Strategic Management of Innovative Development of Enterprise Using Foresight Technologies as Part of Digitalization

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Abstract

Effective strategic management of innovative development is considered a key factor in successful operation of enterprises. Due to dynamic changes in economic, political, and social environment for domestic business, rapid digitalization development, usingforesight technologies is a promising direction of innovative management.With foresight, companies can make decisions that are more informed, adapt to changes, develop innovative products and services, and achieve long-term success. The purpose of the article is to analyze features of strategic management of innovative development of enterprises using format technologies in rapid development of digitalization.Urgency of effective strategic management in innovation, its main components and directions, stages of development and implementation of the management strategy for innovative development of enterprises, considering digital technologies, are studied. Essence and advantages of foresight technologies as a tool for designing future development of the enterprise, main stages of foresight research, the most popular methods of foresight in modern practice of commercial management and public administration are highlighted. Practical significance of the article consists in outlining possible using of foresight as a promising technology to revitalize and increase efficiency of innovative activities of enterprises as part of digitalization in the near and more distant future.

Keywords: Strategic Management, Innovative Development, Innovative Potential, Enterprise, Foresight Technologies, Foresight Methods, Business Environment, Digital technologies.

Introduction

Globalization, digitalization, rapid changes in consumer needs and preferences, growing competition, and others are reasons for relatively high mobility of modern business environment. These and some other circumstances require business entities to be highly adaptable and implement various innovations. To maintain appropriate competitiveness level and efficiency, business structures of various ranks are forced to keep abreast of modern trends in new technologies

and business models, resource and sales markets, consumer behavior and psychological aspects of market behavior. Innovations allow companies to stand out on the market, offering unique products and services, increasing market share, reducing costs and, and finally, increasing business profitability.

Innovation has become a key factor to ensure sustainable development of enterprises and its market stability in the long term. Hence, it is required to create an effective strategy of innovative development, within which specifics of enterprises' activities and features of external environment in conditions of digitalizationwill be considered. Making informed decisions in this direction involves relying on relevant research in of strategic management of innovative development of enterprises. These studies should highlight the most promising innovations for this subject of entrepreneurial activity and barriers that prevent innovative development, identify opportunities to attract investment in innovative activity, provide a basis to evaluate effective innovative projects, and help form effective system for innovations management as part of digitalization.

Literature review

Problems of strategic management of innovative development of enterprises as part of digitalization are a multifaceted research that is developing quite actively and attractsattention of both theoreticians and practitioners. The authors (WangJia et al., 2024) examine the role of strategic management and relevance of external foresight in global enterprises. The purpose of article (Xu Jing, 2024) is to outline that business model of innovative development of enterprises and considering practical aspects of the impact in economic security. (Babenko V. et al., 2024) investigated digitalization impact on ecological and innovative development of enterprises. Within the article (Boman M. et al., 2019, Grigoras-Ichim C. et al., 2018), the role of regulatory policy in innovative development of enterprises is analyzed.

In addition, many publications are devoted to various aspects on implementation of foresight technologies in innovative development of enterprises influenced by digital technologies. (Dörr US. et al., 2024) studied recent trends in foresight development in small and medium-sized enterprises. Article (AlqamHaninRazzaket al., 2024. Ivanova et al., 2022) analyzes digital readiness and strategic flexibility of small and medium-sized enterprises by active use of foresight technologies. In (Kim J.-S. et al., 2023), consider features on applying foresight in making strategic decisions. Scientists (Kononiuk A., 2022) analyzed current state of foresight at enterprises in Poland.(Anzules-FalconesWendy et al., 2021) analyzed the role of business foresight in the circular economy.Within the study (Gholipoor Parvaneh et al., 2020), the design of strategic foresight model was carried out on the example of activities of small and medium-sized enterprises.

It is important to note that research of strategic management of innovative development of enterprises is a dynamic process with constant emergence of new concepts, technologies, models and approaches in accordance with changes in business environment. Currently, research of the innovation role to ensure sustainable development of enterprises, intellectual property management, creation of innovative ecosystems, and impact of digital technologies on the innovation process are currently relevant. Foresight technologies play significant role to form effective system of strategic management of innovative development of business entities.

