

UDC 005.52:621.01  
JEL Classification: O32 + L60 + M11

*Vasylenko M. I.*

## THEORETICAL AND METHODOLOGICAL FOUNDATIONS OF MANAGING INNOVATION ACTIVITY AT INDUSTRIAL ENTERPRISES

Ukrainian State University of Science and Technologies, Dnipro, Ukraine

This article is devoted to deepening the theoretical and methodological foundations of innovation activity management at machine-building enterprises under conditions of digital transformation, wartime economic instability, and structural constraints on industrial development. The current state of innovation activity at Ukraine's industrial and machine-building enterprises is analysed, and a persistent tendency towards a narrowing of innovation potential is identified, as reflected in declining innovation expenditure, a low share of research expenditure in GDP, and an insufficient level of commercialisation of innovative products. It is substantiated that the innovation activity of a machine-building enterprise should be regarded not as a set of separate scientific and technical measures, but as a system-forming factor of long-term competitiveness encompassing technical and technological, organisational and managerial, human-resource, digital, and market components of development. The principles, functions, and structural elements of the innovation activity management system are generalised, and a comparative analysis of the systemic, process-based, functional, project-based, and resource-based approaches to its organisation is carried out. It is proved that none of these approaches, taken separately, ensures the necessary flexibility, coherence, and adaptability for machine-building enterprises under current conditions. In this regard, an integrated approach to innovation activity management is proposed, combining network-based innovation interaction, digitalisation of the innovation cycle, flexible portfolio structuring of projects, knowledge and competence management, and adaptive strategic regulation. It is determined that the practical value of this approach lies in improving the manageability of the innovation process, reducing the time required for the development and implementation of new solutions, strengthening enterprise resilience to external shocks, and expanding opportunities for cooperation with the scientific, engineering, and production environment. It is concluded that the transition to an integrated model of innovation activity management is a prerequisite for technological renewal and the reproduction of competitive advantages at Ukraine's machine-building enterprises.

**Keywords:** innovation activity, strategic management, industrial enterprises, innovation management, digitalisation, adaptive strategic regulation, competitiveness.

**DOI:** 10.32434/2415-3974-2026-23-1-139-147

### *Introduction and formulation of the problem*

Mechanical engineering remains a fundamental pillar of industrial modernisation and the post-war recovery of Ukraine's economy, as it is this sector that provides the technological foundation for the development of transport, energy, the defence industry,

and production infrastructure.

The full-scale war, the disruption of logistics links, rising investment risks, and tightening resource constraints have substantially narrowed the scope for innovative renewal at mechanical engineering enterprises.

© Vasylenko M. I., 2026



This article is licensed under Creative Commons Attribution 4.0 International License (CC-BY)

According to the analytical centre GMK Center, between 2010 and 2021 innovation expenditure by Ukrainian industrial enterprises fell by 63%, to USD 373 million; in 2021–2023 it declined by a further 49%, to USD 191 million, while the share of innovation-active enterprises dropped to 8.8% in 2023. Although in 2024 this indicator temporarily increased to 15.7%, mainly due to defence-related R&D projects, the share of marketed innovative products has continued to remain critically low, not exceeding 2.8% [1].

These trends indicate not only a weakening of innovation activity, but also the exhaustion of traditional models of development management, which heightens the need to rethink the economic essence of innovation activity and its role within the management system of a mechanical engineering enterprise.

Within scholarly discourse, the issue of managing innovation activity has been addressed quite extensively; however, this has generally been done without due consideration of the sector-specific features of mechanical engineering, the impact of digital transformation, and wartime constraints.

In the works of S. Radynskiy and O. Diachun, emphasis is placed on the construction of a mechanism for managing enterprise innovation activity, in which the systemic nature of managerial decisions and the use of relevant evaluation indicators acquire key importance [2].

In their publications devoted to marketing management and digital tools for the development of transport enterprises, T. Charkina, V. Zadoia, and O. Dmytrieva substantiate the expediency of combining digital solutions with customer-oriented approaches as a prerequisite for enhancing competitiveness [3; 4].

At the same time, the publications of L. Fedulova, Yu. Bazhal, V. Dykan, I. Tokmakova, O. Kuzmin, as well as J. Tidd, J. Bessant, and H. Chesbrough, reveal the theoretical and methodological foundations of innovative development, open innovation, organisational renewal, and the strategic management of technological change.

Despite the substantial body of scholarly work, the issues surrounding the integration of the economic content of innovation activity with the management practices of mechanical engineering enterprises under conditions of digitalisation, high external turbulence, and wartime risks remain insufficiently developed.

