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THE IMPACT OF DIGITALIZATION ON THE DEVELOPMENT OF INNOVATIVE ACTIVITY

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The current stage of development of the global economy and macroeconomic environment is characterized by a rapid, irreversible transition to a digital format of doing business. Industry 4.0, the implementation of artificial intelligence (AI), the Internet of Things (IoT), Big Data technologies, and cloud computing are constantly changing the traditional business models of industrial enterprises. Under these conditions, innovative activity is evolving from a mere competitive advantage into a key tool for anti-crisis management and a basic condition for enterprise survival. Digitalization acts as a powerful catalyst for innovative processes, significantly accelerating the cycle from idea generation to its final commercialization.

At the same time, the practical implementation of digital transformation in Ukraine faces unprecedented challenges caused by the functioning of the economy under martial law. The destabilization of the economic environment, the destruction of supply chains and basic infrastructure, along with a shortage of personnel and financial resources, have forced a significant portion of enterprises to shift to a "survival" strategy. This requires the development of new, adaptive innovation management mechanisms that account for the high turbulence of the environment and the specifics of the digital economy.

The issues of innovative activity development are actively researched in the academic community. The theoretical and methodological foundations for understanding the essence of "innovative activity" are highlighted in the works of O. Vasylenko, S. Illiashenko, O. Yefremov, V. Khrapkina, and Ya. Mohylnyi. Most experts view it as a multifaceted process of generating ideas, developing new solutions, and their implementation and commercialization. A significant contribution to assessing the impact of digital technologies on the economy was made by N. Tymoshenko and M. Shabanova, who noted that digitalization allows for reducing the innovation lag and optimizing information costs. Aspects of enterprise functioning in wartime conditions and under insufficient funding are examined by O. Mykhailyk and Ye. Birak, emphasizing innovations as the foundation of post-war recovery.

However, the issues of adapting anti-crisis innovation management mechanisms and bridging the gap between the investment deficit and the requirements of total digitalization at the micro-level remain insufficiently disclosed.

The purpose of the study is to conduct a comprehensive analysis of the state, trends, and key barriers to the development of innovative activity of domestic enterprises in the context of digital transformation and martial law, as well as to substantiate a system of indicators for its assessment.

For a comprehensive assessment of the macroeconomic environment of enterprise functioning, it is advisable to rely on the indicators of the Global Innovation Index (GII). An analysis of Ukraine's positions for the period 2020–2024 demonstrates a steady negative trend, reflecting a systemic weakening of innovation potential under the influence of external factors [5]..

While in 2020 Ukraine ranked 45th among the world's innovative economies (demonstrating high efficiency: 71st place in inputs and 37th in outputs), based on the results of 2024, the country dropped to 60th place among 133 surveyed countries. A critical signal is the sharp drop in the "Innovation Outputs" sub-index (from 42nd place in 2023 to 54th in 2024) against the backdrop of consistently low innovation inputs (78th place). This indicates the depletion of the domestic economy's capacity to generate high innovation outputs amid chronic underfunding and infrastructure destruction [5].

For an in-depth understanding of the nature of this phenomenon, the structure of investment support for innovation expenditures of industrial enterprises for the period 2020–2024 was analyzed. The following structural shifts were identified:

Recovery of total funding: After a rapid decline from UAH 14.4 billion (2020) to UAH 6.9 billion (2023), a sharp increase in funding to UAH 15.1 billion was recorded in 2024 [3].

Absolute dominance of equity capital: Enterprises' own funds remain the foundation of innovative activity (UAH 10.8 billion in 2024). Although their share slightly decreased (from 85.36% in 2020 to 71.78% in 2024), enterprises continue to develop mainly through internal reserves.

Significant growth in state funding: The share of funds from the state budget grew from 1.94% in 2020 to 9.19% in 2024 (reaching UAH 1.38 billion), indicating a targeted state policy to support critical industries during the war.

Stagnation of lending and foreign investment: The role of bank loans fell from 9.56% to 3.75% (UAH 566 million in 2024), which is a consequence of high discount rates and excessive lending risks. The share of foreign investors' funds remains extremely low (about 1%) [3].

