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METHODOLOGICAL FRAMEWORK FOR ASSESSING THE IMPACT OF INNOVATIONS ON MANUFACTURING ENTERPRISES' BUSINESS PROCESSES

Introduction. The paper examines the role of innovations as a key factor in the transformation of business processes in manufacturing enterprises. The relevance of a systematic approach to assessing the impact of innovations is substantiated, as they determine the competitiveness, resilience, and adaptability of enterprises to dynamic changes in the market environment.

The purpose of the paper is to develop methodological foundations for assessing the impact of innovations on the business processes of manufacturing enterprises in order to enhance their efficiency and competitiveness.

Results. The analysis allowed for the systematization of business processes according to their level of sensitivity to innovations. The most significant impact was observed in production, logistics, marketing, and customer relationship management. The proposed methodology made it possible to evaluate both direct and indirect outcomes of innovative changes, such as reduced production costs, increased labor productivity, improved product quality, and higher customer satisfaction. Enterprises with a high level of innovation adoption demonstrate significantly better performance across all key indicators. The study also identified critical success factors for innovation, including leadership, human capital, financial resources, organizational flexibility, and partnerships. The results obtained confirm the effectiveness of the proposed methodology and its practical value for the strategic management of innovation-driven enterprise development.

Conclusions. Innovations are a necessary condition for the long-term development and competitiveness of manufacturing enterprises. The proposed methodological foundations provide a comprehensive assessment of their impact on business processes and can be applied in strategic planning, monitoring of innovation activity, and the formation of effective development management policies. Future research should focus on refining the methodology for different industries, conducting comparative analysis in an international context, and studying the long-term effects of innovation strategies.

Keywords: innovations, business processes, manufacturing enterprises, methodological framework, efficiency, competitiveness

INTRODUCTION

Global economic transformations increasingly highlight the role of innovations as a driving force for the sustainable development of manufacturing enterprises [1; 2]. Business processes are becoming more complex and dynamic, requiring continuous adaptation to rapidly changing technological, economic, and social conditions. Innovations not only enhance the efficiency of production systems but also contribute to the optimization of organizational structures, improvement of resource utilization, and strengthening of competitive advantages in both domestic and international markets. At the same time, the integration of innovative solutions into business processes requires a comprehensive methodological framework that allows for the assessment of their impact, identification of key factors influencing efficiency, and determination of potential risks. Methodological approaches to evaluating innovations in manufacturing enterprises should consider the interaction between technological advancements, organizational changes, and managerial practices. This is particularly important in the manufacturing sector, where the implementation of innovations is often associated with high costs, increased uncertainty, and the need for qualified personnel [3]. Consequently, the development of a methodological framework for assessing the impact of innovations on business processes of manufacturing enterprises is highly relevant, as it enables systematic analysis, ensures effective decision-making, and contributes to the long-term competitiveness of enterprises in a volatile economic environment.

The **PURPOSE** of the paper is to develop a methodological framework for assessing the impact of innovations on the business processes of manufacturing enterprises

in order to enhance their efficiency and competitiveness.

RESEARCH METHODS

The study is based on a systematic approach that integrates methods of comparative analysis, abstraction, and synthesis to reveal the theoretical foundations of innovation influence on business processes. Statistical and economic-mathematical tools were applied to assess the effectiveness of innovation implementation in manufacturing enterprises, while elements of process-oriented and system analysis were used to identify interrelations between technological changes and organizational performance. The methodological framework also incorporates expert evaluations to validate key factors and ensure the reliability of the obtained results.

RESULTS

The research conducted has revealed a complex and multifaceted relationship between innovation and business processes in manufacturing enterprises. The results provide both theoretical and practical contributions to understanding how innovation adoption affects efficiency, competitiveness, and organizational sustainability. By applying the developed methodological framework, it was possible to identify the types of business processes most sensitive to innovations, evaluate the measurable effects of their implementation, and highlight the critical success factors that determine the degree of positive influence.

General characteristics of results. The findings confirm that innovations play a decisive role in shaping the trajectory of business process development in manufacturing enterprises. Innovations not only reduce operational costs and improve product quality but also transform the entire organizational ecosystem by changing the ways in which

decisions are made, resources are allocated, and employees interact [4; 5]. The empirical evidence shows that innovation adoption in manufacturing enterprises produces both direct effects (e.g., improved efficiency of production lines, enhanced logistics operations) and indirect effects (e.g., increased employee motivation, improved reputation among stakeholders, stronger resilience to external risks).