#### ***Purpose of the article***

The aim of the article is to advance the theoretical and methodological foundations of managing the innovation activity of industrial mechanical engineering enterprises under conditions of digital transformation, wartime economic instability, and structural constraints

on industrial development by refining the economic essence of innovation activity, identifying the key trends and barriers to its implementation, and substantiating an integrated approach to its incorporation into the enterprise's strategic management system.

#### ***Presentation of the main material***

In mechanical engineering, innovation activity should be regarded not as an isolated set of scientific and technical measures, but as an economically driven process of generating, selecting, implementing, and commercialising new solutions that provide the enterprise with long-term competitive advantages.

Its content is manifested through the enterprise's ability to transform scientific and technical knowledge, engineering developments, digital technologies, organisational changes, and marketing instruments into new customer value, production efficiency, and market results.

For an industrial enterprise, innovation activity encompasses not only the creation of new types of products or the modernisation of technological processes, but also the renewal of the design system, production cooperation, service support, personnel management, and customer interaction. Its economic essence lies in ensuring the expanded reproduction of competitiveness through the continuous renewal of the enterprise's technical, technological, organisational, and managerial base.

Within the management system, innovation activity performs not an auxiliary but a system-forming function, as it determines the parameters of strategic development, resource provision, operational adaptation, and the market positioning of the enterprise.

At the strategic level, it shapes the trajectory of technological renewal, determines investment priorities, sets the directions for product portfolio diversification, and influences the choice of a competitive behaviour model. At the operational level, innovation activity alters the cost structure, the productivity of production systems, the competency requirements for personnel, the architecture of business processes, and the speed of response to market needs.

Under such conditions, the management of innovation activity should be interpreted as a purposeful managerial influence on the processes of generating, selecting, resourcing, implementing, and diffusing innovations, aimed at achieving economic effect and strengthening the enterprise's market position.

For industrial enterprises, this is of fundamental importance, since in this sector innovation acquires a complex character and combines design and technological, production, digital, logistical, and service components. It should therefore not be reduced merely

to the results of research and development or to individual technical innovations. It must be incorporated into the overall management system as a mechanism for ensuring the enterprise's resilience, adaptability, and long-term development in an unstable external environment.

Such an approach makes it possible to consider innovation activity not as an episodic response to technological challenges, but as a permanent factor in reproducing the competitive advantages of an industrial enterprise.

In this sense, the management of innovation activity appears not as a set of fragmented administrative decisions, but as an integral system within which the enterprise's strategic priorities, available resources, staff competencies, market signals, and organisational mechanisms for implementing change are brought together.

For an industrial enterprise, this system is particularly complex, as it encompasses not only the creation of new technical solutions, but also the coordination of production, engineering, financial, marketing, and service processes. Its subject field is formed by owners, corporate governance bodies, management at different levels, engineering and production specialists, as well as external partners involved in the development, testing, or implementation of innovations.

In this context, the object of managerial influence comprises not only innovation projects or new products, but also technological processes, organisational procedures, and the modes of interaction with customers, suppliers, and the research environment.

The effectiveness of such a system is determined not by the formal presence of separate managerial elements, but by the degree of their internal coherence. In this regard, the principles on which the management of innovation activity is based acquire primary importance.

In mechanical engineering, the principle of integrity signifies the inseparable connection between the technical concept, production implementation, economic feasibility, and the market demand for an innovation.

The principle of systemicity presupposes the coordination of all stages of the innovation cycle, from the emergence of an idea to its commercial exploitation and after-sales support.

No less important is the principle of adaptability, which, under conditions of war, disrupted logistics chains, labour shortages, and accelerated technological change, acquires not a declarative but a practical meaning. Its implementation requires the enterprise

to be capable of promptly revising innovation priorities, reassessing available resources, and altering the forms of work organisation without losing strategic coherence.

The principle of balance, in turn, ensures equilibrium between radical and incremental innovations, between the need to invest in future development and the necessity of maintaining current financial stability.

It is important to note that the contemporary system of managing innovation activity can no longer be confined to the internal production contour. It is increasingly based on marketing analytics, the forecasting of technological trends, customer segmentation, the identification of latent demand, and the assessment of the market scaling potential of new solutions.

For an industrial enterprise, this means a transition from a model in which innovation is generated exclusively “from production” to one in which it arises through interaction between engineering thinking, production capabilities, and the future needs of the customer. Under such an approach, the innovation system ceases to be a technocratic appendage to management and becomes its organic component.