This situation requires the formation of a clear logical model for evaluating the innovative activity of an enterprise, which should include a two-level system: at the macro-level (GII, national indicators) and the micro-level (analysis of the internal environment, funding structure, and operational efficiency).

An important aspect of the development of innovative activity in conditions of macroeconomic instability is the deep adaptation of internal business processes. Digitalization in this context plays the role not only of a technological stimulus but also of a key tool for ensuring operational resilience. Under martial law, the disruption of traditional supply chains, and resource shortages, the synergy of digital technologies and Lean management principles becomes particularly relevant.

The integration of modern IT solutions into logistics and production processes allows enterprises to minimize waste and effectively optimize Value Stream Mapping. The use of automated enterprise resource planning (ERP) systems, cloud platforms for electronic document flow, and interactive data visualization tools provides the

necessary flexibility in inventory management. This allows management to promptly reconfigure production lines and logistics routes in response to external economic or security challenges, keeping costs at the lowest possible level.

The successful implementation of innovative activity under conditions of total digitalization is impossible without appropriate human resources. Innovations are created and implemented by people; therefore, the transformation of HR management approaches becomes a critical condition for enterprise efficiency. The outflow of qualified specialists driven by migration processes amid the war creates a significant barrier to the implementation of high-tech solutions.

Consequently, a modern industrial enterprise is forced to form full-fledged digital talent management ecosystems. Such ecosystems include automated systems for evaluating key performance indicators (KPIs), platforms for continuous distance learning and upskilling, as well as digital tools for monitoring employee engagement and providing psychological support. The innovative potential of a company directly depends on its ability to motivate staff to generate new ideas and quickly adapt to working with advanced technologies such as Big Data analytics or AI. In these realities, talent management turns into the main strategic asset, where the digitalization of internal communications becomes the primary tool for retaining intellectual capital.

The rapid digitalization of innovation processes also highlights the issue of intellectual property protection. The transition of a significant part of research, managerial, and commercial activities into the virtual space significantly increases the risks of unauthorized access, copying of developments, and leakage of trade secrets. Therefore, the formation of a reliable information security architecture must become an integral part of any enterprise's innovation strategy.

This requires the implementation of modern protocols for managing intellectual property rights, which includes the timely patenting of digital algorithms and innovative business models, the use of data encryption technologies, and the development of comprehensive non-disclosure agreements (NDAs) for employees involved in remote innovative work.

Under conditions of external funding deficit, which is evidenced by the statistical analysis of macro-indicators, enterprises are forced to reconsider traditional approaches to strategic planning. The transition from a simple "survival" paradigm to sustainable innovative growth requires the formation of hybrid anti-crisis models. This involves the ability to balance: maintaining the stability of current operational activities while accumulating a portion of internal resources for reinvestment in breakthrough digital projects.

In addition, the implementation of the Open Innovation concept is an effective mechanism for overcoming resource constraints. This approach stimulates active cooperation of industrial enterprises with higher education institutions, research organizations, and startup ecosystems. Integration into regional and international technology clusters allows enterprises to join forces for the joint development and testing of new products, sharing financial risks and gaining access to a wider range of intellectual and grant resources.

Thus, the implementation of digital technologies has transformed innovative activity from an additional advantage into a basic tool for ensuring enterprise survival in the market. The domestic innovation ecosystem is under significant pressure, functioning amid a deficit of external capital. Enterprises rely on self-financing, which minimizes debt risks but significantly limits the pace of scaling and modernization.

Given this, further scientific and applied research should be directed towards the following vectors:

Formation of anti-crisis innovation strategies: Developing effective models for the transition of enterprises from a "survival" concept to active digital scaling.

Optimization of production processes: In-depth study of the integration of Lean production tools and modern digital ERP systems to reduce enterprise operational costs.

Diversification of funding sources: Seeking and attracting alternative financial instruments (venture capital, international grants, crowdfunding) to compensate for the shortage of bank lending.

Intellectual property management: Improving mechanisms for the patent protection of innovative solutions in the context of digital openness and growing cyber risks.

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