The purpose of the article is to analyze features of strategic management of innovative development of enterprises using format technologies in rapid development of digitalization.

Methodology

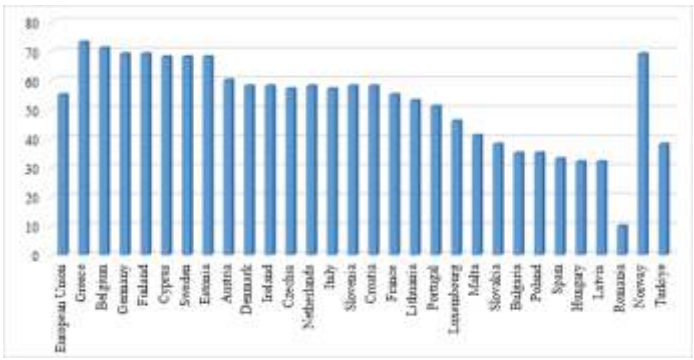
Within research, the following methods were used: analysis and synthesis methods, content analysis method, graphic method, induction and deduction methods, statistical method, systematization method, abstraction method, analytical method, dialectical method, decomposition method, generalization method, method of observations and systemicity, complex and synergistic scientific approaches.

Results

Analysis of the EU experience provesurgency and necessity of introducing innovations at enterprises.

According to results of statistical data analysis, we can say that for 2018-2020, leading countries in terms of innovative development of enterprises were as follows (Fig. 1): Greece (72.6%), Belgium (71.3%), Norway (69.6%), Germany (68.8%), and Finland (68.7%). While the lowest indicators of innovative development were enterprises of the following countries as Romania (10.7%), Latvia (32%), Hungary (32.7%), Spain (33.5%), Poland (34.9%).

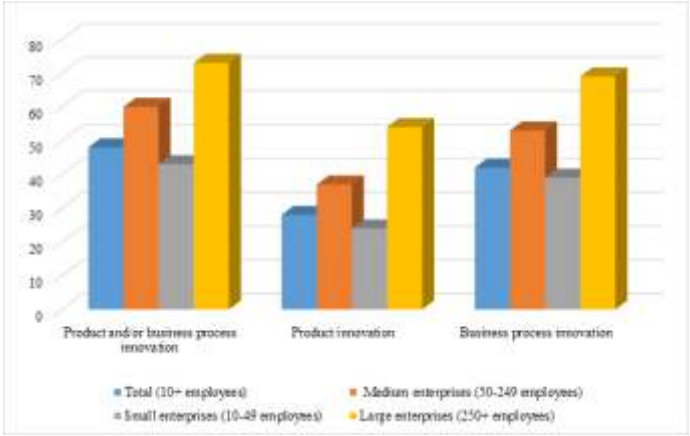
Figure 1.Share of innovative enterprises, 2018-2020 (%)



Source: Eurostat (2024)

Figure 2presents data demonstrating innovative development of enterprises by type of introduced innovations and accordingly that their size (small, medium, large enterprises). Most innovative products and processes were implemented by large enterprises.

Figure 2. Share of innovative enterprises by type of innovation and size class, European Union, 2018-2020