The functional content of the innovation activity management system also requires a broader interpretation. This concerns not only the classical functions of analysis, planning, organisation, motivation, and control.

In contemporary mechanical engineering, particular importance is attached to the prognostic function, associated with identifying technological and market shifts; the integration function, which ensures the alignment of R&D, production, finance, and sales; the communication function, which establishes stable channels of interaction between internal units and external participants in the innovation process; as well as the knowledge management function, without which it is impossible to accumulate, disseminate, and transform experience into new competitive solutions.

The informational and organisational support for innovation activity should encompass knowledge management systems, digital document circulation, databases on developments, CRM and PLM solutions, analytical platforms for assessing market demand, as well as project interaction tools for all participants in the innovation cycle.

A logical continuation of this perspective is an appeal to the scientific and methodological approaches on the basis of which the instruments for managing innovation activity are formed.

In the scholarly literature, systemic, process-based, functional, project-based, and resource-based approaches are traditionally distinguished, each of

which reflects a particular perspective on the study of an enterprise’s innovative development:

– the systemic approach makes it possible to consider innovation activity as a subsystem within the overall management architecture and ensures the internal coherence of decisions; however, excessive formalisation may increase organisational inertia;

– the process-based approach focuses attention on the sequence of stages in the innovation cycle, which is useful for regulating actions, yet it often proves insufficient for taking account of strategic priorities and the variability of the external environment;

– the functional approach facilitates the allocation of responsibility among units, but in the absence of proper coordination it may cause a disconnect between research, production, and commercialisation;

– the project-based approach gives innovation activity the necessary flexibility and clearly defines timelines, budgets, and expected outcomes, although in itself it does not guarantee a link between individual projects and the enterprise’s long-term development trajectory;

– the resource-based approach, in turn, makes it possible to assess the provision of innovation with material, financial, human, and informational resources, but it does not always fully take into account the role of knowledge, creativity, cross-functional interaction, and open innovation linkages.

A comparative analysis of these approaches gives grounds to assert that none of them, taken separately, provides the necessary depth and flexibility for mechanical engineering enterprises operating under conditions of wartime instability, technological renewal, and the digital restructuring of production.

In such a case, a more productive option is an integrated approach that combines the systemic character of strategic vision, the logic of process structuring, the clarity of functional allocation, the flexibility of project management, and the resource-based substantiation of innovation decisions.

Its practical value lies in the fact that it makes it possible to form an open innovation ecosystem within which the enterprise interacts with universities, research institutions, start-ups, suppliers, customers, and industry partners, treating such linkages not as an auxiliary resource but as a direct source of innovation dynamics. Under this approach, particular importance is attached to the management of intellectual capital, the digitalisation of production processes, the use of cloud services, collaborative development platforms, CRM and PLM systems, as well as predictive analytics tools.

An analysis of the statistical dynamics of innovation activity in Ukrainian industry confirms the relevance of the outlined provisions. Despite the limited availability of official sectoral statistics on mechanical engineering, the accessible data from the State Statistics Service of Ukraine, analytical materials published by GMK Center, and expert assessments make it possible to trace the general trends that are of fundamental importance for this study [5-7].

Above all, this concerns the long-term decline in the share of innovation-active industrial enterprises, which has been accompanied by a reduction in innovation expenditure and an extremely low share of R&D expenditure in Ukraine’s GDP.

For mechanical engineering, these processes have been even more acute, as the sector combines high capital intensity, a complex production cycle, and a critical dependence on technological renewal (Table 1).

Table 1

**Key indicators of innovation activity among industrial and mechanical engineering enterprises of Ukraine in 2020–2024**

Year	Share of innovation-active industrial enterprises, %	Share of innovation-active mechanical engineering enterprises, %	Innovation expenditure, USD million	Share of R&D expenditure in GDP, %
2020	16,8	14	400	0,39
2021	9,6	8	373	0,38
2022	-	-	-	-
2023	8,8	6	191	0,37
2024	15,7	12	382	0,37

Source: compiled by the author on the basis of [5-7]

The data presented in the table indicate a contradictory development trajectory. On the one hand, 2024 saw a revival of innovation activity among industrial enterprises, which is largely

explained by the growth of defence orders, the concentration of resources on applied developments, and increased demand for dual-use technological solutions (Fig.).

On the other hand, this growth does not yet indicate the sustainable restoration of a fully-fledged innovation ecosystem, since the share of R&D expenditure in GDP remains critically low, while mechanical engineering continues to operate under conditions of a shortage of long-term financing, the deterioration of the production base, and significant workforce losses.