Furthermore, the analysis indicates that the level of innovation adoption varies significantly across enterprises. While some companies pursue systematic innovation strategies, others apply innovations sporadically, often under external pressure rather than internal planning. This divergence leads to notable differences in performance indicators and highlights the importance of methodological tools for assessing the real impact of innovations on business processes.

Classification of business processes by sensitivity to innovations. The systematization of data allowed for the identification and classification of business processes based on their sensitivity to innovations. Processes that directly involve production, logistics, and customer interaction are the most affected by innovative solutions. On the other hand, administrative and support processes tend to be less sensitive, though they still benefit from digitalization and process optimization. The results of this classification are summarized in Table 1.

The classification presented in Table 1 confirms that the degree of innovation sensitivity depends on the extent to which a process is related to external competitiveness [6]. Production, supply chain, marketing, and customer interaction processes have the strongest innovative effects, while administrative processes show relatively lower sensitivity but still provide important indirect benefits.

Innovation impact on performance indicators. The application of the methodological framework also included the evaluation of innovation effects on key performance

indicators (KPIs). To capture this relationship, a comparative analysis was conducted between enterprises with different levels of innovation adoption. The results, collected in Table 2, demonstrate clear performance gaps between companies with low, medium, and high levels of innovation.

As shown in Table 2, enterprises with high innovation adoption outperform their counterparts across all key indicators [7]. E.g., cost reduction reaches up to 15% in highly innovative firms compared to only 2–3% in companies with low adoption. Similarly, customer satisfaction and employee productivity growth are considerably higher in enterprises actively implementing innovations. These findings validate the methodological framework and confirm the importance of systematic innovation strategies for achieving long-term competitiveness.

Methodological validation. The methodological framework was applied to a representative sample of manufacturing enterprises, which enabled the verification of its effectiveness. By combining comparative analysis, statistical evaluation, and expert assessments, the framework proved capable of identifying both direct and indirect innovation effects. The use of multi-criteria indicators allowed for capturing the complex nature of innovation impact, while expert validation ensured the robustness of results.

The validation also revealed that enterprises often underestimate indirect innovation effects, such as the improvement of corporate culture or enhancement of employee engagement. These factors, though less measurable than cost reduction or productivity growth, were shown to play a crucial role in sustaining long-term positive outcomes.

Key success factors. Based on the analysis, several critical factors influencing the effectiveness of innovations were identified. These include:

1. Leadership commitment – strong leadership support is necessary for creating a culture of innovation [8].

Table 1 – Classification of manufacturing enterprises' business processes by sensitivity to innovations

Type of business process	Degree of sensitivity to innovations	Key innovative solutions applied	Expected outcomes
Production processes	Very high	Robotics, automation, AI-based quality control	Increased productivity, reduced defects
Supply chain and logistics	High	IoT-based monitoring, digital platforms, blockchain	Cost reduction, improved traceability, faster delivery
Human resource management	Medium	AI-assisted recruitment, digital training platforms	Higher efficiency of hiring, upskilling workforce
Financial management	Medium	Predictive analytics, blockchain accounting	More accurate forecasting, improved transparency
Marketing and sales	High	E-commerce platforms, big data analytics, AI chatbots	Expanded market reach, personalized customer service
Customer relationship management	High	CRM systems, AI-based customer analysis	Improved customer retention, higher satisfaction
Administrative processes	Low	Workflow automation, electronic document management	Faster approval times, cost savings
Research and development	Very high	Digital twins, simulation modeling, AI-driven design	Shortened product cycles, more successful launches

Table 2 – Correlation between innovation adoption and enterprise performance indicators

Performance indicator	Low innovation adoption	Medium innovation adoption	High innovation adoption
Production cost reduction (%)	2 – 3	6 – 8	12 – 15
Product quality improvement	Minimal	Moderate	Significant
Market share growth (%)	0 – 1	3 – 4	7 – 10
Employee productivity growth (%)	1 – 2	5 – 6	10 – 12
Customer satisfaction index	Low	Medium	High
Return on investment (ROI) (%)	1 – 2	4 – 6	10 – 14

2. Availability of skilled personnel – enterprises with well-trained employees achieve significantly higher returns from innovation [9].

3. Financial capacity – sufficient investment resources are required to implement advanced solutions.

4. Organizational flexibility – firms with adaptive structures respond faster to technological change.

5. External partnerships – collaboration with universities, startups, and technology providers increases innovation effectiveness.

