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STRATEGIC INNOVATIVE MANAGEMENT AND SUSTAINABLE DEVELOPMENT OF INDUSTRIAL ENTERPRISES

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Introduction. Amidst the dynamic changes in the competitive environment, strategic management of innovative development is a decisive factor in ensuring the stability and sustainable development of industrial enterprises. Despite the importance of innovative development, many enterprises face problems implementing an effective innovation strategy and lacking an innovative culture due to successfully managing projects with a high share of research and development (R&D).

Aim and tasks. This study aims to analyse the factors that influence the effectiveness of strategic management in the innovative development of industrial enterprises and to form a case for modelling business processes by assessing the cost component of R&D and its components.

Results. The results of the study show that sustainable development of an industrial enterprise is possible under conditions of high-quality strategic management ("Technology Roadmapping" of industrial innovations and the "Open Innovation" model). The effectiveness of strategic management in the development of an industrial enterprise depends on factors such as the development of an innovation culture, investments in innovation processes, the ability of the enterprise to adapt, and the availability of information necessary for making strategic decisions. According to the results obtained in Ukraine, there is an increase in the volume of spending on scientific experiments and developments by 2.1% in 2022 compared to 2018, while spending on applied research increased by 35.3%, with a decrease in spending on scientific experimental developments by 13.1%. According to the results of calculating the correlation coefficient, it was found that there is a close relationship (0.913) between the cost of implementing innovations in production and the cost of R&D, which is the basis for coordinating the modelling of scientific and technical activities and business processes at the regional economy level.

Conclusions. During this research, the features of creating a technological map of innovation at an industrial enterprise were considered, and the open innovation model was adapted to the operating conditions of an industrial enterprise. Considering that the innovative basis of industrial content is formed in different regions of Ukraine with different dynamics, a recommendation was made regarding using interregional cooperation tools to form economic models for the sustainable development of industrial enterprises.

Keywords: strategies, innovative development, industrial enterprise, technological innovation map, open innovation.

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1. Introduction.

Technological progress require industrial enterprises to improve and innovate to maintain competitiveness constantly. Trends in digitalisation, the development of artificial intelligence, and the Internet of Things require enterprises to implement the latest technologies and make fundamental changes to the strategic management of innovation processes. Despite significant investments in research and development (R&D), on average 2-4% of company revenue in countries with high incomes, many enterprises face problems of inefficient use of resources and insufficient integration of innovations into the overall development strategy.

The study hypothesises that the strategic management of innovative development of industrial enterprises directly affects their competitiveness and market sustainability, and the development of an innovative culture and increased investment in R&D contribute to the formation of an effective system of strategic management of the innovative development of an industrial enterprise.

The level of innovation activity in EU countries varies from 45% to 80%, depending on the industry and country (Fitz-Oliveira & Wasgen, 2023). According to the State Statistics Service of Ukraine (2024), from 2018 to 2023, the share of enterprises implementing innovations is only about 20%, which indicates significant potential for improving the situation through optimisation of strategic management of innovation development. The problem is also complicated by the lack of information for decision-making and effective mechanisms for assessing and monitoring innovation activity to form an innovation management strategy for an industrial enterprise. Enterprises should have clear criteria for measuring innovation activities, which complicates the adoption of informed management decisions.

Thus, to ensure the sustainable development of industrial enterprises, it is necessary to develop and implement effective strategies for managing innovation, including developing an innovative culture, increasing investment in research, and implementing flexible management methods considering regional characteristics.

The development of the regional economy is crucial for the country's development, which necessitates the creation of conditions for the effective implementation of innovations. Since business process modelling requires a sufficient amount of information, it is necessary to develop such approaches to create an information base for the digital economy that will make it possible to create a model for the implementation of innovations based on the availability of developments in a certain geographical region of the country. Since developed innovations result from research activity, modelling business processes in a particular region requires information about the research's qualitative, quantitative, and cost components.

This study considers the cost component of R&D. The effectiveness of innovation implementation will also be analysed by studying the cost criterion and the correlation between the total amount of innovation costs and costs for scientific and technical experimental developments. The proposed studies on cost indicators of innovation activity aim to create optimal conditions for economic modelling in the context of the digital transformation of the regional economy.