In this context, it is particularly important that even a certain recovery in quantitative indicators does not eliminate the underlying problem, namely the gap between the need for a technological breakthrough and the institutional weakness of the mechanisms for

managing innovation activity at the enterprise level.

An analytical reading of this dynamic shows that, following the relatively high level of innovation activity in 2016, there was a gradual contraction of the innovation process, which intensified in the pre-war period and reached a critical threshold under the conditions of full-scale war.

The increase in the indicator in 2024 should therefore be interpreted with caution: it reflects, rather, the economy’s response to extraordinary defence-related and technological needs than the resolution of the structural crisis in innovation-driven development.

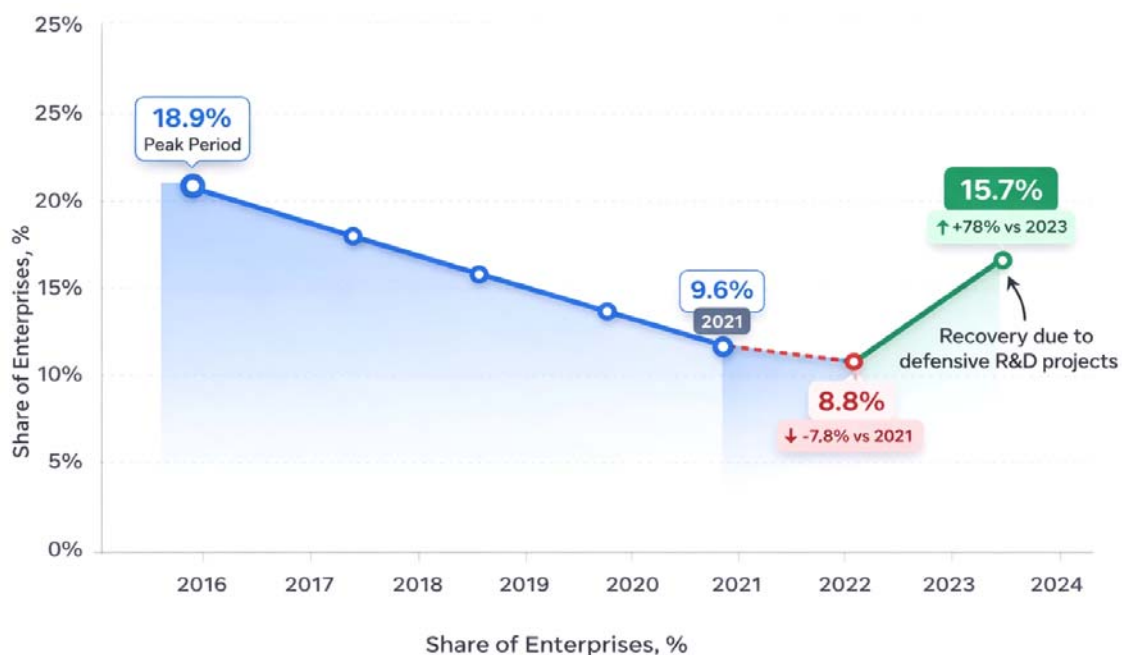


Fig. Dynamics of the share of innovation-active industrial enterprises in Ukraine in 2016–2024

Source: authors’ development based on data [5-7]

Therefore, the statistical analysis not only records fluctuations in individual indicators, but also confirms the need to move towards a new model for managing the innovation activity of industrial enterprises – one that is more integrated, adaptive, digitally supported, and oriented towards the cooperation of knowledge, resources, and market opportunities.

The theoretical analysis carried out and the generalisation of statistical trends provide grounds for asserting that mechanical engineering enterprises require not the local improvement of individual innovation management instruments, but a transition to an integral model for managing innovation activity.

This need is driven by a combination of several factors: the high capital intensity of production, the lengthy cycle of developing and bringing new products into operation, the growing technological complexity

of the market, the shortage of investment resources, as well as wartime and logistical risks, which substantially increase the cost of managerial error.

Under these conditions, an integrated approach is proposed, within which the innovative development of the enterprise is regarded as a continuous process of aligning strategic priorities, digital solutions, resource provision, partnership interaction, and the accumulation of knowledge.

Unlike traditional models, in which innovation activity is often reduced either to a set of individual projects or to the functioning of a separate R&D block, it is proposed to proceed from the understanding that, for mechanical engineering, innovation is the result of the interaction of several contours - design, production, informational, marketing, human resource, and cooperative.