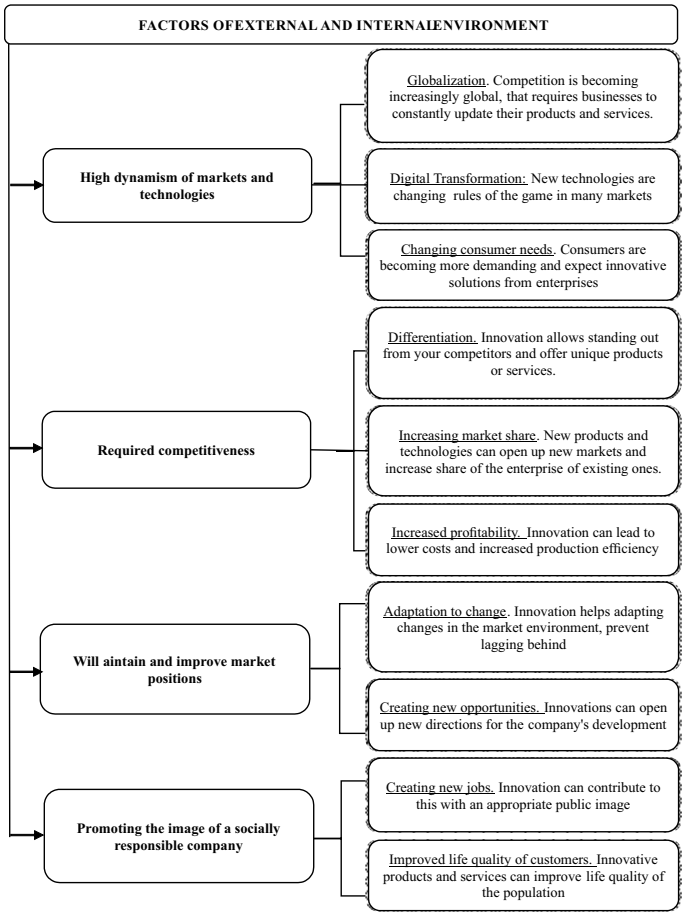
Note: survey reference period - 2018-2020

Source: Eurostat (2024)

Effective strategic management of innovative development of enterprises is one of the key success factors in dynamic business environment. Enabling companies to be flexible, adaptive and competitive is a necessary condition for survival and prosperity in today's world. Urgency of effective strategic management in innovations is due to many factors of internal and external environment (Fig. 3).

It is advisable to consider strategic management of innovative development of enterprises as part of innovative management, which consists in planning and implementing innovative solutions, projects, finding new opportunities, promising ideas, optimally evaluating them and ensuring a quick response to existing challenges and capturing leading positions in the market.

Figure 3. Key factors of the external and internal environment that determine the need to build effective system of strategic management of the innovative activity of the enterprise



Source:systematized by the authors

Integral components of effective strategic management of innovative development of the subject of entrepreneurial activity in any market should be.

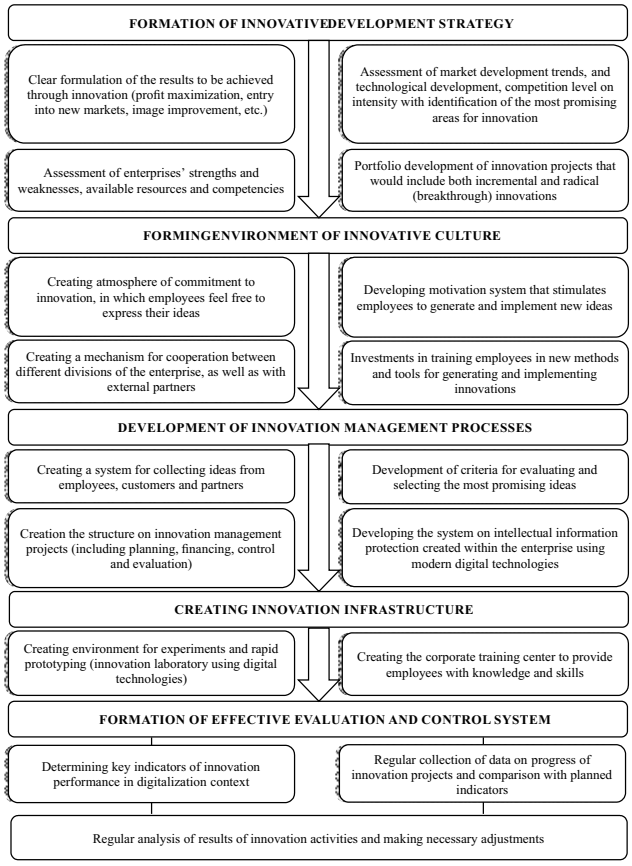
1. Determination of strategic goals that must be achieved within a certain time. A mandatory prerequisite for effective management of innovative development is clear results that the enterprise seeks to achieve using innovative methods and tools.
2. Basic analysis of the external environment. Effective achievement of the set goals is impossible without constant high-quality monitoring of the market situation, trends in technological sphere and actions of competitors.
3. Formation of innovative culture. The desired condition for future innovative breakthrough is formation of the internal atmosphere that maximally promotes generation and implementation of new ideas.
4. Thoughtful and rational allocation of resources. Speed and efficiency by implementing innovative projects is largely determined by the enterprise's ability to correctly choose priorities and effectively mobilize available financial, human and material resources.
5. Optimal risk management system. Introduction of innovations is often associated with risks, which imposes certain requirements on the enterprise's management system as part of digitalization.

