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### **Theoretical Foundations of Innovative Support for the Post-war Development of the Agricultural Sector of Ukraine**

**Abstract. Introduction.** The article substantiates the theoretical basis for considering innovative support a key factor in Ukraine's agricultural sector's post-war development. This issue is relevant because there is a need to find effective mechanisms for modernizing the industry, increasing its competitiveness, and ensuring national food security during economic recovery.

**Purpose.** The study aims to substantiate the theoretical basis of innovative support as a determining factor in Ukraine's agricultural sector's post-war development, generalize the evolution of economic innovation theory, reveal the specifics of innovation processes in agriculture, and develop a structural-logical model of innovative support for agricultural production.

**Results.** Based on a systematic analysis of the evolution of economic innovation theory and the works of prominent scholars such as J. Schumpeter, P. Drucker, S. Kuznets, C. Freeman, and C. Christensen, the study generalizes and systematizes the key approaches to defining the essence of the concepts of "innovation," "the innovation process," and "novelty." The study reveals the organizational and economic specifics of innovation processes in the agricultural sector that distinguish it from other sectors of the economy. Specifically, the study analyzes factors such as dependence on natural and climatic conditions, seasonality of production, the long cycle of biological innovations, and the unique role of land as an indispensable means of production. The innovation potential of the agricultural industry is defined as a complex system of human, material, technical, financial, and organizational resources. An analysis of the current state of these components in Ukraine revealed systemic problems, including a shortage of qualified personnel, a technological gap between large and small producers, and limited access to financial resources. The research's central result is an author's structural-logical model for supporting innovation in agricultural production. The model reflects the stages of innovation, from idea generation to resource allocation and achievement of strategic goals, such as enhancing competitiveness, ensuring food security, and promoting sustainable socio-economic development. The model is presented as a universal theoretical framework that can be adapted to develop state programs supporting innovations during the post-war period.

**Conclusions.** The proposed model serves as a universal theoretical framework adaptable for the formation of state programs to support innovations in the agricultural sector during the post-war period. The practical value of the study lies in the possibility of using its results to form an effective innovation policy in the agricultural sector.

**Keywords:** innovations; innovative support; agricultural sector; post-war development; innovation potential; development model.

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### **Теоретичні засади інноваційного забезпечення повоєнного розвитку аграрного сектору України**

**Анотація.** У статті обґрунтовано теоретичні засади інноваційного забезпечення як ключового фактору повоєнного розвитку аграрного сектору України. На основі системного аналізу еволюції економічної теорії інновацій, що охоплює праці Й. Шумпетера, П. Друкера, С. Кузнеця та інших провідних вчених, узагальнено та систематизовано ключові підходи до визначення сутності понять «інновація», «інноваційний процес» та «нововведення». Розкрито організаційно-економічні особливості інноваційних процесів в аграрному секторі, зокрема залежність від природно-кліматичних умов, сезонність виробництва та специфіку використання біологічних активів. Визначено структуру інноваційного потенціалу аграрної галузі як сукупності кадрових, матеріально-технічних, фінансових, організаційних

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та інших ресурсів. Центральним результатом дослідження є розробка авторської структурно-логічної моделі інноваційного забезпечення розвитку сільськогосподарського виробництва. Модель комплексно відображає послідовність етапів від ініціації інноваційної ідеї до досягнення стратегічних цілей: підвищення конкурентоспроможності, забезпечення продовольчої безпеки та сталого соціально-економічного розвитку.

**Ключові слова:** інновації; інноваційна підтримка; аграрний сектор; повоєнний розвиток; інноваційний потенціал; модель розвитку.

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### **Problem statement in general form and its connection with important scientific or practical tasks.**

In a dynamic market environment characterized by globalization of economic processes and rapid technological change, innovation has become essential for the viability and long-term competitiveness of domestic businesses. This is why innovation management, encompassing the development, formation, implementation, and commercialization of new ideas, products, and technologies, is a necessary prerequisite for the sustainable functioning of economic entities today [19].

Innovative support is particularly relevant right now in Ukraine's agricultural sector, which has suffered significant losses because of military actions. In the post-war period, recovering the agricultural sector requires restoring production potential and qualitatively renewing it based on modern, innovative solutions such as digitalizing production processes, increasing energy efficiency, sustainably using land, and innovating agricultural technologies. Implementing innovations can increase labor productivity, reduce the resource intensity of production, ensure adaptation to climate change, and grow the added value of agricultural products.

Therefore, supporting the post-war development of Ukraine's agricultural sector is an important direction of state policy and scientific research. This support forms the foundation for increasing the competitiveness of the agricultural industry, activating investment activity, and accelerating the Ukrainian economic recovery a whole.