2. Literature review.

The processes that need to be carried out at an industrial enterprise in the process of forming the concept of sustainable development were studied by Akgün (2022) and Fitz-Oliveira (2023), who drew attention to the importance of sustainable development planning (Akgün & Polat, 2022) and considered its features for industrial enterprises (Fitz-Oliveira & Wasgen, 2023).

The impact of the tools emerging from the digital transformation of the modern economy was studied by Bobro (2024) and Massa et al. (2023). These studies revealed patterns between the development of digital tools and the increase of economic information (Bobro, 2024), which needs to be processed qualitatively to obtain informatively significant volumes of data, and presented the main approaches to collecting and processing information, the elements of which were used in conducting this study (Massa et al., 2023).

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Much attention is paid to the study of implementing innovations to form a sustainable development of an industrial enterprise. The features of managing the processes of finding sources of innovative activity (Biswas et al., 2024), methods of managing the processes of implementing innovations (Cucino et al., 2024), and the features of implementing innovative business projects that are closely related to scientific and technical developments (Chupryna et al., 2022) are considered.

Since innovation management is accompanied by a systematic analysis of the effectiveness of its implementation and requires ongoing adjustments to the course of innovation processes, management specialists must have the appropriate skills (Brem et al., 2019). Managers should also fully understand the nature of digital requirements, especially when compiling statistical reports during the implementation of innovations, which has an impact on the results of studies similar to this one (Foster-McGregor et al., 2021).

The implementation of innovations is accompanied by an increase in the requirements for the level of competence of participants in innovation processes, which affects the quality of their implementation (Vendrell-Herrero et al., 2023). As part of this study, statistical data is used to consider all the requirements for recording innovation processes.

Since the industrial sector of the economy is being studied, it is necessary to take into account the peculiarities of the transition from industrial to neo-industrial development of certain regions of Ukraine (Hirna et al., 2022). The study used statistical observation methods proposed in innovation analysis studies (Koval et al., 2024). Recommendations on applying methodological features of the implementation and functioning of efficiency analysis systems in industrial entrepreneurship were considered by Sahaidak et al. (2020).

However, despite the causal relationships between the level of business activity and structural changes in the manufacturing sector (Machado & Davim, 2022), questions regarding the impact of the value of R&D and the level of spending by industrial enterprises on the introduction of innovations remain unclear (Gozali et al., 2024).

Mostly, these processes are considered separately and within the framework of countries as a whole, without specifying individual regions, which does not provide complete information about the presence of scientific developments of an industrial direction in certain regions and complicates the processes of technological mapping when creating strategies for the development of industrial enterprises (Nguyen et al., 2024).

3. Theoretical framework.

This study aims to analyse the factors that affect the effectiveness of strategic management in the innovative development of industrial enterprises and to form a case for modelling business processes by assessing the cost component of R&D and its components. The objectives of this study are:

- to implement effective innovation mapping ("Technology Roadmapping") to identify regions of Ukraine that are leaders in forming the research and technical base of industrial innovations, and to study the dynamics of their advancement in total expenditures on research and development.

- to investigate the correlation between the costs of implementing innovations and the costs of implementing R&D in general and the cost of implementing innovations for 1% of enterprises engaged in innovative activities, that is, to find out the presence or absence of innovative developments not implemented in these regions, thus creating a motivational circle to encourage the search for industrial innovations and the effective use of the "Open Innovation" model.

The research was conducted using the method of studying the concepts of the functioning of the "Technology Roadmapping" and "Open Innovation" models by forming theoretical information about the features of their creation and functioning (Brandmeier & Rupp, 2024; Szopik-Depczyńska et al., 2024; Zavidna et al., 2019). To study the adequacy of the functioning of models with R&D products, a statistical analysis of its expenses was conducted for the period from 2018 (x_{2018} for each indicator) to 2022 (x_{2022} for each indicator) in the regions of Ukraine that showed the 10 highest results.

For all obtained indicators, the absolute percentage increase for the study period was investigated using formula:

$$\Delta_{\%} = \frac{x_{2022} - x_{2018}}{x_{2018}} * 100\% \quad (1)$$

According to the results of 2019, a correlation was found between the total amount of costs for the implementation of innovations (y_i) and costs for R&D (x_i) for regions according to formula (2).

$$r = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 (y_i - \bar{y})^2}} \quad (2)$$

4. Results.

The innovative development of industrial enterprises is based on the digitalisation of production processes and technologies that allow enterprises to increase production efficiency, optimise resource use, and reduce costs (Massa et al., 2023).