It should be noted that a set of individual efforts and measures to revive innovative activity of the subject of entrepreneurial activity is unlikely to bring significant positive result without a well-thought-out innovation strategy with appropriate implementation mechanism. Building effective management system for innovative development is a complex process that requires comprehensive approach and joint work of various functional units of the enterprise. Ability of the business structure to innovate directly results by possible combination of various innovative and management tools into a single system, consistent set of interdependent processes and structures aimed at finding new problems and ways to solve them, synthesize ideas into business concept, and also choose, which projects receive funding.

Key steps in developing and implementing management strategy for innovative development of the enterprise can be as follows (Fig. 4).

Important role to increase efficiency of innovative activities of domestic business structures of various ranks can be played by active implementation of foresight technologies, which have gradually become one of the most effective tools of innovative organization of society. This approach to future research allows identifying and analyzing potential technological, social and economic changes. It should not be equated with traditional forecasting. It is rather creating future scenarios and developing strategies to achieve the desired results. By combining best achievements of forecasting and strategic planning, foresight has become one of the most effective technologies to prognosis further development of enterprises.

Figure 4. Main stages of building innovative strategy of the enterprise as part of digitalization



Source: systematized by the authors

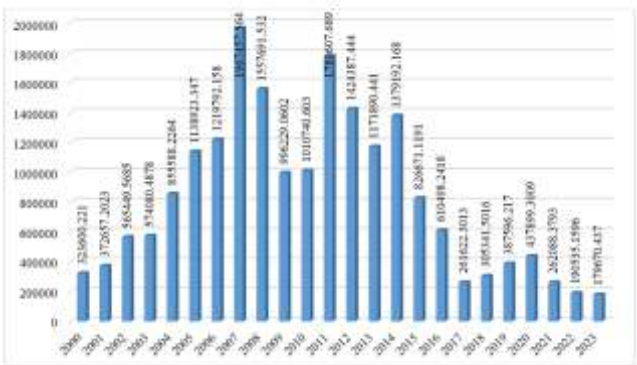
Figure 5 analyzes the number of innovative products (goods, services) introduced by industrial enterprises. In 2008, the number of innovative products was 2446 units, of which 840 were new to the market. The highest value of the indicator was in 2016 - 4139 units of innovative products, of which 978 were new to the market. In 2023, the number of innovative products was 2715 units, of which 437 were new to the market, which is 16%.

Fig. 5. Number of innovative products (goods, services) introduced by industrial enterprises (units), 2008-2023

Source:ukrstat.gov.ua

Statistical data of industrial enterprises (Fig. 6) shows that until 2007, enterprises actively carried out innovative activities and positive dynamics were observed. From 323,600 thousand USD in 2000, this indicator grew to 1,967,457 thousand USD in 2007. Further trends were jumpy and starting from 2015, the indicator experienced a sharp decline. In 2015, expenses for innovations by industrial enterprises amounted to 826,671 thousand USD, in 2023 - 179,670 thousand USD. Thus, over the past 10 years, the indicated indicator has decreased almost 8 times.

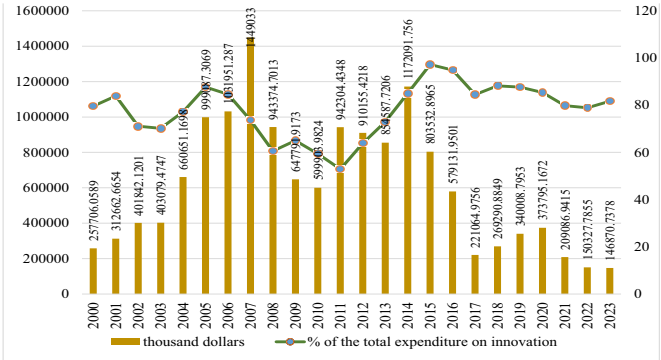
Fig. 6. Innovation costsof industrial enterprises, thousand USD



Source:ukrstat.gov.ua

Figures 7-10 presents an analysis of innovation spending by industrial enterprises by funding sources. Thus, Figure 7 shows innovation spending from own funds. For the period 2000-2023, the percentage of total innovation spending ranged from 52.9% in 2011 to 97.2% in 2015. Also, high values were in 2005 (87.7%), 2014 (85.0%), 2016 (94.9%), 2018 (88.2%), 2019 (87.7%) and 2020 (85.4%). The lowest indicators were in 2008-2012 (52.9%-65.0%).

