Rocznik Ochrona Środowiska

Volume 28 Year 2026 ISSN 2720-7501 pp. 235-249

https://doi.org/10.54740/ros.2026.018 open access

Received: April 2026 Accepted: April 2026 Published: May 2026

Strategic Planning and Management Tools for the Development and Effective Operation of Agribusiness Entities

Maryna Ponomarova[1], Liudmyla Lomovskykh[2], Vitalina Antoshchenkova[3], Serhii Stankevych[4], Nataliia Yefremova[5], Pavlo Aksenko[6]

[1]UNESCO Chair of Philosophy of Human Communication and Social and Humanitarian Disciplines, State Biotechnological University, Kharkiv, Ukraine
https://orcid.org/0000-0001-8463-821X

[2]Department of Global Economics, State Biotechnological University, Kharkiv, Ukraine
https://orcid.org/0000-0002-0760-0215

[3]Department of Global Economics, State Biotechnological University, Kharkiv, Ukraine
https://orcid.org/0000-0002-3963-6263

[4]Department of Zoology, Entomology, Phytopathology, Integrated Plant Protection and Quarantine named after B.M. Lytvynov, State Biotechnological University, Kharkiv, Ukraine
https://orcid.org/0000-0002-8300-2591

[5]Department of Management, Business and Administration, State Biotechnological University, Kharkiv, Ukraine
https://orcid.org/0000-0001-9358-4743

[6]State Biotechnological University, Kharkiv, Ukraine
https://orcid.org/0000-0003-1184-5554

**corresponding author's e-mail: lapo4kamari@gmail.com*

Abstract: The article examines innovative strategic management approaches in Ukraine's agricultural sector amid full-scale military aggression, macroeconomic instability, and accelerated European integration. Employing statistical, comparative, and systematic analytical methods, the study evaluates the strategic effectiveness of key management instruments – digital transformation tools, EU harmonization mechanisms, FAO-supported recovery initiatives, and the National Agricultural Development Strategy until 2030 – in maintaining and restoring the productive and export potential of the agri-food complex. The empirical analysis reveals a profound structural disruption: the agricultural sector's share of GDP contracted sharply from 12% (2021) to 4% (2022), while grain production declined from a historic peak of 86.5 million tonnes (2020) to 56 million tonnes (2024), reflecting cumulative losses attributable to territorial occupation, infrastructure destruction, extensive land contamination, and acute labour shortages. The study demonstrates that systematic deployment of precision agriculture technologies – including unmanned aerial vehicles, IoT-integrated soil and crop monitoring, satellite remote sensing, and unified digital management portals – has yielded measurable gains in resource efficiency and operational cost reduction, strengthening sectoral resilience under wartime constraints. Strategic priorities for sustainable recovery are identified as follows: modernization of agro-industrial infrastructure, regulatory harmonization with EU food safety and phytosanitary standards, targeted support for small and medium agricultural enterprises, stimulation of innovation activity reflected in the European Innovation Scoreboard index growth from 0.21 (2020) to 0.28 (2023), and diversification of export market access. The critical stabilizing role of international institutional support is substantiated – FAO-coordinated initiatives secured storage capacity for 4.07 million tonnes of grain and delivered essential agricultural inputs to over 45,000 farming households. It is concluded that strategic management innovation constitutes a necessary yet insufficient condition for comprehensive sector recovery; effective rehabilitation demands integrated policy frameworks combining digital transformation, physical infrastructure restoration, institutional capacity building, regulatory reform, and sustained international cooperation.

Keywords: strategic management, agri-food sector, digital transformation, food security, EU integration, agricultural innovation, sustainable development, war impact, FAO support, Ukraine

1. Introduction

The agro-industrial complex of Ukraine occupies a structurally irreplaceable position within the national economy, contributing substantially to the formation of gross domestic product, the preservation of rural employment, and the generation of export revenues that underpin macroeconomic stability. Under conditions of full-scale military aggression, the productive and institutional foundations of this sector have been subjected to unprecedented stress, rendering the sophistication of strategic planning frameworks and the purposeful deployment of innovation-oriented management instruments not merely advantageous but operationally indispensable (Skrypnyk, 2022; Sus et al., 2022; Adamiv, 2023). The capacity of agribusiness entities to translate strategic intent into measurable performance outcomes depends critically on their ability to embed digital technologies, data-driven decision-making architectures, and adaptive organizational structures into their core management processes – competencies whose strategic importance has been fundamentally magnified by the

compounding pressures of wartime disruption and accelerating European integration requirements (Kovalchuk, 2023; Bazaluk et al., 2022; Kalinichenko, 2025; Kovalenko & Malakhova, 2025).