Equally important is cooperation between industrial enterprises and research institutes for exchanging knowledge and technology. However, with high bureaucracy, such interaction may be reduced to the successful implementation of innovations (Chkhaidze et al., 2023). The modern challenges in the field of innovative development include financing issues.

Despite significant investments in research and development in developed countries, many enterprises still experience a shortage of resources for the implementation of innovative projects, which requires the development of new financial instruments and models of support for innovation activities that would provide stable financing and reduce risks for investors (Sahaidak et al., 2020). Effective strategic management of industrial enterprises' innovative development depends on several key factors determining their ability to innovate and adapt to the modern market environment (Table 1).

Table 1. Key factors influencing the effectiveness of strategic management of innovative development.

Key factors	Description	Cases of influence
Innovative culture	The value system, attitude, and behaviour of employees regarding innovations and developments.	Boosting employee motivation, fostering creativity, and enhancing communication
Investments in R&D	Financing of research and development works.	New product and technology development, quality improvement, and cost reduction.
Cooperation with scientific institutions	Partnership with universities, research institutes, and other research centres.	Access to advanced technologies, reducing research time and costs.
Flexibility and adaptability	Quickly react and adapt strategies to changes in the environment.	Implementation of Agile and Lean methods.
Human Resources Management	Employee skill development and continuous training opportunities.	Increasing the creativity improves the results of innovation.

Source: based on Sapotnitska et al. (2023).

Table 1 presents information on the key factors that influence the effectiveness of strategic management in the innovative development of industrial enterprises. Introducing key factors into strategic management will allow industrial enterprises to ensure long-term competitiveness and sustainability in the market.

The development of models and tools for the strategic management of innovation development is a key task for enterprises seeking to maintain competitiveness and sustainability in a dynamic market environment (Prokopenko et al., 2021; Shmygol et al., 2018). The main goal of such models is to create a system of management tools aimed at effectively implementing innovation strategies that allow enterprises to adapt to changes and implement new ideas (Stefan, 2021).

One of the key models is the "Technology Roadmapping" model, which allows planning and coordinating the development of technologies in the strategic goals of the enterprise in several main stages (Fig. 1).

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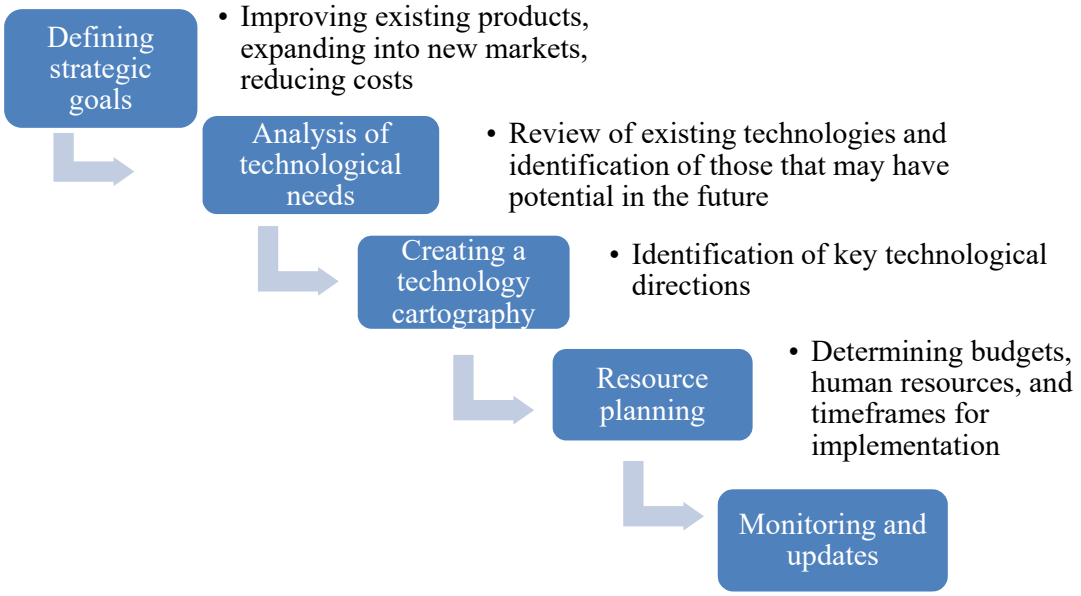

Fig. 1. Stages of the "Technology Roadmapping" model.

