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**STRATEGY FOR MANAGEMENT OF INNOVATIVE ACTIVITIES
OF ENTERPRISES IN THE ELECTRICAL INDUSTRY****СТРАТЕГІЯ УПРАВЛІННЯ ІННОВАЦІЙНОЮ ДІЯЛЬНІСТЮ
ПІДПРИЄМСТВ ЕЛЕКТРОТЕХНІЧНОЇ ГАЛУЗІ**

The article examines current approaches to developing a strategy for managing the innovative activities of enterprises in the electrical industry, which is an important factor in increasing their competitiveness in the domestic and global markets. Particular attention is paid to key aspects of choosing a strategic approach for the innovative development of small enterprises that have limited resources, but at the same time have significant potential for implementing innovative solutions. Various models of managing innovation processes are analyzed, including adaptive, proactive, differentiated and integrated approaches, with a detailed description of their advantages and limitations. A number of strategies for organizing innovative activities are also proposed, among which the strategies of technological leadership, adaptive response, partnership in innovation and gradual improvement are highlighted. The results of the work have practical value for small businesses, providing them with effective tools for optimizing innovation activities. The conclusions of the study also open up prospects for further scientific explorations towards improving strategic management in the electrical engineering industry.

Keywords: management, strategy, innovative activity, electrical engineering industry, enterprise.

У статті розглянуто сучасні підходи до формування стратегії управління інноваційною діяльністю підприємств електротехнічної галузі, яка відіграє важливу роль у забезпеченні конкурентоспроможності як на національному, так і на міжнародному рівнях. Електротехнічна промисловість є одним із ключових секторів економіки, що характеризується швидкими темпами технологічного розвитку, високою динамікою змін ринкового середовища та необхідністю постійного вдосконалення виробничих процесів. У зв'язку з цим, питання формування ефективної стратегії управління інноваційною діяльністю є надзвичайно актуальним. У роботі визначено основні аспекти обґрунтування стратегічного підходу до інноваційного розвитку малого підприємства, яке має обмежені ресурси, але значний потенціал для впровадження новачій. Зокрема, акцент зроблено на важливості інтеграції інновацій у бізнес-моделі підприємств, що дозволяє ефективно адаптуватися до швидких змін у технологіях і вимогах споживачів. Автори аналізують існуючі підходи до управління інноваціями, такі як адаптивний, випереджувальний, диференційований та інтегрований підходи, визначаючи їхні переваги та недоліки. У статті обґрунтовано, що вибір конкретної стратегії залежить від ринкових умов, технологічного рівня підприємства, його фінансових можливостей та інноваційного потенціалу. Запропоновано перелік можливих стратегій управління інноваційною діяльністю, зокрема: стратегія технологічного лідерства, стратегія адаптивного реагування, стратегія співпраці у сфері інновацій та стратегія поступового вдосконалення. Особливу увагу приділено практичним рекомендаціям щодо реалізації обраної стратегії, включаючи створення системи моніторингу інноваційної діяльності, управління ризиками та забезпечення ефективної комунікації між різними підрозділами підприємства. Результати дослідження спрямовані на розробку інструментів для оптимізації управління інноваційними процесами на підприємствах електротехнічної галузі, що сприятиме їхньому сталому розвитку та посиленню конкурентних позицій. Отримані висновки та рекомендації можуть бути використані як у практичній діяльності малих підприємств, так і в подальших наукових дослідженнях у цій сфері.

Ключові слова: управління, стратегія, інноваційна діяльність, електротехнічна галузь, підприємство.

Problem statement. The relevance of the study is due to the need to adapt to rapid changes in the technological environment, increased global competition, as well as the role of innovation in ensuring energy efficiency and environmental sustainability. The electrical engineering industry is key to Ukraine's integration into international markets and increasing its economic potential, and effective innovation management contributes to the growth of the competitiveness of enterprises. In addition, the lack of a strategic approach to managing innovation activities in the context of the specifics of the industry emphasizes the scientific and practical significance of this study.