Scholarly engagement with strategic management in the agri-food sector has expanded along several analytically distinct but functionally interconnected trajectories. One strand of inquiry treats strategic innovation as an instrument for ensuring food security, stabilizing rural socioeconomic conditions, and strengthening export capacity within the broader architecture of Ukraine's EU accession agenda (Zoria, 2019; Panchenko, 2023; Zakharchuk et al., 2023; Mykhalchuk, 2024). A parallel research tradition examines strategic management tools as structural enablers of post-conflict reconstruction, foregrounding the challenges of innovation diffusion across heterogeneous enterprise populations, persistent territorial disparities in digital infrastructure quality, and the limited institutional absorptive capacity of small agricultural producers confronting simultaneous market and security shocks (Ingram et al., 2022; Bondarchuk et al., 2022; Baida et al., 2023; Diukarev, 2025). International scholarship has increasingly directed attention toward the systemic interdependencies linking agricultural innovation adoption, climate change adaptation imperatives, and technological modernization trajectories as co-determinants of long-run sectoral competitiveness (Furman & Gontaruk, 2019; Kadyrus et al., 2020; Piata, 2020; Mirzoieva et al., 2022; Nagaj et al., 2025; Melnyk et al., 2025).

The restructuring of strategic management practice enforced by martial law conditions has introduced qualitatively novel constraints into the operational environment of Ukrainian agribusiness (Grishnova & Kozlovskyy, 2020). Territorial occupation of productive agricultural land, systematic destruction of processing and logistics infrastructure, severed international supply chain linkages, and acute human capital attrition through mobilization and forced displacement have collectively reconfigured the strategic calculus confronting enterprise managers at every scale of operation (Gorobets & Myrhorodska, 2019; Boiko & Krupa, 2019; Hurenko, 2023; Dunda et al., 2026). Within this reconfigured landscape, the strategic value of digitalization initiatives – encompassing unmanned aerial vehicle deployment, IoT-integrated field monitoring, AI-powered yield forecasting, and unified digital management portals – and the organizational willingness to commit resources to innovation-based competitive positioning have emerged as primary differentiators of enterprise resilience and recovery trajectory (Shaleny et al., 2024; Sklavos et al., 2024; Kovalenko & Malakhova, 2025; Kalinichenko, 2025). Concurrently, the EU integration imperative generates a compound strategic pressure: it simultaneously imposes demanding regulatory harmonization requirements and expands the market opportunity set available to enterprises achieving compliance – a duality that rewards adaptive strategic capacity and penalizes institutional inertia (Sus et al., 2022; Kvasha et al., 2022; Kovalchuk, 2023; Karbovska et al., 2026).

This investigation approaches strategic management instruments as constitutive elements of a comprehensive innovation governance architecture rather than as isolated operational levers, examining their collective capacity to sustain competitive advantage and reinforce the agri-food sector's contribution to national food security under wartime conditions. The analytical scope encompasses digital transformation pathways, EU regulatory harmonization mechanisms, internationally supported recovery programming, and the strategic framework established by the National Agricultural Development Strategy through 2030 (Skrypnyk, 2022; Adamiv, 2023; Sus et al., 2022). Particular scholarly attention is devoted to the structural asymmetry separating large vertically integrated agro-holdings from small and medium-sized producers with respect to strategic innovation resource access and digital readiness – a divide that generates differentiated recovery trajectories across enterprise cohorts and demands targeted recalibration of public support architecture (Mykhalchuk, 2024; Panchenko, 2023; Bondarchuk et al., 2022). The productive synthesis of established strategic analysis methodologies – including SWOT-based environmental scanning, scenario planning, and Balanced Scorecard performance integration – with emerging innovation management approaches centred on Big Data analytics, machine learning applications, and precision agriculture instrumentation constitutes a defining strategic challenge for sustainable agribusiness development in the current period (Baida et al., 2023; Bondarenko et al., 2023; Kalinichenko, 2025; Diukarev, 2025).