Source: based on Nazarova et al. (2022).

Another important model is "Open Innovation", which involves active cooperation with external partners, including companies, universities, research laboratories, and start-ups (Primario et al., 2024). The model's approach allows enterprises to access new ideas, technologies, and resources that can significantly strengthen their innovation efforts. The open innovation model helps to increase the speed of introducing new products to the market and reduces research and development costs (Fig. 2).

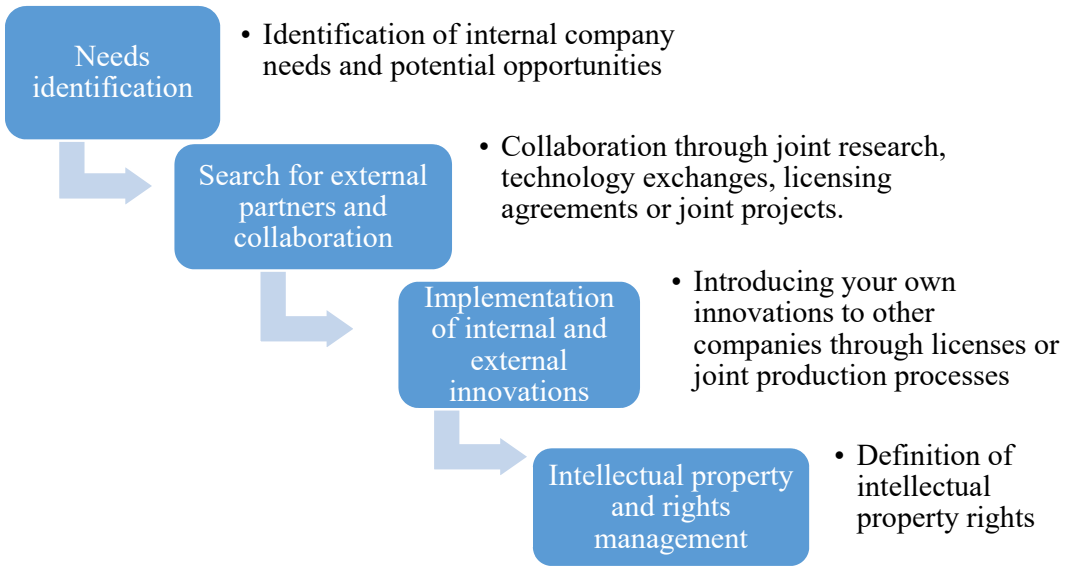

Fig. 2. Stages of the "Open Innovation" model.

Source: adapted from Cucino et al. (2024).

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To substantiate the effectiveness of strategic innovation management models, it is important to conduct a systematic analysis and evaluation of the results of their implementation, which includes measuring performance indicators such as time from idea to commercialisation, percentage of profitable innovation projects, and market share growth of new products (Koval et al., 2024).

Assessing the effectiveness of the proposed strategies and their implementation in industrial enterprises is crucial for ensuring the sustainable development and competitiveness of organisations in modern economic reality. After developing strategic solutions and choosing optimal development paths, a comprehensive assessment of their effectiveness is important. The presented process includes an assessment of financial indicators, such as return on investment, increase in turnover, and improvement in the financial stability of the enterprise (Purdenko et al., 2023). Additionally, an assessment of effectiveness considers the impact of strategies on a company's market position and competitive potential.

In practice, to successfully evaluate the effectiveness of strategies, it is important to apply a systematic approach and use both quantitative and qualitative methods, which may include auditing, and monitoring implementation results, regular analysis and tracking of important performance indicators, and expert assessment of external consultants and specialised analytical agencies. The overall goal of evaluating the effectiveness of strategies is to ensure the enterprise's long-term success through the rational use of resources, maximising value for stakeholders, and maintaining competitive advantage in the global market environment.

