity, sustainability and competitiveness; ii) the need to update enterprise and national strategies to integrate human-centric innovation principles; iii) the importance of investing in digital skills development and cross-sectoral training programmes; iv) the necessity of financial mechanisms supporting technological modernisation and risk mitigation [4]. This study contributes to academic and practical discourse by outlining pathways for effective digital transformation during the transition to Industry 5.0.

Conclusion. Digital transformation significantly influences economic systems, reshaping production models, management practices and financial strategies. The transition from Industry 4.0 to Industry 5.0 enhances competitiveness and resilience through the adoption of AI, IIoT, robotics, blockchain and human-centric technologies. However, digital maturity gaps, economic instability and limited investment capacity may constrain the pace of adoption.

Future research directions include measuring the economic effects of specific Industry 5.0 technologies in Ukrainian enterprises; identifying priority sectors for accelerated industrial modernization; assessing environmental and social implications of the new industrial paradigm.

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PRIORITIES FOR THE COMING PHASE OF UKRAINE'S AI POLICY

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Introduction. Ukraine still does not use AI widely in its economy, and current adoption is fragmented. Ukraine needs short-term and long-term AI policy actions to benefit from new technological changes. Otherwise, the productivity gap between Ukraine and leading countries will grow even more.