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Адаптаційні інструменти забезпечення трансформації економіки аграрних підприємств в умовах євроінтеграції та діджиталізації

Предметом дослідження є система адаптаційних інструментів трансформації економіки аграрних підприємств у контексті впровадження євроінтеграційних стандартів і цифрових технологій.

Метою дослідження є наукове обґрунтування та концептуалізація ефективних інструментів адаптації аграрних підприємств до умов європейської інтеграції та цифрової трансформації, спрямованих на підвищення їхньої економічної стійкості, інноваційності та конкурентоспроможності.

Методи дослідження – застосовано системний і структурно-функціональний підхід, методи порівняльного аналізу, інституційного моделювання, SWOT-аналіз, контент-аналіз нормативної бази ЄС та України, а також експертне оцінювання рівня цифрової готовності аграрних підприємств.

Результати роботи. Розроблено узагальнену типологію адаптаційних інструментів трансформації аграрної економіки, проаналізовано бар'єри цифрової трансформації, охарактеризовано механізми впливу євроінтеграційного курсу на управлінські практики агропідприємств, запропоновано структурну модель цифрової інклюзивності аграрного сектора в умовах сталого розвитку.

Галузь застосування результатів. Результати можуть бути використані аграрними підприємствами, об'єднаннями виробників, дорадчими службами, місцевими громадами, державними структурами та донорами програм підтримки цифрової та євроінтеграційної трансформації сільського господарства.

Висновки. Трансформація економіки аграрних підприємств у сучасних умовах євроінтеграції та цифровізації вимагає системного, міждисциплінарного та скоординованого підходу. Створення гнучкої моделі адаптації на основі поєднання цифрових, фінансових, інституційних і кадрових інструментів дозволяє забезпечити стратегічну стійкість і відкриває нові можливості для інтеграції у спільний європейський простір сталого агровиробництва.

Ключові слова: аграрне підприємство, адаптаційні інструменти, цифровізація, євроінтеграція, економічна трансформація, стале сільське господарство, управлінські практики, цифрова інклюзивність.

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Adaption tools for ensuring the transformation of the economy of agricultural enterprises in the conditions of european integration and digitalization

The subject of the study is a system of adaptation tools for the transformation of the economy of agricultural enterprises in the context of the implementation of European integration standards and digital technologies.

The purpose of the study is the scientific substantiation and conceptualization of effective tools for adapting agricultural enterprises to the conditions of European integration and digital transformation, aimed at increasing their economic sustainability, innovation and competitiveness.

Research methods – a systemic and structural–functional approach, methods of comparative analysis, institutional modeling, SWOT analysis, content analysis of the regulatory framework of the EU and Ukraine, as well as expert assessment of the level of digital readiness of agricultural enterprises were applied.

Results of the work. A generalized typology of adaptation tools for the transformation of the agrarian economy has been developed, barriers to digital transformation have been analyzed, mechanisms of the influence of the European integration course on the management practices of agricultural enterprises have been characterized, a structural model of digital inclusion of the agricultural sector in the context of sustainable development has been proposed.

Field of application of the results. The results can be used by agricultural enterprises, producer associations, advisory services, local communities, state structures and donors of programs to support the digital and European integration transformation of agriculture.

Conclusions. The transformation of the economy of agricultural enterprises in modern conditions of European integration and digitalization requires a systemic, interdisciplinary and coordinated approach. Creating a flexible adaptation model based on a combination of digital, financial, institutional and personnel tools allows ensuring strategic stability and opens up new opportunities for integration into the common European space of sustainable agricultural production.

Keywords: agricultural enterprise, adaptation tools, digitalization, European integration, economic transformation, sustainable agriculture, management practices, digital inclusion.

Problem statement. Ukrainian agricultural enterprises operate in the context of deep structural shifts associated with the need to harmonize with European standards, as well as adapt to the rapid development of digital technologies. At the same time, the instability of the external environment, the limited resource base and the uneven level of digital readiness create serious challenges for the implementation of effective transformation strategies. In this regard, the need to form a holistic system of adaptation tools is becoming more urgent, which will ensure the innovative development of the agricultural sector in the new paradigm of sustainable economic growth. Analysis of recent research and publications. The preparation of the article was based on a wide range of scientific sources, which allowed for a comprehensive study of adaptation processes in the agricultural sector of Ukraine in the context of European integration progress and digital transformation. The selected works cover issues of institutional development, innovative management, strategic planning and modernization of management approaches. The work of Zos–Kior (2018) focuses on improving public administration through career consulting, which is relevant in the formation of human capital in the agricultural sector [1]. Dyachenko (2024) investigates the innovative development of agricultural enterprises in the context of European