**Analysis of Recent Research and Publications.** The study of the essence of innovation and its role in economic growth has been the subject of works by such scholars as J. Schumpeter [1; 2], P. Drucker [3], S. Kuznets [4], V. Rossokha [19], J. Holbeek [18], P. Frankelius [20], A. Masliukivska, and others. In addition, V. O. Zakolodyazhny [21], O. O. Karpenko, O. Yermakov [22] have addressed sector-specific features of business activity, among others.

Despite the significant number of studies and scientific publications on the topic, the issue of systematizing approaches to defining the economic essence of innovation and its specific features, taking into account modern business conditions and dynamic changes across all spheres of human activity, remains insufficiently resolved.

Although the practice of innovation research has existed for many centuries, profound scientific doctrines regarding innovation theory were not formed until the twentieth century. An analysis of the evolution of economic innovation theory identifies eight key stages,

ranging from theories of the pre-market economy to the theory of the new economy. The first scientific approaches to substantiate the concept of innovation in detail are associated with the research of Austrian economist Joseph Schumpeter, considered the founder of innovation theory [1; 2]. Peter Drucker further developed the theory by integrating entrepreneurial and innovative activity into the foundation of the theory of innovative entrepreneurship [3]. Other scholars, such as Simon Kuznets [4] and Christopher Freeman [5], also made significant contributions. Contemporary concepts also address open innovation [6] and disruptive innovation [7].

Despite the substantial volume of scientific research, the problem of forming a holistic mechanism to support innovation specifically in the agricultural sector under the particular conditions of post-war transformation remains insufficiently explored.

**Formulation of the article's goals (problem statement).** The purpose of the article is to generalize the theoretical foundations of innovative activity and, based on them, develop a structural-logical model of innovative support for the post-war development of the agricultural sector of Ukraine.

Presentation of the main research material. The theoretical evolution and the essence of the "innovation" category have undergone a long path of development. Schumpeter distinguished three types of innovations: new products or services, technological improvements, and new forms of business organization [1]. He was also the first to separate the concepts of "invention," "research and development," and "innovation" [2].

The works of Simon Kuznets [4] address the relationship between innovation and economic growth. He developed new approaches to the theory of innovation, building on Joseph Schumpeter's ideas.

Protection of innovations: Kuznets believed that protecting property rights to new ideas and technologies is vital for stimulating innovation and economic development;

Stimulating competition: he emphasized that competition can incentivize the development of new ideas and technologies by encouraging companies to be creative and find new ways to compete.

Support for research and development: he believed that the state should fund research and development because it can lead to the creation of new technologies and products.

Development of education and infrastructure: he underscored that creating new ideas and technologies requires appropriate knowledge and infrastructure; thus,

developing education and infrastructure is vital for innovation.

Creating a favorable economic environment: Kuznets believed that innovation requires an open, flexible environment capable of adapting to changes.

American scholars have also explored the theory of "innovations," viewing them as an integrated production and organizational-economic system that implements scientific and technical ideas or inventions into

commercial reality and economic activity. Thus, P. Drucker outlined the contours of a new innovative economy where intellectual property prevails, and the primary processes are the intellectualization of labor and investment in the development of intellectual capital [3, p. 23]. Summarizing scientific approaches, various interpretations of the essence of innovation can be identified (Table 1).

**Table 1 Summarizing scientific approaches, various interpretations of the essence of innovation**

Object of Study	Author(s)	Characteristics of Innovations
<b>Change</b>	L. Vodáček, F. Valenta	Changes aimed at the introduction and use of new types of consumer goods, production and transportation means, markets, and organizational forms in industry.
<b>Process</b>	C. Freeman, J. Tidd, J. Bessant	A socio-technical and economic process which, through the practical application of ideas and inventions, leads to the creation of products and technologies with improved characteristics and is oriented toward economic benefit (profit). A complete process from idea to a finished product successfully marketed.
<b>System</b>	J. Schumpeter	A holistic, internally contradictory, and dynamic system concerned with the development of new methods of production and new products.
<b>Cycle</b>	H. Ya. Goldstein	A techno-economic cycle in which the use of research and development results directly causes technical and economic changes that, in turn, exert feedback effects on R&D activities.
<b>Result</b>	S. D. Ilyenkova, S. Yu. Yagudin, L. M. Gokhberg, D. V. Sokolov, H. Barnett; C. Christensen	The outcome of innovative activity realized in the form of a new or improved product introduced to the market, or a new or improved technological process. Concepts or ideas that must diffuse in order for market formation to be successful.
<b>Object</b>	V. G. Medynsky, S. V. Ildemenov	An object embodied in production because of conducted scientific research or a created invention, which qualitatively differs from its previous analogue.
<b>Information, Knowledge</b>	A. A. Chukhno	Improvement of productive forces based on information-intellectual technologies and knowledge.
<b>Economic Necessity</b>	S. V. Onyshko	Satisfaction of market demand and generation of profit by the producer.
<b>Measures</b>	F. Nixon	A set of technical, production, and commercial measures leading to the emergence of new and improved industrial processes and equipment.