Optimising the strategic management of innovative development is critically important for ensuring the competitiveness and sustainable development of industrial enterprises (Massa et al., 2023). Based on the research conducted, the following practical recommendations can be developed:

1. Systematic analysis of the market and technological trends to identify market needs and opportunities for introducing new technologies and products.

2. Implementation of the "Open Innovation" or "Technology Roadmapping" model. Involving external partners and collaborating with universities, research centres, and start-ups can significantly increase innovation potential.

3. Creating a stimulating environment for innovation in the company to attract ideas from employees at all levels.

4. Intellectual property management, which may include patent registration, licensing agreements, and confidentiality control.

5. Monitoring and evaluating results. Implementing systems for monitoring and evaluating the results of innovation development strategies.

The presented recommendations will help industrial enterprises maintain competitiveness and innovation capacity in a rapidly changing market environment, creating a stable basis for further development.

The successful creation of "Technology Roadmapping" depends on the quality of information used in economic modelling processes. Since the digital transformation of the regional economy consists of the formation of certain volumes of information, which are created by concentrating the results of statistical observations, it is necessary to form not only data stating economic results but also data that will help in finding means of updating the existing industrial component of the economy. The current stage of industrial development requires introducing innovations. It is necessary to establish potential sources of research and developments that will be used as innovative means to create high-quality information support for the economic modelling of processes that require innovative solutions (Di Virgilio et al., 2023).

The creation of such sources of information is extremely important because the digitalisation of the economy has many positive and negative aspects, namely, a large amount of economic and other information that is not formed according to a certain classification, which complicates the use of information and leads to the loss of potential innovative developments due to the timely receipt of information about these developments by potential consumers.

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The loss of industrial innovative solutions most often occurs due to the lack of optimization of information support for business processes. This indicates that the digitalization of the economy requires improvement in the methodology for creating digital economic resources, increasing the significance of regional sources in filling the information field, and applying the "Open Innovation" model.

In the case of the development of the information component of innovative activities in industrial production, an analysis of the costs of R&D solutions in Ukraine as a whole for 2018-2022 was conducted. Furthermore, leaders were identified as creating innovative products that could be used in the industry at the regional level.

Figure 3 presents the all-Ukrainian indicators of costs for scientific research and development, applied scientific research, and scientific and technical experimental developments from 2018 to 2023. The most productive was 2021 in the study period, which indicates an increase in innovative activity in the post-pandemic period.

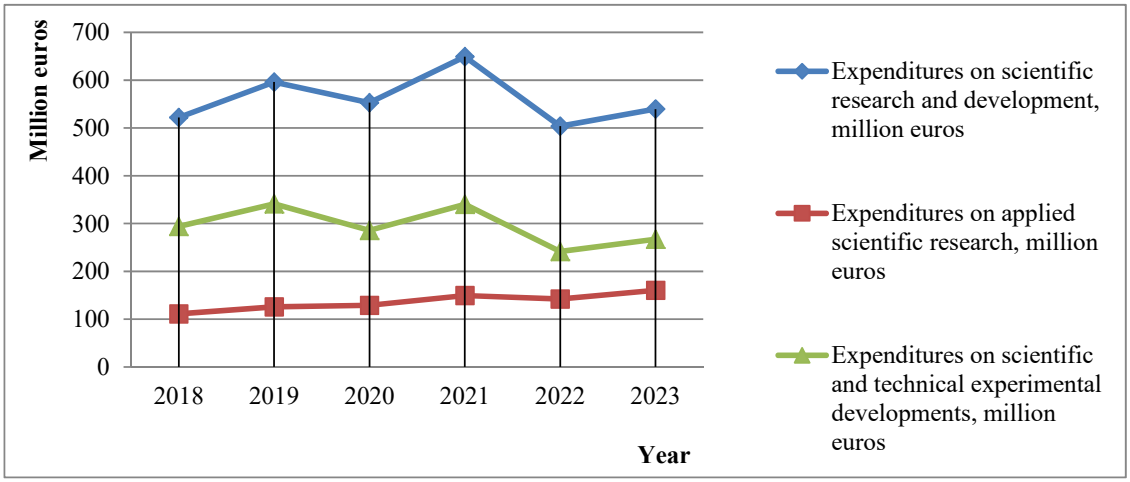

Fig. 3. Costs of developing innovative industrial products in Ukraine.