Under conditions of active military conflict and accelerating EU integration requirements, strategic management innovations demonstrate measurable differentiation in effectiveness across enterprise size categories. Large vertically integrated agro-holdings achieve substantially higher rates of technology adoption (65–75% for precision agriculture deployment) compared to small and medium-sized producers (15–25%), with this differential persisting despite public support programs. This asymmetry generates asymmetric recovery trajectories that threaten sectoral structural diversity. The study confirms or refutes this proposition through empirical analysis of adoption patterns, innovation investment levels, and productivity outcomes across enterprise cohorts, and identifies policy mechanisms to narrow this divide.

2. Methods

The study draws on a multilevel methodological framework combining quantitative and qualitative approaches to examine strategic management innovation in Ukraine's agri-food sector under conditions of full-scale military conflict and accelerated European integration. The systemic analysis method guided the structural assessment of transformation processes in the agricultural sector, enabling the evaluation of institutional, technological, and regulatory interdependencies in the context of EU accession requirements. The logical-theoretical approach was applied to trace causal connections between the adoption of digital management instruments – including precision agriculture technologies, IoT-integrated monitoring systems, and unified digital portals – and observed outcomes in sectoral productivity, resource efficiency, and competitive positioning.

Despite EIS design primarily for EU member states, its application to Ukraine is justified by: (1) Eurostat methodological compatibility enabling cross-national comparison; (2) EIS inclusion of non-member economies (e.g., Serbia 0.41, North Macedonia 0.28); (3) Comparability caveats: Ukraine's EIS values (0.21 in 2020, 0.28 in 2023) reflect wartime suppression of innovation metrics and should not be directly compared (1:1) with EU averages (0.74–0.80). Data interpreted with explicit acknowledgment of validity limitations due to conflict impact on R&D institutions and labour market disruption. EIS trends (0.21→0.28) indicate direction of change despite wartime constraints.

Statistical processing of data sourced from the State Statistics Service of Ukraine (2018–2024), the Food and Agriculture Organization of the United Nations (FAO), the European Commission, and the European Innovation Scoreboard formed the quantitative backbone of the analysis. This included multi-year dynamics of agricultural production indicators, innovation activity indices, organic land use shares, and labour productivity metrics across the full study period. A comparative analysis was conducted to benchmark Ukraine's innovation performance against EU member states using the European Innovation Scoreboard framework, enabling the identification of structural gaps and priority areas for policy intervention.

Content analysis of strategic program documents – including the National Agricultural Development Strategy until 2030, FAO Ukraine initiatives, and EU digitalization policy frameworks – complemented the quantitative assessment by mapping the administrative architecture, target objectives, and operational reach of each strategic instrument. SWOT analysis was applied to systematize internal strengths and external opportunities against structural vulnerabilities and wartime constraints facing the agri-food sector. The generalization and abstract-logical methods were employed at the synthesis stage to consolidate empirical findings into a coherent strategic assessment and to ground the study's policy recommendations in the documented realities of wartime agricultural management and post-conflict recovery planning.

3. Results

Ukraine's agro-industrial complex is a structurally vital component of the national economy, making substantial contributions to GDP formation, rural employment, and export revenue. In the context of intensifying global competition, climate variability, market volatility, and accelerating technological transformation, strategic planning has emerged as the primary instrument for securing the sustainable development of agricultural enterprises and preserving their competitive positioning in both domestic and international markets.