integration, emphasizing the importance of a strategic orientation towards innovation [2]. Doroshenko et al. (2025) analyze adaptation strategies for increasing the efficiency of enterprises in the context of threats, which allows assessing a risk-oriented approach to transformation [3]. Gnatenko et al. (2021) consider scenario modeling of public innovation policy, which is relevant for strategic planning in the agricultural sector [4]. Shary et al. (2020) substantiate an institutional model of land relations, which is important for agricultural administration in the context of European integration [5]. Dotsyuk (2024) analyzes the export potential of agricultural enterprises, which is directly related to adaptation to the requirements of the European market [6]. Belkin and Trapaidze (2025) investigate the marketing planning of agricultural enterprises, which forms the basis of adaptive market strategies [7]. Gnatenko and Kulikova (2016) highlight areas for improving human resource management, an important factor in successful digital transformation [8]. Zos–Kior et al. (2020) focus on the development of labor potential, which is a key resource in a changing digital environment [9]. Aranchiy et al. (2022) model the assessment of the effectiveness of financial management, which is important for the economic sustainability of agricultural enterprises in the transformation period [10].

Analysis of sources shows that the transformation of the agricultural sector requires the integration of institutional reforms, digital solutions, and human capital development. The involved scientific works allowed us to delve deeper into the conceptual and applied aspects of adaptation tools and to form a substantiated model of agricultural enterprises' response to the challenges of European integration and digitalization.

Presentation of the main material. The modern transformation of the agricultural sector of Ukraine is taking place in conditions of profound macroeconomic, socio-political and technological changes, caused by the course towards European integration and the rapid spread of digital technologies. In this context, agricultural enterprises are faced with the need to adapt to new standards, requirements and a competitive environment, which dictate the need to introduce effective adaptation management tools. European integration involves not only harmonization of the regulatory and legal field with the *acquis communautaire*, but also a gradual change in the paradigm of the functioning of agribusiness. From an orientation towards a raw material development model, enterprises are moving to an innovative and technological structure of the economy, in which the ability to quickly integrate modern tools of digitalization, sustainable land use, effective resource management and responsible farming plays a key role. One of the main challenges for the agricultural sector is ensuring economic sustainability and competitiveness in conditions of high instability, in particular changes in external markets, increased requirements for product safety, transformation of supply chains and rising prices for resources. In this regard, adaptive tools act not only as a means of minimizing risks, but also as a catalyst for the transition to an innovation-oriented development model. The formation of such tools involves the integration of technological, organizational, economic and management solutions that allow agricultural enterprises to remain flexible, efficient and socially responsible [1–6]. A significant factor in successful transformation is digitalization. It opens up new horizons for optimizing agricultural production, increasing the accuracy of agricultural operations, reducing losses, streamlining logistics processes and increasing the transparency of economic activities. Adaptive digital tools include the use of

precision farming systems, agroanalytics based on satellite data, cloud platforms for managing agricultural processes, the implementation of IoT solutions in monitoring the condition of soils, moisture and yield, as well as the use of blockchain technologies in traceability systems. All these elements not only increase economic efficiency, but also allow enterprises to meet the requirements of European markets in terms of environmental friendliness, safety and sustainability of agricultural production. Along with digital technologies, institutional and financial adaptation mechanisms are of key importance. Participation in programs to support small and medium-sized agribusiness within the framework of EU instruments, the use of financial leasing programs, preferential lending, index insurance and grant programs of European integration direction allows not only to modernize the material and technical base, but also to reduce the risk of losses in unstable conditions. At the same time, it is important to take into account regional specifics, the scale of enterprises' activities and their readiness for institutional changes. Lack of access to financing, difficulty in forming strategic coalitions, lack of sufficient project capacity – all this complicates the use of the potential of European programs, which requires the active participation of industry associations, advisory services and state agencies in forming a favorable environment.

The transformation of the economy of agricultural enterprises in the context of European integration also involves the introduction of new standards of corporate governance, increasing the level of transparency, efficiency of the accounting, reporting and internal control system. The transition to digital forms of accounting, electronic certification of products, automation of interaction with state systems of registration and monitoring of economic activity – all this contributes to strengthening institutional trust and opens the way to international cooperation. In this context, the implementation of ESG principles in the activities of enterprises is of particular importance, which is becoming a new norm in interaction with investors, banks, export partners and consumers.

A separate vector is human capital. Transformation processes require agricultural enterprises to invest in personnel training, the development of digital skills, project management competencies, international law, environmental management. In

this aspect, partnership with educational institutions, participation in international exchanges, and the implementation of dual education practices are effective, which allows not only to improve the qualifications of personnel, but also to integrate European management cultures.

The adaptation process is further complicated by military risks, threats to food security, damage to infrastructure and disruption of logistics chains. In such conditions, adaptation tools should include anti-crisis strategies, operational planning systems, backup business models, development of local markets and digital analytical forecasting tools. Effective transformation of the agricultural sector requires the formation of a synergistic model of interaction between the state, business, science and international partners, within which not only technological modernization is ensured, but also social inclusion, environmental responsibility and strategic sustainability of agricultural production [5–9]. In general, the adaptation of the agricultural economy in the context of European integration and digital transformation should not take place in a fragmented manner, but as a systemic process of deep renewal of the management logic, institutional architectonics and technological framework of enterprises. The effectiveness of this process depends on the ability of agricultural entities to respond to external changes in a timely manner, implement comprehensive solutions, and form long-term development strategies that are harmonized with European priorities and national interests of sustainable development. Table 1 reflects the Impact of European integration requirements on the management practices of agricultural enterprises (Table 1).