Source: based on the State Statistics Service of Ukraine (2024).

However, when considering the number of innovative products introduced by industrial enterprises (Fig. 4), for the period from 2000 to 2023, the highest level was observed in 2002 (22,847 goods) and the lowest in 2021 (1,756 goods), which is 13 times less.

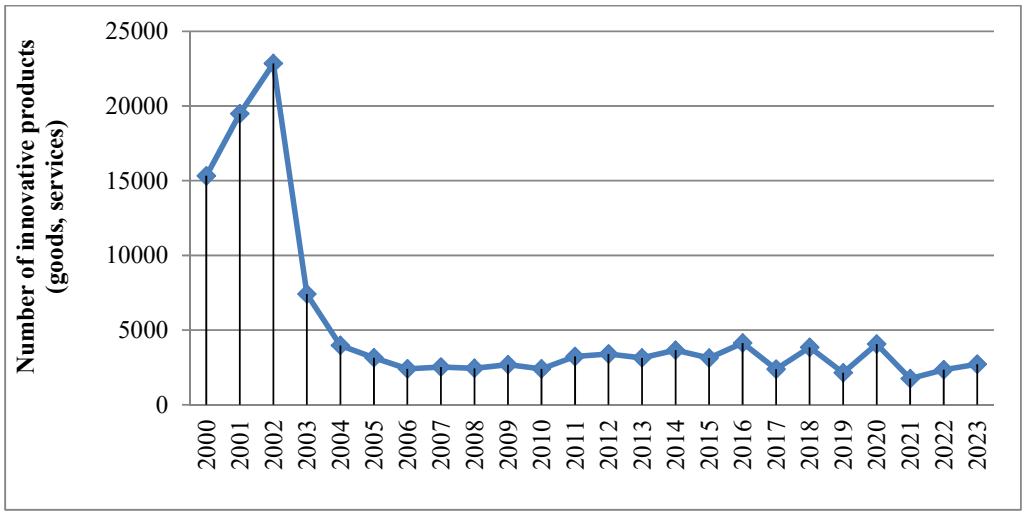

Fig. 4. Number of innovative products (goods, services) introduced by industrial enterprises.

Source: based on the State Statistics Service of Ukraine (2024).

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Since 2021 is characterised by the highest cost of scientific research and development, the question arises about the quality of business process modelling at the Ukraine and the regional level. One of the problems in implementing developed innovations in the industrial direction is the insufficient level of awareness of potential users and the scientific and technical documentation accompanying the development of innovation. The lack of complete technical and economic information about the content and features of industrial innovations complicates business process optimisation by performing high-quality modelling of the further development of individual enterprises, areas of activity, and regions as a whole.

Overcoming this problem requires an idea of the sources of scientific development in the relevant area. Most often, analytical information concerns either individual enterprises or the whole of Ukraine, which does not allow, when modelling the transformation of the regional economy, to recreate the ways of searching, analysing, selecting, and implementing innovations.

Therefore, it is important to analyse the dynamics of cost indicators of R&D expenses and identify the regions in which the most significant expenses on applied research are carried out.

Comparing the 2022 figures with the 2018 figures, it can be noted that R&D expenditure in Ukraine decreased by 3.5% (Table 2).

Table 2. Expenditures on R&D, million euros.

	2018	2019	2020	2021	2022
Ukraine (Total)	521.9	596	552.9	649.1	503.8
Kyiv city	240.1	286.9	296.1	378.4	305.3
Kharkiv region	97.8	98.9	83.1	59.7	36.8
Dnipropetrovsk region	63.2	79.8	49.1	64.7	53.9
Lviv region	13.3	16.1	16.1	20.5	15.1
Kyiv region	12.8	14.4	11.5	10.2	8.4
Mykolaiv region	10.3	8.2	9.8	13.5	4.9
Odesa region	9.2	11.8	10.3	10.7	8.4
Sumy region	5.7	3.2	5	5.5	4
Cherkasy region	3.1	1.8	2.5	3.8	1.9
Chernivtsi region	2.7	3.7	3.6	4.2	3.3
% of ten regions	87.8	88.1	88.1	88	87.7

Source: based on the State Statistics Service of Ukraine (2024).