Analysis of recent research and publications. The issue of innovative activity and its impact on the economic development of the state has attracted the attention of many foreign researchers, among whom the works of F. Aghiyon [1], J. Kuka [2], R. Solow [3], B. Twiss [4] and J. Schumpeter [5] should be particularly noted. Also significant are studies aimed at analyzing the innovative activity of Ukraine taking into account international ratings, carried out by O. Levkivskiy [6], T. Pisarenko [7] and T. Kvasha [7], L. Rozhkova [8], O. Kovalenko [9] and other scientists. Given the constant changes in the nature of innovative processes, there is a need for regular updating of data on their current state. This is critically important for ensuring the validity of management decisions aimed at stimulating innovative development.

Formulating the purposes of the article. The purpose of the article is development of theoretical and methodological foundations and practical recommendations for the formation of an effective strategy for managing the innovative activities of enterprises in the electrical engineering industry, aimed at increasing their competitiveness, innovative potential and adaptability to modern market conditions.

Presentation of the main research material. The formation of an innovation strategy for an enterprise in the electrical engineering industry producing cable products requires a systematic approach focused on market requirements, technological progress, and optimization of production processes. Figure 1 shows the key approaches to developing such a strategy.

Analysis of the internal and external environment includes regular market research to understand the need for specialized cables for renewable energy: conducting a SWOT analysis to assess the strengths and weaknesses of the enterprise, as well as opportunities and threats in the external environment; PESTLE analysis to determine the impact of political, economic, social, technological, legal and environmental factors on the enterprise's activities and studying trends in cable products, for example, the development of halogen-free, high-voltage or fiber optic cables.

Definition of the mission and goals of innovative activities. The following definition of the mission of a small enterprise in the electrical industry is proposed: development of high-quality cable products to meet the growing needs for energy saving and safety. Long-term and short-term goals - increasing market share, reducing costs, introducing new technologies; introduction of cables made of fully recyclable materials; long-term goal: reducing production energy costs by 20% by 2030.

As measures to substantiate the product strategy of the small enterprise under study, it is proposed to



Figure 1. Key approaches to forming an innovation strategy for an enterprise in the electrical engineering industry

Source: [10]

identify promising areas for expanding the range: cables for renewable energy sources, «smart» cable solutions for IoT; development of innovative materials for use in cable production – new insulating coatings with improved environmental characteristics, development of cables resistant to high temperatures for electric vehicles and fast charging systems, cables for offshore wind farms with improved insulation capable of operating in harsh conditions.

Investment support for the innovative development of enterprises in the electrical engineering industry includes planning investments in equipment upgrades - automated lines for high-precision extrusion and cooperation with state innovation support programs and attracting grants to finance research and development, launching a new production line for cables with fiber optic elements, participation in EU grant programs, such as Horizon Europe, for the development of “smart” cables with temperature and voltage sensors.

As measures for the implementation of technological innovations, automation and digitalization of production processes (Industry 4.0) are proposed, i.e. the use of robotic systems, sensors, ERP systems for resource management, as well as the transition to green energy in production – the use of renewable energy sources to reduce the carbon footprint and the introduction of cable material recycling technologies, the introduction of an automated quality control system that uses high-resolution cameras to detect defects in cables, the use of solar panels as energy sources

for the production of cables, which allows reducing CO₂ emissions by 30%.

To form a marketing strategy, it is advisable to use innovations as a competitive advantage, i.e. positioning products as the most technologically advanced and environmentally friendly and promoting them through digital marketing, participation in international exhibitions and industry forums, emphasizing in your advertising campaign the use of materials that do not contain harmful substances to improve fire safety, the use of digital marketing – and the use of platforms such as LinkedIn to promote products among business clients (B2B).

Measures to develop human resources include investing in improving the skills of employees – training in modern technologies, innovation management, digital tools, and creating an environment for the development of ideas within the company – innovation incubators, idea competitions among employees, the formation of a small educational center for engineers, where they teach the latest technologies in cable production, including robotic processes, holding internal competitions for the best idea for optimizing production with a cash reward.