In this sense, innovation activity ceases to be an auxiliary component of development and acquires the status of a system-forming factor of the enterprise's long-term competitiveness.

For the practical specification of the proposed approach, it is advisable to structure it according to its key components (Table 2).

Table 2

**Key provisions of the integrated approach to managing the innovation activity of mechanical engineering enterprises**

<b>Component</b>	<b>Content of the provision</b>	<b>Expected result</b>
<i>Networked innovation interaction</i>	The formation of a stable system of cooperation with universities, research institutions, engineering companies, start-ups, technology suppliers, and key customers is proposed.	Broader access to competencies, reduced costs at individual stages of R&D, and accelerated development of new solutions.
<i>Digitalisation of the innovation cycle</i>	The integration of IIoT, PLM, CAD/CAM, digital modelling, cloud platforms, and analytical services into the processes of product development, production, and support is proposed.	Reduced duration of production preparation, improved accuracy of design solutions, and increased flexibility of the production system.
<i>Flexible innovation portfolio</i>	The formation of a balanced portfolio of incremental, radical, defence-oriented, and socially significant projects is proposed.	Alignment of short-term efficiency with long-term technological development.
<i>Knowledge and competency management</i>	The creation of a corporate knowledge base, the recording of the results of developments, technical solutions, errors, and patent outputs, as well as the strengthening of internal training, is proposed.	Preservation of engineering experience, reduced knowledge losses, and improved quality in the preparation of innovative solutions.
<i>Adaptive strategic regulation</i>	The regular revision of innovation priorities on the basis of scenario analysis, flexible budgeting, and the rapid adjustment of investment decisions is proposed.	Greater resilience to external shocks and the preservation of controllability under conditions of instability.

Source: compiled by the author

The presented system of provisions makes it possible to move from fragmented management of innovations to a more mature model in which innovation activity is embedded in the overall management architecture of the enterprise.

First and foremost, it is proposed to shift the emphasis from the internal closedness of the innovation process to an open cooperative model. For mechanical engineering, this is of fundamental importance, since the complexity of contemporary developments, the shortage of time for bringing products to market, and resource constraints make a self-sufficient model of innovation increasingly ineffective.

Networked interaction makes it possible to attract specialised knowledge more rapidly, reduce the costs of testing and refining solutions, and shorten the path from concept to practical implementation.

The second emphasis is connected with the digitalisation of the innovation cycle. In this case, the issue is not the partial automation of individual operations, but the formation of a unified digital environment in which design preparation, production mastering, parameter control, service support, and

customer feedback are combined within a continuous information contour.

Such a logic makes it possible to enhance the manageability of the innovation process, minimise time losses, strengthen adaptability to changing technical requirements, and support the production of complex customised products.

No less important a component of the proposed approach is the portfolio-based organisation of innovation projects. For a mechanical engineering enterprise, it is risky both to focus excessively only on rapid improvements to existing products and to concentrate all resources on long-term high-risk projects.

It is therefore proposed that the innovation portfolio should be regarded as a system of complementary initiatives within which different types of projects perform different functions.

Incremental innovations support the current market position, radical innovations form the basis for a future technological breakthrough, defence-oriented innovations respond to urgent security challenges, and socially significant innovations expand the enterprise's capacity to adapt to social needs and

state priorities. Such an approach enhances not only economic balance but also the strategic resilience of the enterprise.

Particular attention should be paid to the block of knowledge and competency management. In mechanical engineering, knowledge has a directly applied character and is embodied not only in documentation, but also in professional experience, project solutions, algorithms of action, technological routes, and skills in overcoming production constraints. It is therefore proposed to record not only the results of successful developments, but also data on unsuccessful attempts, technical errors, the reasons for rejecting particular design decisions, and the accumulated experience of cross-functional interaction.

Such a system makes it possible to reduce the loss of engineering knowledge, which is especially important under conditions of labour shortages, relocation, and the disruption of professional ties.

The concluding element of the proposed approach is adaptive strategic regulation. Its content lies in ensuring the flexible adjustment of innovation strategy in accordance with changes in market parameters, technological priorities, regulatory requirements, and wartime economic conditions. The application of scenario analysis, flexible budgeting, the reservation of resources for promising initiatives, and the regular revision of investment decisions is proposed. This ensures the combination of strategic consistency with the necessary operational responsiveness of managerial action.