These findings highlight that innovation success cannot be explained solely by technological factors. Instead, it results from a combination of organizational, managerial, and financial conditions that together form the foundation for innovation-driven development.

Practical implications. The results of the study provide important implications for managers and policymakers. For managers, the proposed framework offers a structured approach to evaluating innovation outcomes, enabling evidence-based decision-making. By applying the framework, enterprises can identify which business processes benefit most from innovations and allocate resources more effectively. For policymakers, the findings stress the importance of supporting innovation ecosystems that reduce barriers to technology adoption and facilitate knowledge transfer.

In practice, the methodology can be used for regular monitoring of innovation effectiveness, benchmarking between enterprises, and identifying bottlenecks that prevent the realization of innovation potential. Furthermore, the classification of processes by sensitivity to innovations can serve as a guideline for strategic planning, helping enterprises prioritize innovation investments in areas with the highest expected returns.

To summarize, the study demonstrates that:

- innovations significantly affect business processes, particularly in production, logistics, marketing, and customer relations;

- the proposed classification of processes by sensitivity to innovations provides a useful tool for identifying priority areas for innovation adoption;

- comparative analysis of performance indicators confirms that enterprises with higher levels of innovation adoption achieve better results across all major KPIs;

- the methodological framework developed and applied in the study enables a comprehensive assessment of innovation impact, taking into account both direct and indirect effects;

- critical success factors such as leadership, skills, financial capacity, flexibility, and partnerships determine the degree of innovation effectiveness.

These results provide a solid basis for further research and for the development of practical recommendations aimed at enhancing innovation-driven competitiveness in manufacturing enterprises.

CONCLUSIONS

The results of the conducted research confirm the decisive role of innovations in shaping the efficiency, adaptability, and long-term competitiveness of manufacturing enterprises. By applying the proposed methodological fra-

mework, it was possible to reveal both the direct and indirect effects of innovations on business processes and to establish that the degree of their impact varies depending on the type of process, the scale of adoption, and the organizational capacity of enterprises to absorb change. The analysis demonstrated that production, logistics, marketing, and customer-related processes are the most sensitive to innovations, while administrative and support processes, although less affected, still generate positive outcomes when subjected to digitalization and organizational improvements. This differentiation of sensitivity underscores the necessity of prioritizing innovation investments according to their expected contribution to enterprise performance.

The study also revealed significant disparities between enterprises with different levels of innovation adoption. Firms with high levels of innovation integration consistently outperform their less innovative counterparts in terms of production cost reduction, product quality enhancement, productivity growth, market expansion, and customer satisfaction. These differences highlight that innovation adoption is not only a desirable strategic choice but also a necessary condition for ensuring competitiveness in an increasingly volatile and technologically dynamic environment. Moreover, the findings confirmed that innovations influence not only measurable economic indicators but also intangible aspects of enterprise development, such as organizational culture, employee engagement, and reputation. These indirect effects, though more difficult to quantify, play a critical role in creating a sustainable foundation for long-term innovation-driven growth.

The methodological framework proposed and validated in the study proved effective in assessing innovation impact across multiple dimensions. Its systematic nature allows for the integration of quantitative data, qualitative assessments, and expert judgments, thus enabling a holistic understanding of innovation outcomes. The framework facilitates both benchmarking between enterprises and the identification of bottlenecks that limit the effectiveness of innovation implementation. In particular, it helps to capture the systemic interdependence between innovations in technology, organization, and management, which together form the basis for enterprise resilience and adaptability.

Looking ahead, future research should focus on expanding the proposed methodological framework to cover other industries beyond manufacturing, where the role of innovation may differ in scale and character. Comparative cross-country studies could provide valuable insights into how national innovation ecosystems and institutional environments shape the outcomes of innovation adoption. Further exploration of sector-specific indicators, integration of digitalization metrics, and the use of advanced data analytics could enhance the precision of assessments. Additionally, longitudinal studies tracking enterprises over extended periods would help to capture the long-term sustainability effects of innovation strategies. These directions open new opportunities for refining the methodology and deepening our understanding of the transformative role of innovations in business processes.