The development of cooperation and partnership includes concluding agreements with scientific organizations to jointly create innovations in the electrical industry, as well as partnerships with foreign companies to exchange best practices and license modern technologies; participation in a joint project between ABB and Nexans to create cables for deep-sea energy transportation is recommended, if possible.

The formation of a financial strategy involves the formation of a budget for innovations taking into account the profitability of projects and the assessment of innovation risks and the creation of mechanisms for their minimization (risk insurance), the implementation of a system for predicting market changes using AI to minimize the risks of unsuccessful investments, the use of co-financing models with partners or grant funds.

Monitoring and adjusting the strategy includes the implementation of a KPI system to assess the effectiveness of innovative projects, i.e. reducing production costs, increasing sales and constantly analyzing results and adapting to changes in market conditions, applying the KPI system – quarterly analysis of the effectiveness of implemented innovations by indicators such as the percentage of defective products and the duration of the production cycle, the transition from the production of traditional cables to fiber-optic ones due to the growth of demand for high-speed networks.

The innovation strategy should be dynamic, able to quickly respond to changes in technology and market demand. This will allow the cable products enterprise to remain competitive and a leader in its industry. The innovation strategy in the cable industry should be flexible, focused on technology and environmental friendliness, and also include a constant dialogue with the market.

The choice of a strategic approach for enterprises in the electrical engineering industry, in particular for cable product manufacturers, should be justified both by the specifics of the industry and by global trends in the development of the economy, technologies and market demand. The main aspects for the justification of the choice of a specific strategic approach are given in Table 1.

Considering the above factors, it seems appropriate to emphasize that the optimal approach for enterprises

in the electrical engineering industry is a comprehensive innovation approach that includes the following components:

- greening of production (transition to green design and materials);
- digitalization and implementation of automation;
- development of new products to meet demand from renewable energy, the electromobility sector, etc.;
- cost optimization through energy-efficient and innovative technologies;
- globalization through entry into new markets and international partnerships.

A small enterprise in the electrical engineering industry operates in conditions of constant technological changes, high competition and growing demand for innovative solutions. The choice of a strategic approach should take into account the specifics of the industry, the limited resources of the enterprise and market prospects. To substantiate the strategy, certain aspects should be taken into account (Fig. 2).

The features of the electrical products market include:

- the speed of change in technologies: the electrical industry is characterized by high dynamics of innovation (IoT, automation, renewable energy). This creates a need for orientation towards innovative products;
- increasing demand for environmental solutions: interest in energy-efficient and safe products that meet environmental standards (ISO 14001) is growing;
- competition: small enterprises often cannot compete with large ones on price, but can win due to innovation and flexibility [12].

As strategies for developing innovative activities of small enterprises in the electrical industry, it is advisable to use the following (Table 2).

Ultimately, the choice of a strategy for developing innovative activities of a small enterprise in the electrical industry is influenced by the following factors:

- limited resources (small enterprises often lack capital for large-scale projects, so they should focus on point innovations);
- management flexibility (due to less bureaucracy, a small enterprise can quickly adapt its strategy to changes);
- state support (the use of innovation stimulation programs in Ukraine can provide financial support for the implementation of new projects).

The recommended strategic approach for a small enterprise in the electrical industry is an innovation strategy combined with deep specialization. Such an approach will allow creating high-quality niche products, adapting to technological changes and remaining competitive in a dynamic market.