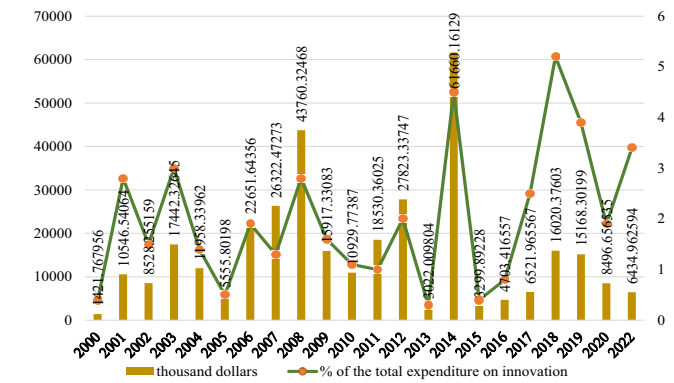
Fig. 7. Enterprises' own funds innovation expenses, thousand USD



Source:ukrstat.gov.ua

Figure 8 shows the situation with financing innovation activities from the state budget. The highest percentage of total innovation expenditures was in 2003 (3.0%), 2014 (4.5%), 2018 (5.2%), 2019 (3.9%) and 2022 (3.4%). The lowest percentage of innovation financing from the state budget was in 2000 (0.4%), 2005 (0.5%), 2013 (0.3%), 2015 (0.4%), 2016 (0.8%).

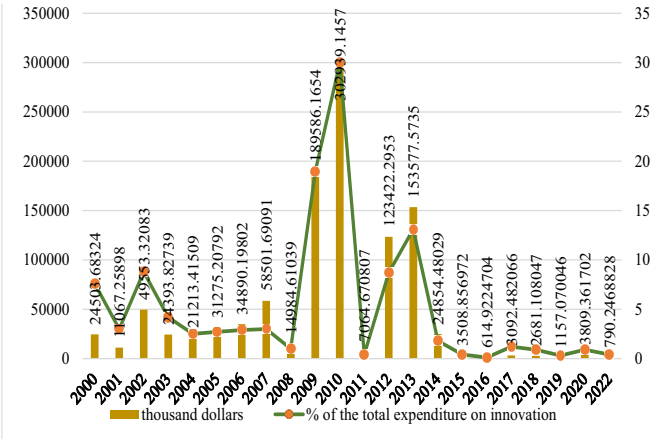
Fig. 8. State budget spending on innovation, thousand USD



Source: ukrstat.gov.ua

Figure 9 analyzes the dynamics of innovation spending at the expense of non-resident investors. We can state that the highest investment rates were in 2009 (19.0%), 2010 (30.0%), 2013 (13.1%), while the lowest percentages of total innovation spending were in 2011 (0.4%), 2015 (0.4%), 2016 (0.1%), 2019 (0.3%) and 2022 (0.4%).

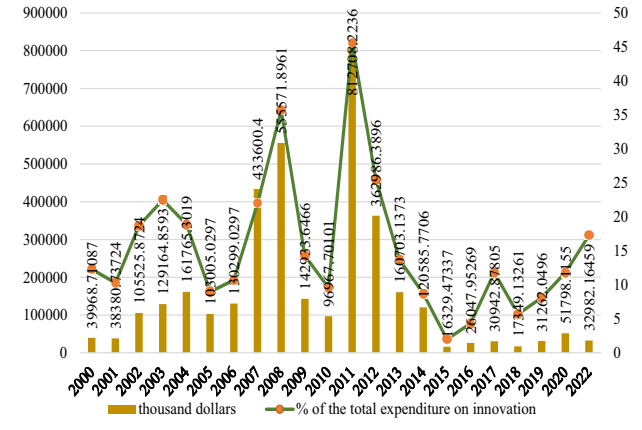
Fig. 9. Innovation spending of non-resident investors, thousand USD



Source: ukrstat.gov.ua

Figure 10 shows the situation with innovation spending by industrial enterprises from other sources. Thus, for this source of financing, the highest values of the indicator were in 2003 (22.5%), 2007 (22.0%), 2012 (45.6%) and 2013 (25.5%), and the lowest values were in 2016 (2.0%), 2017 (4.3%), 2018 (5.7%).