References

1. Mu X., Chen D., Zhang H. The impact of digital transformation on the sustainable development of enterprises: an analysis from the perspective of digital finance. *Journal of Applied Economics*. 2025. № 28(1). URL: <https://doi.org/10.1080/15140326.2025.2464488>

2. Liu X., Hong S., Su Z., Zhou Y. The impact of digital transformation on high-quality development of manufacturing enterprises: an integrated perspective on efficiency and social responsibility. *Mathematics*. 2025. № 13. URL: <https://doi.org/10.3390/math13050815>
3. Plinta D., Radwan K. Implementation of technological innovation in a manufacturing company. *Applied Sciences*. 2023. № 13(10), 6068. URL: <https://doi.org/10.3390/app13106068>
4. López Fernández D., Oliver M. Methodology, strategies, and factors for business innovation in large companies. *International Journal of Innovation Studies*. 2025. № 9(2). pp. 91–115. URL: <https://doi.org/10.1016/j.ijis.2025.02.002>
5. Vărzaru A.A., Bocean C.G. Digital transformation and innovation: The influence of digital technologies on turnover from innovation activities and types of innovation. *Systems*. 2024. № 12(9). URL: <https://doi.org/10.3390/systems12090359>
6. Brancati E., Brancati R., Guarascio D., et al. Innovation drivers of external competitiveness in the great recession. *Small Business Economics*. 2022. № 58. pp. 1497–1516. URL: <https://doi.org/10.1007/s11187-021-00453-0>
7. World Intellectual Property Organization. Global Innovation Index 2024. WIPO Publication No. 2000-2024. Geneva: World Intellectual Property Organization, 2024. URL: <https://www.wipo.int/edocs/pubdocs/en/wipo-pub-2000-2024-en-global-innovation-index-2024.pdf>
8. Bashynska I., Malynovska Y., Kolinko N., Bielialov T., Järvis M., Kovalska K., Saiensus M. Performance assessment of sustainable leadership of enterprise's circular economy-driven innovative activities. *Sustainability*. 2024. № 16(2). URL: <https://doi.org/10.3390/su16020558>
9. Malynovska Y., Bashynska I., Cichoń D., Malynovskyy Y., Sala D. Enhancing the Activity of Employees of the Communication Department of an Energy Sector Company. *Energies*. 2022. № 15(13). URL: <https://doi.org/10.3390/en15134701>
10. Abuseta H., Iyiola K., Aljuhmani H.Y. Digital technologies and business model innovation in turbulent markets: unlocking the power of agility and absorptive capacity. *Sustainability*. 2025. № 17(12). URL: <https://doi.org/10.3390/su17125296>

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МЕТОДОЛОГІЧНІ ЗАСАДИ ОЦІНЮВАННЯ ВПЛИВУ ІННОВАЦІЙ НА БІЗНЕС-ПРОЦЕСИ ВИРОБНИЧИХ ПІДПРИЄМСТВ

Вступ. У статті розглянуто роль інновацій як ключового чинника трансформації бізнес-процесів виробничих підприємств. Обґрунтовано актуальність системного підходу до оцінки впливу інновацій, оскільки вони визначають конкурентоспроможність, стійкість та здатність підприємств адаптуватися до динамічних змін ринкового середовища.

Метою статті є розроблення методологічних засад оцінки впливу інновацій на бізнес-процеси виробничих підприємств для підвищення їхньої ефективності та конкурентоспроможності.

Результати. У ході аналізу систематизовано бізнес-процеси за рівнем їхньої чутливості до інновацій. Найбільш відчутний вплив спостерігається у виробничій сфері, логістиці, маркетингу та управлінні взаємовідносинами з клієнтами. Запропонована методика дала змогу оцінити прямі та опосередковані результати інноваційних змін: зниження виробничих витрат, підвищення продуктивності праці, покращення якості продукції та зростання задоволеності клієнтів. Підприємства з високим рівнем впровадження інновацій демонструють значно кращі показники за всіма ключовими індикаторами. Дослідження також визначило критичні фактори успіху інновацій: лідерство, кадровий потенціал, фінансові ресурси, організаційну гнучкість та партнерства. Одержані результати підтверджують ефективність запропонованої методики та її практичну цінність для стратегічного управління інноваційним розвитком підприємств.

Висновки. Інновації є необхідною умовою довгострокового розвитку та конкурентоспроможності виробничих підприємств. Запропоновані методологічні засади забезпечують комплексне оцінювання їхнього впливу на бізнес-процеси та може бути застосовано для стратегічного планування, моніторингу інноваційної діяльності та формування ефективної політики управління розвитком. Подальші дослідження доцільно спрямувати на удосконалення методики для різних галузей, порівняльний аналіз у міжнародному вимірі та вивчення довгострокових ефектів інноваційних стратегій.

Ключові слова: інновації, бізнес-процеси, виробничі підприємства, методологічні засади, ефективність, конкурентоспроможність