Conclusions. The article analyzes modern approaches to the formation of a strategy for the innovation activity of enterprises in the electrical industry and identifies key aspects of a strategic approach to the innovative development of small businesses in the industry. It is substantiated that effective management of innovation processes contributes to increasing the competitiveness of enterprises, their adaptation to rapid technological changes and meeting market needs. The proposed list of strategies for managing innovation activities includes partnership in the development of innovations, orientation towards

Table 1

Aspects of substantiation of a specific strategic approach for the innovative development of a small enterprise in the electrical industry

Aspect	Justification	Conclusion
Industry dynamics	The electrical industry is going through a period of transformation associated with the growing demand for green energy, digitalization and smart technologies. This creates a need for high-tech, environmentally friendly cable products; competition from Asian manufacturers is growing, which stimulates enterprises to innovate to maintain competitive positions	Implementation of strategies aimed at technological leadership and meeting growing market needs, environmentally friendly cable products
Environmental and regulatory requirements	The world is facing increasing requirements for reducing the carbon footprint, recycling waste and using safe materials (e.g. RoHS, REACH); The lack of an environmental component can lead to loss of access to the EU and other regions' markets	An environmental strategy is becoming a key element for competitiveness
Technological progress and digitalization	The implementation of Industry 4.0 technologies allows enterprises to optimize production processes, reduce costs and improve product quality; demand for "smart" cables with temperature, voltage or damage sensors is growing rapidly	Technological innovations and the transition to digital production management platforms
Changing consumer demand	The market requires products for new segments, such as renewable energy sources (wind and solar power plants), electric vehicles, Internet of Things (IoT); consumers increasingly choose cables with long service life and improved safety characteristics	The strategy should take into account the orientation towards new market segments and the development of an innovative product range
Economic efficiency	There is pressure in the industry to reduce the cost of products due to competition and instability of raw material prices (copper, aluminum, polymers); the introduction of energy-efficient technologies can reduce production costs	Provides for the modernization of production with an emphasis on energy saving and the use of alternative materials
Globalization and partnership	to expand sales markets enterprises should develop international cooperation and implement best global practices; partnerships with universities and research institutions allow for faster adaptation of new developments	An approach to open innovation and cooperation with external partners allows for reduced time and costs for developing new products

Source: developed by the author [10]

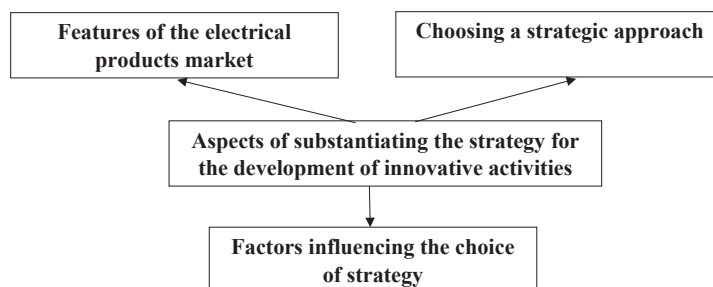


Figure 2. Aspects of substantiating the strategy for developing innovative activities of an electrical engineering enterprise

Source: [11]

Table 2

Exemplary strategies for developing innovative activities for enterprises in the electrical industry

Strategy	Rationale	Example	Benefits
Innovative	Small businesses should focus on niche products, such as home automation solutions or energy-efficient devices	Using Internet of Things (IoT) technologies to create "smart" energy management systems increasing the added value of products; attracting customers focused on modern technologies	increasing the added value of products; attracting customers focused on modern technologies
Diversification	Expanding the product range reduces dependence on one market segment	Developing products for different sectors, such as consumer electronics, industrial equipment, renewable energy	Reducing the risks associated with a decline in demand in a particular segment
Deep specialization	Focusing on a specific narrow niche allows the company to become a leader in a specialized segment	Production of high-tech components for power plants	possibility of establishing a high margin; less competition compared to mass products

Source: developed by the authors based on [13]

environmental technologies and the use of digital platforms for the development of products and services.

Prospects for further research include the analysis of the impact of digital technologies on the effectiveness of innovation activity, the development of risk assessment models and mechanisms for their minimization, the study of the role of state support in

stimulating innovation and the creation of a system for monitoring and evaluating the effectiveness of implemented strategies. The implementation of these areas will contribute to increasing the efficiency of innovation management and strengthening the positions of enterprises in the electrical industry in the national and international markets.

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