*Source: compiled by the authors based on [5; 7; 8; 9].*

The innovation category is primarily characterized by the transformation of scientific and technological ideas into new products and technologies, making innovation a continuous process. Thus, O. Yu. Yermakov defines innovation as the accumulation of new knowledge embodied in scientific, economic, technical, organizational, and social novelties, aiming to enable business entities to generate profit by satisfying societal needs [22].

Clarifying the approaches proposed by domestic scholars, it should be emphasized that the innovation process is a series of interconnected actions, stages, and phases of scientific, technical, and economic research. In this context, innovative elements are key drivers of development. The results of these activities require continuous research, testing, and implementation in commercial production.

Innovative support for the agricultural sector must take into account its unique characteristics. Unlike industrial assets, land is a spatially limited and qualitatively heterogeneous resource [13, p. 167]. Dependence on natural and climatic conditions creates a high level of uncertainty [14, p. 70]. The seasonality of production complicates long-term financial planning, and the use of biological assets means that the innovation cycle may last 8-10 years.

The effectiveness of innovation activity depends on innovation potential, which includes human capital, material and technical, and financial and investment components [15; 17]. In Ukraine, the analysis reveals a shortage of qualified specialists, a technological gap between farms, and limited access to financing. To systematize the innovation support process, a structural and logical model is proposed (Table 2)).

**Table 2 Stages and components of the innovative support model for agricultural sector development**

Stage	Content and Key Components
<b>Initiation and Analysis</b>	Emergence of a problem/proposal Analysis of the environment and the problem Identification of potential opportunities Assessment of the industry's innovation potential.
<b>Implementation</b>	Comprehensive innovation support, including scientific and technical, technological, financial and investment, organizational and economic, resource, human capital, and information components.
<b>Outcome-Oriented</b>	Production of innovative products, leading to an increase in the level of innovation potential and enhanced competitiveness of the industry.
<b>Strategic</b>	Achievement of final objectives: ensuring food security, resource conservation, socio-economic development, and advancement of agricultural production.

*Source: developed by the authors*

In general, agricultural production is a multifunctional and strategically important process within the agro-industrial complex. The sector's main tasks are to achieve sustainable growth in agricultural production, reliably provide food and raw materials for the country, and ensure the growth of the agricultural sector's competitiveness and national food security. Considering the role of agricultural production in the state's economic and social development, improving its efficiency and competitiveness depends on addressing economic growth issues, including providing innovative support.

Formulating and addressing the specifics of innovative support for the development of agricultural production primarily requires defining the theoretical essence of the process of innovative support for the agricultural sector of Ukraine.

The significance of researching innovative potential as an independent category and, at the same time, a component of the cumulative potential of agricultural producers is determined by the need for a deep understanding of the processes occurring at the macro level. This primarily involves systematic analysis and monitoring of market and consumer needs, which helps agricultural producers adapt to changing market conditions. As a result, the groundwork is laid for the swift implementation of developed solutions and the efficient utilization of existing innovative potential.

It should be emphasized that the innovative support process is characterized by multi-level application and cyclic development. Specifically, at the macroeconomic level, innovation activity reflects the state's attitude toward innovation and defines its strategic goals, tasks, and forms of activity in science and technology. It also

establishes benchmarks for achieving effective results in these areas.

At the same time, the cyclical nature of innovation development covers successive stages – from forming a scientific and technical idea to its commercial realization – and is continuous. This is due to the constant improvement of the innovative product, the acquisition of new consumer properties, the expansion of application spheres, and the further development of innovations used in the creation process.

**Conclusions from this research and prospects for further research in this direction.** A broad analysis of scientific sources was conducted to generalize theoretical approaches to defining the essence of innovations, identify key stages in the evolution of innovation theory, and systematize the classification of innovations.

The innovative development of the agricultural sector was found to have significant organizational and economic features due to its dependence on natural factors, seasonality, and the specifics of using biological assets. This requires the formation of a special mechanism for innovative support.

An author's structural-logical model of innovative support for the development of the agricultural sector has been proposed, which comprehensively combines an analysis of the industry's potential, a multi-level support system, and expected socio-economic results. This model can serve as a theoretical basis for developing state programs to support innovations during the post-war period.

Further research should focus on developing methodological tools for quantitatively assessing the innovation potential of agricultural enterprises and practically testing the proposed model.

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