Thus, the proposed approach is not only applied but also methodological in character, since it brings together within a single managerial contour the systemic, project-based, digital, cooperative, and competency-based logics of development. Its distinctiveness lies in the fact that innovation activity is interpreted not as a set of isolated measures, but as an integrated process of reproducing the competitive advantages of a mechanical engineering enterprise.

#### Conclusions

As a result of the study, it has been demonstrated that, under contemporary conditions, the innovation activity of industrial enterprises should be regarded not as an autonomous functional area, but as a structural element of strategic management capable of ensuring the enterprise's adaptation to technological, market, and security-related changes. It has been established that the combination of digital transformation and wartime economic instability forms a new configuration of managerial requirements, in which the speed of the innovation cycle, the coherence of managerial decisions, the ability to reallocate resources, and the incorporation of knowledge assets

into the process of value creation acquire decisive importance.

The scientific result of the article lies in substantiating an integrated approach to managing the innovation activity of a mechanical engineering enterprise which, unlike fragmented functional solutions, is oriented towards combining strategic planning, digital instruments, project management, networked interaction, and internal organisational adaptability within a single managerial contour. This has made it possible to clarify the place of innovation activity within the enterprise management system as a factor not only of technological renewal, but also of ensuring long-term resilience, competitiveness, and the manageability of development.

The practical value of the results obtained lies in the possibility of using the proposed provisions in the formation of the innovation strategy of industrial enterprises, the modernisation of managerial decision-making mechanisms, the determination of investment priorities in digital technologies, and the building of a coordination system between production, technological, and analytical subsystems. The prospects for further research should be associated with the development of instruments for evaluating the effectiveness of innovation activity management and with the testing of the proposed approach at enterprises in different industrial sub-sectors.

#### REFERENCES

1. Hryhorenko, Yu. (2025). Za rakhunok oboronnykh R&D vytraty na innovatsii v Ukraini u 2024-mu zrosly udvichi [Due to defense R&D, innovation expenditures in Ukraine doubled in 2024]. *GMK Center*. Retrieved from <https://gmk.center/ua/infographic/za-rahunok-oboronnih-r-d-vitrati-na-innovacii-v-ukraini-u-2024-mu-zrosli-udvichi/> [in Ukrainian].
2. Radynskiy, S., & Diachun, O. (2022). Mekhanizm upravlinnia innovatsiinoiu diialnistiu pidpriemstva [Mechanism of management of enterprise innovation activity]. In: *Materialy VIII Mizhnarodnoi naukovo-praktychnoi konferentsii "Suchasni finansovi ta ekonomichni doslidzhennia" – Proceedings of VIII International scientific and practice conference "Modern financial and economic research"*, (pp. 147–149). Ternopil. Retrieved from [https://elartu.tntu.edu.ua/bitstream/lib/38524/2/FMZKPNES\\_2022\\_Radynskiy\\_S-Mechanism\\_of\\_management\\_147-149.pdf](https://elartu.tntu.edu.ua/bitstream/lib/38524/2/FMZKPNES_2022_Radynskiy_S-Mechanism_of_management_147-149.pdf) [in Ukrainian].
3. Charkina, T., Zadoia, V., & Dmytrieva, O. (2023). Marketing management at railway transport enterprises. In: *Innovative Development of the Road and Transport Complex: Problems and Prospects*, (pp. 158–171). Kharkiv: PC Technology Center, DOI: <https://doi.org/10.15587/978-617-7319-71-8.CH10> [in English].

4. Site of State Statistics Service of Ukraine. (2022). Kilkist innovatsiino aktyvnykh promyslovykh pidpriemstv za vydamy ekonomichnoi diialnosti promyslovosti za 2020–2021 roky [Number of innovatively active industrial enterprises by types of economic activity of industry for 2020–2021]. [www.ukrstat.gov.ua](http://www.ukrstat.gov.ua). Retrieved from [https://www.ukrstat.gov.ua/operativ/operativ2021/ni/vut\\_ippni/kpp\\_ved.xlsx](https://www.ukrstat.gov.ua/operativ/operativ2021/ni/vut_ippni/kpp_ved.xlsx) [in Ukrainian].

5. Site of State Statistics Service of Ukraine. (2024). Vytraty na innovatsii promyslovykh pidpriemstv za vydamy vytrat (2007–2023) u 2023 rotsi [Innovation expenditures of industrial enterprises by types of expenditures (2007–2023) in 2023]. [www.km.ukrstat.gov.ua](http://www.km.ukrstat.gov.ua). Retrieved from <https://www.km.ukrstat.gov.ua/ukr/statinf/povid280524.htm> [in Ukrainian].