The dynamics of agribusiness development in Ukraine over the period 2005–2025 are illustrated in Figure 1, which tracks two key indicators: the share of the agro-industrial complex in GDP (%) and grain production volumes (million tonnes). Regarding the GDP share, relative stabilization was observed at 7.5–8.5% throughout 2005–2021, with moderate fluctuations. The year 2021 constituted an exception, when the indicator rose to 12%, attributable to a record harvest and favourable conditions in global agricultural markets. Following the onset of full-scale military aggression in February 2022, the agro-industrial sector's GDP share contracted sharply to 4%, reflecting the scale of sectoral losses resulting from the occupation of agricultural lands, infrastructure destruction, and logistical disruption. During 2023–2025, a gradual recovery to 6.9–7.55% is recorded. Grain production dynamics demonstrate a pronounced upward trajectory throughout the study period: from 38 million tonnes in 2005 to a record 86.5 million tonnes in 2020 and 86 million tonnes in 2021, confirming the successful technological modernization of the sector and the expansion of cultivated areas (KSE Institute, 2024; State Statistics Service of Ukraine, 2026). Full-scale aggression led to a sharp decline to 56 million tonnes in 2024 – a 35% contraction from the peak. The 2025 projection of 60.79 million tonnes indicates a partial recovery of productive capacity.

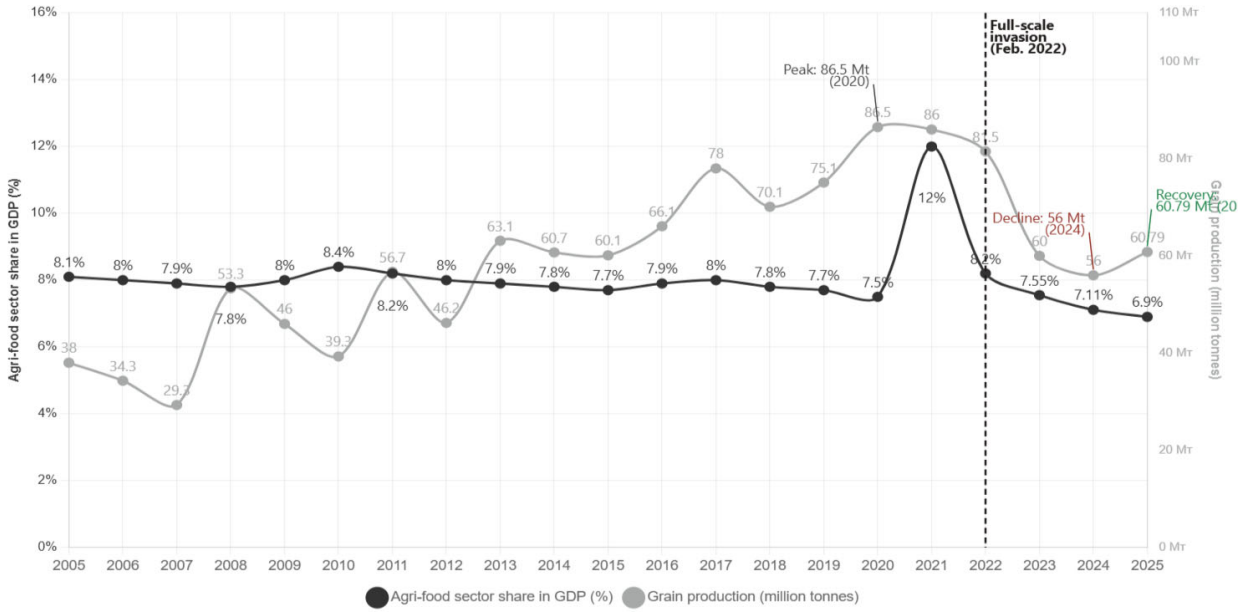

Fig. 1. Dynamics of Agribusiness Development in Ukraine (2005–2025)

Source: Authors' calculations based on State Statistics Service of Ukraine (2026), FAO (2025), World Bank (2025).

Effective strategic planning enables agro-industrial enterprises to adapt to external environment changes, optimize resource utilization, anticipate risks, and identify new development opportunities. Despite the severe disruptions imposed by Russian military aggression – which significantly impaired production and logistics – the agricultural sector has retained its significance for Ukraine's economic recovery and global food security. Strategic management innovation has proven decisive in navigating this period of turbulence, with a sustained focus on resilience, competitiveness, and long-term food security (Kudria et al., 2023).

In response to the challenges generated by the ongoing conflict, Ukraine has implemented a series of strategic management innovations within its agri-food sector. The Agricultural Development Strategy of Ukraine until 2030 serves as the primary framework, designed to prepare the sector for EU integration by emphasizing sustainable practices, the competitive modernization of agricultural processes, and innovation in both products and production methods. International partners support these efforts and are essential for attracting foreign investment and stimulating economic recovery.