The European integration process carries with it not only obligations, but also institutional impulses

for profound changes in the internal management of agricultural enterprises. The implementation of European standards in practice requires a complete restructuring of management approaches – from product quality control to digital management. Such implementation contributes to the systemic transformation of agricultural production in Ukraine and opens up new opportunities for increasing export potential. Let us reflect the characteristics of the barriers to the digital transformation of the agricultural sector (table 2).

The issues of digital transformation of the agricultural economy are not limited to technical challenges, they are complex and cover the managerial, educational, legal and mental spheres. Without overcoming the above barriers, it is impossible to achieve either effective resource management or integration into the European digital space of agricultural production. Overcoming these limitations requires multi-level interaction: intergovernmental support, business activity and involvement of local communities.

Analysis of the typology of barriers to digital transformation of the agricultural sector in Ukraine demonstrates that the limitations are not only technological or resource in nature, but have a deeply rooted systemic and structural content. Their overcoming is impossible solely through the efforts of individual enterprises, as it requires synchronization with state policies, regional initiatives and educational strategies. In particular, cultural inertia and a low level of digital trust form a persistent resistance to change, which cannot be overcome only through technical modernization [8–10].

Effective response to these challenges involves the creation of a favorable digital environment, where motivation for innovation is supported by transparent rules, accessible infrastructure and ongoing educa-

Table 1. The impact of European integration requirements on the management practices of agricultural enterprises

European integration vector	Changes in management	Expected transformational results
Harmonization with EU standards	Implementation of HACCP, GLOBALG.A.P., ISO 22000 systems	Improved access to EU markets, increased consumer confidence
EU environmental legislation	Implementation of environmental monitoring programs, introduction of organic farming	Reduced environmental burden, support for international certifications
Integration into EU agricultural policies	Strategic planning in accordance with CAP (Common Agricultural Policy)	Leveling the playing field, increased investment attractiveness
EU digital transformation policy	Transition to Smart Farming, digital farm management platforms	Increased resource management efficiency, transparency of processes

Source: proposed by the authors

Table 2. Characteristics of the barriers to the digital transformation of the agricultural sector

Barrier type	Manifestation in the practice of enterprises	Overcoming opportunities
Technological	Lack of access to modern equipment and software	Leasing support, sharing platforms
Human	Insufficient IT literacy of personnel, shortage of specialists	Training in agro-educational hubs, dual education
Institutional	Lack of digital integration policies at the community level	Formation of local digitalization strategies
Financial	High cost of implementing innovative solutions	Participation in EU grant programs, lending
Cultural	Low trust in digital systems, resistance to change	Communication campaign, internal motivation for change

Source: proposed by the authors

tional activities. The role of educational platforms and agrodigital hubs as a means of actively implementing digital literacy at all levels of agricultural production should be emphasized. The formation of an inclusive digital ecosystem will not only reduce structural barriers, but also ensure stable integration of the Ukrainian agricultural sector into the modern European economic and technological space.

Conclusions

A comprehensive study of adaptation tools for the transformation of the economy of agricultural enterprises has revealed that effective adaptation to the conditions of European integration and digital transformation requires a multi-vector approach, where the key role is played by the consistency of the strategic goals of enterprises with the priorities of state policy and European standards. Transformation processes are systemic in nature and cover both technological and managerial levels, as well as the socio-cultural sphere, which involves the formation of a new paradigm for conducting agricultural business. The introduction of digital technologies, in particular elements of precision agriculture, agroanalytics and digital monitoring, demonstrates high efficiency provided that enterprises have sufficient organizational readiness and human resources capacity. At the same time, uneven access to resources and knowledge, especially among small and medium-sized farms, creates significant challenges for the formation of a balanced agricultural environment. The identified differentiation in the level of digital readiness indicates the need to create institutions to support transformation, focused on overcoming barriers not only of a technical, but also educational, regulatory and mental nature. European integration vectors modernize the agricultural sector not only through regulatory requirements, but

also by stimulating internal changes in the management structure, decision-making logic, and organization of production processes. This opens up new opportunities for the institutional maturity of agricultural enterprises, but also actualizes the challenges of consolidating resources, forming intersectoral partnerships, and including communities in transformation processes.

In general, ensuring the successful adaptation of the agricultural economy to the requirements of European integration and the challenges of digitalization depends on the ability to create a flexible, integrated, and predictive change management system. It is the synergy of digital technologies, institutional support, educational practices, and strategic thinking that can provide the agricultural sector of Ukraine with a new quality of competitiveness in the European economic space.

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