Fig. 10. Innovation spending from other sources, thousand USD



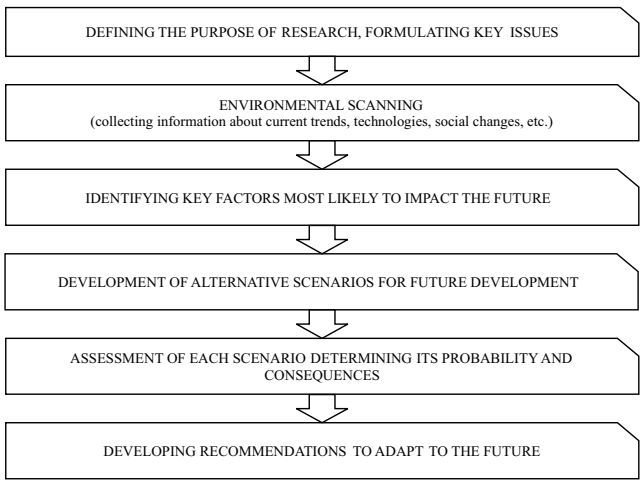
Source: ukrstat.gov.ua

Despite limited experience of using foresight technologies in Ukraine, they are becoming more and more popular every year. This is due to many objective advantages of this tool. Thus, foresight helps business structures plan activities for the long term, considering possible changes and challenges as much as possible; stimulates development of innovations, directing efforts to promising areas of research; allows identifying potential risks and developing strategies to minimize them; provides information for making informed decisions at all levels of the enterprises' management.

Foresight differs from forecasts made by traditional methods in that it is focused on the development of practical measures to approach planned strategic milestones. According to experience of developed countries, the foresight is an excellent tool for developing long-term strategies to increase competitiveness and achieve maximum efficiency of enterprises' development.

From organizational point of view, foresight is a complex step-by-step and multifaceted cooperation of experts from various fields of activity (Fig. 11), due to which priorities of strategic development of the business structure based on innovations under the influence of digitalization are determined.

Figure 11. Main stages of foresight research



Source: systematized by the authors

Complex nature of the process is a significant advantage of foresight over traditional methods of predicting and forecasting economic and social trends. Involvement of a wide range of stakeholders and competent persons from different social strata (stakeholders) not only in the formation of the most probable picture of the future, but also in practical implementation of their own forecasts (based on coordination of their interests by forming common vision of the desired future and tools for its achievement) provides for recovering expenses spent on research resources and ensure its high efficiency.

Foresight technologies are powerful toolsto understand the future and be ready for it. They enable business structures to be more adaptive and successful in today's mobile and changing world. In business, priority areas of application of foresight are development of new products and services, identification of new promising market segments, and risk management. By identifying new technologies, changes in consumer behavior, regulatory changes, and other factors that may affect business, these technologies allow companies clearly predict future trends. Foresight can create a long-term development strategy that considers potential challenges and opportunities, identify innovative projects that will bring the greatest return in the future, analyze potential risks associated with innovations and develop strategies to minimize them. In addition, foresight is an excellent basis for partnerships with other companies, scientific institutions and other stakeholders for joint development of innovations. Therefore, using foresight technologies is one of the most effective ways of managing innovative development of the enterprise.

Foresight technologies allow companies to see beyond the horizon and be ready for most probable challenges of the future. Widespread use of these technologies in domestic business would help enterprises anticipate needs of their customers in the near and distant (especially post-war) future, develop products capable of meeting these needs, optimize business models with their adaptation to changing market conditions and rapid development of digitalization, prepare to likely changes and their effective management.