Considering this indicator by regions that were among the top ten leaders in R&D spending in 2018, it should be noted that certain regions significantly increased the volume of these costs. For example, in Kyiv, these volumes increased the most and amounted to 27.2% of the 2018 level; in the Chernivtsi region, 22.2%; and in the Lviv region, 13.5%.

These regions have significant potential for research and development. However, this indicator decreased significantly in some regions. For example, in the Kharkiv region, spending on scientific research and development in 2022 decreased by 62.4% compared with 2018, in the Mykolaiv region by 52.4%, in the Cherkasy region by 38.2%, in the Kyiv region by 34.4%, and in the Sumy region by 29.8%.

The smallest decrease in spending on scientific research and development was observed in the Dnipropetrovsk region (14.7%) and Odesa region (8.7%). Research and development do not always directly impact the innovative nature of economic development since they create an innovative information field in general and motivate the formation of directions for modelling economic development. Applied scientific research has a more significant direct impact on the innovative environment, contributing to the formation of the most innovative solutions. In this regard, the dynamics of expenditure on applied scientific research in Ukraine as a whole and in ten regions that were leaders in R&D in 2018 are examined in more detail (Table 3).

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Table 3. Expenditures on applied scientific research, million euros.

	2018	2019	2020	2021	2022
Ukraine (Total)	111	125.6	129	149.2	142.1
Kyiv city	56.3	63.9	72.4	87.5	77.4
Kharkiv region	19.1	19.8	14.8	11.8	13.6
Dnipropetrovsk region	4.6	3.4	4.8	5.8	6
Lviv region	3.9	3.4	5.4	5.6	4.5
Kyiv region	4.1	6.5	4.3	2.9	2.9
Mykolaiv region	1.1	0.7	0.9	1.5	0.9
Odesa region	3	4.4	3.4	3.5	2.8
Sumy region	1.6	0.7	1.5	2.1	1.6
Cherkasy region	1.1	0.7	1.3	2	0.9
Chernivtsi region	1.7	2.4	2.3	2.8	2.2
% of ten regions	86.9	84.4	86	84.1	79.4

Source: based on the State Statistics Service of Ukraine (2024).

In Ukraine in 2022, compared to 2018, there was an increase of 28% in spending on applied scientific research, indicating an increase in the country's innovative potential as a whole. However, considering changes in spending on applied research, there were mixed results in different regions. In 2022, in Kyiv, spending on applied scientific research increased by 37.5% compared to 2018; the same increase was observed in the Dnipropetrovsk region by 30.4%, Chernivtsi region by 29.4%, Lviv region by 15.4%. Spending on applied scientific research in the Sumy region in 2022 remained at 2018.

However, regions that were leaders in 2018 reduced spending on applied research, namely the Kyiv region by 29.3%, the Kharkiv region by 28.8%, the Cherkasy and Mykolaiv regions by 18.2%, and the Odesa region by 6.7%. The theoretical basis for industrial innovations is being created, and a change in the activity of different regions of Ukraine accompanies this process. However, scientific and technical experimental developments are needed to create technological maps to implement innovations. The dynamics of experimental developments expenditures in Ukraine and the ten leading regions in 2018 are presented in Table 4.

Table 4. Expenditures on experimental developments, million euros.

	2018	2019	2020	2021	2022
Ukraine (Total)	294	341.2	285.6	340.1	241.6
Kyiv city	110.4	137.7	134.5	185.2	140.2
Kharkiv region	61	59.4	46.3	24.9	16.3
Dnipropetrovsk region	53.9	69.4	38.6	52.7	42.7
Lviv region	3.5	4.4	3.9	6	3.7
Kyiv region	5.7	6.1	4.6	4.1	2.9
Mykolaiv region	8.1	7.1	8.4	11.4	0
Odesa region	3	4.4	4.1	4	2.8
Sumy region	3.5	2	2.9	2.7	0
Cherkasy region	1.1	0.6	0.3	0.8	0.2
Chernivtsi region	0.2	0.2	0.1	0.1	0.1
% of ten regions	85.2	85.4	85.3	85.8	86.5

Source: based on the State Statistics Service of Ukraine (2024).