6. Site of State Statistics Service of Ukraine. (2025). Vytraty na innovatsii promyslovykh pidpriemstv za vydamy vytrat (2020–2024) [Innovation expenditures of industrial enterprises by types of expenditures (2020–2024)]. [www.uz.ukrstat.gov.ua](http://www.uz.ukrstat.gov.ua). Retrieved from [https://www.uz.ukrstat.gov.ua/statinfo/nauka/2025/vytr\\_innov\\_vyd\\_vytr\\_2020-2024.pdf](https://www.uz.ukrstat.gov.ua/statinfo/nauka/2025/vytr_innov_vyd_vytr_2020-2024.pdf) [in Ukrainian].

Received 12.03.2026.

Revised 15.04.2026.

Accepted 16.05.2026.

Published 30.05.2026.

## ТЕОРЕТИКО-МЕТОДОЛОГІЧНІ ЗАСАДИ УПРАВЛІННЯ ІННОВАЦІЙНОЮ ДІЯЛЬНІСТЮ НА ПРОМИСЛОВИХ ПІДПРИЄМСТВАХ

*Василенко М. І.*

Статтю присвячено поглибленню теоретико-методологічних засад управління інноваційною діяльністю машинобудівних підприємств в умовах цифрової трансформації, воєнно-економічної нестабільності та структурних обмежень промислового розвитку. Проаналізовано сучасний стан інноваційної активності промислових і машинобудівних підприємств України та виявлено стійку тенденцію до зуження інноваційного потенціалу, що проявляється у скороченні витрат на інновації, низькій частці витрат на наукові дослідження у ВВП та недостатньому рівні комерціалізації інноваційної продукції. Обґрунтовано, що інноваційна діяльність машинобудівного підприємства має розглядатися не як сукупність окремих науково-технічних заходів, а як системоутворювальний чинник довгострокової конкурентоспроможності, який охоплює техніко-технологічні, організаційно-управлінські, кадрові, цифрові та ринкові компоненти розвитку. Узагальнено принципи, функції та структурні елементи системи управління інноваційною діяльністю, а також здійснено порівняльний аналіз системного, процесного, функціонального, проектного та ресурсного підходів до її організації. Доведено, що жоден із них окремо не забезпечує належної гнучкості, узгодженості та адаптивності для машинобудівних підприємств у сучасних умовах. У зв'язку з цим запропоновано комплексний підхід до управління інноваційною діяльністю, який поєднує мережеву інноваційну взаємодію, цифровізацію інноваційного циклу, гнучке портфельне структурування проектів, управління знаннями та компетентностями, а також адаптивне стратегічне регу-

лювання. Визначено, що практична цінність такого підходу полягає у підвищенні керованості інноваційного процесу, скороченні тривалості розроблення і впровадження нових рішень, зміцненні стійкості підприємства до зовнішніх шоків і розширенні можливостей кооперації з науковим, інжиніринговим та виробничим середовищем. Зроблено висновок, що перехід до комплексної моделі управління інноваційною діяльністю є необхідною передумовою технологічного оновлення та відтворення конкурентних переваг машинобудівних підприємств України.

**Ключові слова:** інноваційна діяльність, стратегічне управління, промислові підприємства, інноваційний менеджмент, цифровізація, адаптивне стратегічне регулювання, конкурентоспроможність.

## THEORETICAL AND METHODOLOGICAL FOUNDATIONS OF MANAGING INNOVATION ACTIVITY AT INDUSTRIAL ENTERPRISES

*Vasylenko M. I.\**

Ukrainian State University of Science and Technologies,  
Dnipro, Ukraine

\*e-mail: [naukapublik@gmail.com](mailto:naukapublik@gmail.com)