Encouraging enterprises to constantly search for new ideas and solutions, using foresight technologies will help Ukrainian enterprises create innovation culture, speeding up making informed decisions about investing in innovative projects, goods and services. As European experience proves, enterprises using foresight technology have a higher chance of becoming market leaders.

One of key decisions of the preliminary stage of foresight research is the choice of a specific foresight technique for managing innovative development of the enterprise as part of digitalization. Depending on a number of factors, methodological base should combine methods that would be relatively easy to use and at the same time should provide adequate evidence base. Foresight techniques effective in commercial practice, which can be adapted to the needs of a specific enterprise, have a wide spectrum (Table 1).

Table 1- Foresight methods for managing innovative development of the enterprise

Method name	Brief description of the method
Methods of collective forecasting	
Delphi method	Experts repeatedly anonymously express their opinions about future trends. After e ach survey round, they read results of previous round and can adjust their predictions. Feedback with respondents, enabling them to adjust their own assessments, allows for consensus and more accurate forecasts
Method of scenarios	Several alternative scenarios of future development are developed, which consider different combinations of key factors. It is effective complement to the research carried out by other methods and helps the enterprise to prepare for various possible future options
Brainstorming method	A group of experts generates many ideas for future scenarios. The method makes it possible to obtain a wide range of expert opinions with obtaining some non-standard solutions to probable problems

Method name	Brief description of the method
Methods of data analysis	
Analysis of trends	Identification and analysis of long-term trends in development of technologies, markets, and society. Uses mathematical models to predict future results based on historical data
Text analysis	Analysis of large volumes of textual information (news, scientific articles, patents, etc.) to find new ideas and identify the latest trends
Analysis of social networks	Studying thoughts and feelings of consumers in social networks to identify new customer requests and trends in consumer behavior
Visualization methods	
Mental maps	Method of organizing creative thinking using schemes built according to certain algorithm. It is a visual representation of innovative ideas and their relationships
Technological road maps	A plan outlining short-term and long-term goals to be achieved with the latest technology. It is a visualization of development of technologies over time
Scenario visualizations	Visual presentation of various future development scenarios
Other methods	
The method of analogies	Finding analogies between different industries to generate new ideas. Using discovered parallels and principles of solving similar problems, experts try to solve the specific problem set before them
Synectics method	Combining concepts that are distant in content for production of new ideas. After formulating the problem, a group of experts tries using experience of solving similar problems in other, sometimes completely distant areas
Method of morphological analysis	Consistent thorough analysis of all possible combinations of system elements. A certain problem is divided into relatively independent parts with a search for all possible options for a practical solution to each of the parts

Source: systematized by the authors

Contemporary management practice in commercial activity, as well as public administration, offers a sufficient number of methods and tools that can be used in foresight. The most numerous group of methods is based on expert knowledge and assessments, as well as special techniques and procedures for practical work with an expert environment. On the other hand, methods of quantitative assessment of existing trends and their likely consequences are relevant, as a rule, using specially selected programs and developed models. Choice of specific methods of foresight to increase effectiveness of strategic management of innovative development of enterprises depends on such factors as research goals (what problems must be solved with using foresight), scope of its application, industry, size and culture of business organization, resources (time, money, experts), available for research.

Conclusions

The role of foresight as an effective tool for strategic management of innovative development of enterprises as part of digitalization is growing significantly. Using foresight can ensure that the business structure is one step ahead of competitors in identifying new opportunities and markets, preparing for possible changes and challenges and, accordingly, reducing risks, accelerating innovative development and concentrating efforts and resources on the most promising areas. In the conditions of modern and post-war Ukraine, these technologies can become foundations of the most effective methodology for long-term forecasting and a perfect tool for determining priorities ofstrategic nature in innovations.

Butpractical implementation of foresight technologies requires domestic companies to form appropriate teams of

specialists, and therefore requires additional investments to improve qualifications of managers and experts at all levels. This, as well as the ability to clearly define strategic goals, to choose adequate methods for their achievement, to develop and implement realistic and pragmatic scenarios, is really capable of turning foresight into a familiar attribute of domestic commercial practice in strategic management of innovative activities as part of digitalization.

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