Across Ukraine, spending on scientific and technical experimental developments in 2022 compared to 2018 decreased by 17.8. Mykolaiv and Sumy regions stopped funding scientific and technical experimental developments in 2022. In 2022, spending on experimental developments in the Cherkasy region decreased by 81.8% compared to 2018, in the Kharkiv region by 73.3%, in the Chernivtsi region by 50%, in the Kyiv region by 49.1%, in the Dnipropetrovsk region by 20.8%, in Odesa region by 6.7%.

An increase in spending on scientific and technical experimental developments in 2022 compared to 2018 occurred in Lviv region by 5.7% and in Kyiv city by 27%. Thus, due to the rapid reduction in funding for scientific and technical experimental developments, innovative growth in many regions has been threatened. However, given the availability of sources of industrial innovation, when modelling regional development, it is necessary to consider the need to carry out scientific and technical experimental developments independently or in cooperation with relevant regions. Generally, the following heat diagram can be constructed for the observation period (Figure 5).

Region	Expenditures on R&D, %	Expenditures on applied research,%	Expenditures on experimental developments,%
Kyiv city	27.2	37.5	27
Dnipropetrovsk Region	-14.7	30.4	-20.8
Kyiv Region	-34.4	-29.3	-49.1
Lviv Region	13.5	15.4	5.7
Mykolaiv Region	-52.4	-18.2	-100
Odesa Region	-8.7	-6.7	-6.7
Sumy Region	-29.8	0	-100
Kharkiv Region	-62.4	-28.8	-73.3
Cherkasy Region	-38.8	-18.2	-81.8
Chernivtsi Region	22.2	29.4	-50

Decreasing more than 20%	10-20% decreasing	0-10% decreasing	0-10% increasing	10-20% increasing	Increasing more than 20%

Fig. 5. Heatmap of R&D expenditures by region.

In the existing statistical observations on the formation and implementation of innovations in Ukraine, it should be noted that from 2000 to 2019, these observations were carried out regularly and in full; however, in the subsequent period, the level of interest in innovation processes subsided, which led to the absence of a certain layer of statistical information.

Considering the correlation between the total volume of expenses on innovation implementation and R&D expenses for the regions that were leaders in 2018 in terms of financing, it can be noted that the obtained correlation coefficient is 0.918, which indicates a significant impact of R&D expenses on innovation implementation. Considering the correlation coefficient between the costs of scientific and technical experimental design and development and the number of costs of implementing innovations per 1% of enterprises, the result is 0.876. This means that the costs of enterprises are significantly dependent on the availability of scientific and technical experimental developments.

5. Conclusions.

An analysis of current trends and challenges in the strategic management of industrial enterprises' innovative development confirmed the need for continuous adaptation to rapidly changing technological and economic conditions. Growing competition and changes in consumer preferences require enterprises to seek innovative solutions and flexibility in strategic planning. Research on the key factors influencing the effectiveness of strategic management of innovative development emphasises the importance of focusing on market needs, engaging partners, and innovation culture.

The development and justification of models for strategic management of innovative development confirmed the effectiveness of using the "Open Innovation" model, which promotes active partner cooperation and the integration of innovative ideas into all aspects of the enterprise's activities and "Technology Roadmapping", which aligns technology development in enterprise's strategic goals. Innovations being developed significantly impact the possibilities of their implementation.

Therefore, when creating a "Technology Roadmapping", it is necessary to consider financing costs for experimental developments. From 2018 to 2022, significant changes were observed in the regions in the amount of financing costs for R&D, applied research and experimental developments. The most significant positive results in the formation of an innovative base were achieved by the city of Kyiv (growth of 27.2%) and the Lviv region (growth of 13.5%), which must be considered when modelling business processes in the context of forming concepts for strategic management of innovative development of industrial enterprises.

When studying the relationships between the total costs of implementing innovations and the costs of experimental developments, they were found to have a close relationship (correlation coefficient 0.918).

When modelling innovation processes in regional economies, it is necessary to consider the costs of developing one's base of scientific and technical experimental developments or participation in innovation development processes in other regions, which should be considered in the functioning of the "Open Innovation" model.

Regarding the costs of enterprises and the total costs of scientific and technical experimental developments, the correlation coefficient is 0.876. This also indicates the relationship between the costs of enterprises on innovations and the costs of their creation, as well as the need to consider the interests of enterprises located in the region, considering the innovative nature of changes in different regions under the influence of their digitalisation.

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