Vasylenko M. I. ORCID: <https://orcid.org/0009-0007-0436-4257>

This article is devoted to deepening the theoretical and methodological foundations of innovation activity management at machine-building enterprises under conditions of digital transformation, wartime economic instability, and structural constraints on industrial development. The current state of innovation activity at Ukraine's industrial and machine-building enterprises is analysed, and a persistent tendency towards a narrowing of innovation potential is identified, as reflected in declining innovation expenditure, a low share of research expenditure in GDP, and an insufficient level of commercialisation of innovative products. It is substantiated that the innovation activity of a machine-building enterprise should be regarded not as a set of separate scientific and technical measures, but as a system-forming factor of long-term competitiveness encompassing technical and technological, organisational and managerial, human-resource, digital, and market components of development. The principles, functions, and structural elements of the innovation activity management system are generalised, and a comparative analysis of the systemic, process-based, functional, project-based, and resource-based approaches to its organisation is carried out. It is proved that none of these approaches, taken separately, ensures the necessary flexibility, coherence, and adaptability for machine-building enterprises under current conditions. In this regard, an integrated approach to innovation activity management is proposed, combining network-based innovation interaction, digitalisation of the innovation cycle, flexible portfolio structuring of projects, knowledge and competence management, and adaptive strategic regulation. It is determined that the practical value of this approach lies in improving the manageability of the innovation process, reducing the time required for the development and implementation of new solutions, strengthening enterprise resilience to external shocks, and expanding opportunities for cooperation with the scientific, engineering, and production environment. It is concluded that the transition to an integrated model of innovation activity management is a prerequisite for technological renewal and the reproduction of competitive advantages at Ukraine's machine-building enterprises.

**Keywords:** innovation activity, strategic management, industrial enterprises, innovation management, digitalisation, adaptive strategic regulation, competitiveness.

#### REFERENCES

1. Hryhorenko, Yu. (2025). Za rakhunok oboronnykh R&D vytraty na innovatsii v Ukraini u 2024-mu zrosly udvichi [Due to defense R&D, innovation expenditures in Ukraine doubled in 2024]. *GMK Center*. Retrieved from <https://gmk.center/ua/infographic/za-rahunok-oboronnih-r-d-vitrati-na-innovacii-v-ukraini-u-2024-mu-zrosli-udvichi/> [in Ukrainian].
2. Radynskiy, S., & Diachun, O. (2022). Mekhanizm upravlinnia innovatsiinoiu diialnistiu pidpriemstva [Mechanism of management of enterprise innovation activity]. In: *Materialy VIII Mizhnarodnoi naukovo-praktychnoi konferentsii “Suchasni finansovi ta ekonomichni doslidzhennia” – Proceedings of VIII International scientific and practice conference “Modern financial and economic research”*, (pp. 147–149). Ternopil. Retrieved from [https://elartu.tntu.edu.ua/bitstream/lib/38524/2/FMZKPNES\\_2022\\_Radynskiy\\_S-Mechanism\\_of\\_management\\_147-149.pdf](https://elartu.tntu.edu.ua/bitstream/lib/38524/2/FMZKPNES_2022_Radynskiy_S-Mechanism_of_management_147-149.pdf) [in Ukrainian].
3. Charkina, T., Zadoia, V., & Dmytriiieva, O. (2023). Marketing management at railway transport enterprises. In: *Innovative Development of the Road and Transport Complex: Problems and Prospects*, (pp. 158–171). Kharkiv: PC Technology Center, DOI: <https://doi.org/10.15587/978-617-7319-71-8.CH10> [in English].
4. Site of State Statistics Service of Ukraine. (2022). Killkist innovatsiino aktyvnykh promyslovykh pidpriemstv za vydamy ekonomichnoi diialnosti promyslovosti za 2020–2021 roky [Number of innovatively active industrial enterprises by types of economic activity of industry for 2020–2021]. *www.ukrstat.gov.ua*. Retrieved from [https://www.ukrstat.gov.ua/operativ/operativ2021/ni/vut\\_ippni/kpp\\_ved.xlsx](https://www.ukrstat.gov.ua/operativ/operativ2021/ni/vut_ippni/kpp_ved.xlsx) [in Ukrainian].
5. Site of State Statistics Service of Ukraine. (2024). Vytraty na innovatsii promyslovykh pidpriemstv za vydamy vytrat (2007–2023) u 2023 rotsi [Innovation expenditures of industrial enterprises by types of expenditures (2007–2023) in 2023]. *www.km.ukrstat.gov.ua*. Retrieved from <https://www.km.ukrstat.gov.ua/ukr/statinf/povid280524.htm> [in Ukrainian].
6. Site of State Statistics Service of Ukraine. (2025). Vytraty na innovatsii promyslovykh pidpriemstv za vydamy vytrat (2020–2024) [Innovation expenditures of industrial enterprises by types of expenditures (2020–2024)]. *www.uz.ukrstat.gov.ua*. Retrieved from [https://www.uz.ukrstat.gov.ua/statinfo/nauka/2025/vytr\\_innov\\_vyd\\_vytr\\_2020-2024.pdf](https://www.uz.ukrstat.gov.ua/statinfo/nauka/2025/vytr_innov_vyd_vytr_2020-2024.pdf) [in Ukrainian].