Digital technologies have become the foundational driver of innovation in Ukraine's agricultural sector, substantially enhancing its operational resilience and productive efficiency (Fig. 2). The deployment of digital instruments – including unmanned aerial vehicles, land resource management systems, and integrated digital portals – has transformed agricultural practice by enabling precise monitoring and resource management, reducing costs, and improving productivity. Despite persistent challenges, including limited rural internet connectivity, digitalization efforts continue to expand their operational reach, providing critical support to the sector under conditions of ongoing instability (FAO, 2022).

Unmanned aerial vehicles have emerged as a strategically important instrument in Ukraine's agricultural sector, offering multiple performance advantages. Equipped with advanced sensing systems, drones enable precise crop treatment, significantly reducing requirements for chemical inputs and water. They additionally facilitate monitoring of otherwise inaccessible territories, generating high-resolution imagery and data that support optimized field resource management. Beyond their production function, drones have played an important role in sustaining Ukraine's agricultural export capacity by supporting grain supply routes through the Black Sea corridor. The broader integration of digital instruments – encompassing GPS-guided equipment, IoT sensors, and AI-powered management platforms – has enabled precise data collection and analysis, resulting in more efficient land use, improved resource management, substantial cost savings, and enhanced decision-making capacity among farming enterprises (Table 1). (FAO, 2022a; Cabinet of Ministers of Ukraine, 2024). The Strategy for the Development of Agriculture and Rural Areas in Ukraine until 2030 is a comprehensive framework designed to modernize the agricultural sector and align it with EU standards.

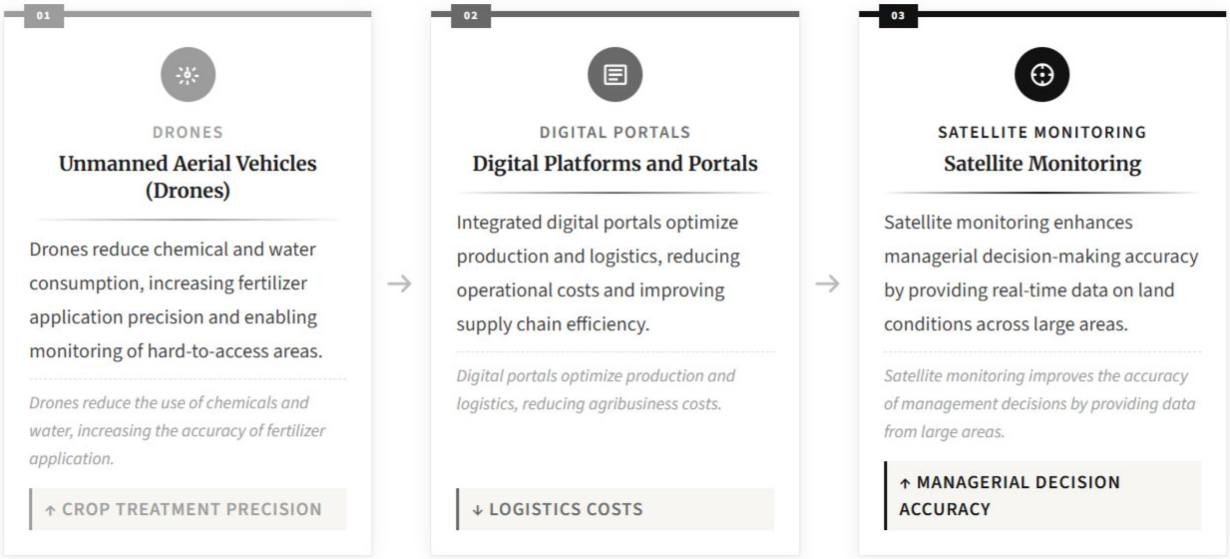

Fig. 2. Enhancing agribusiness with digital technologies
Source: Authors' development based on FAO and UNDP (2022a).

Table 1. Strategic priorities and objectives of Ukraine's agricultural sector for the period to 2030

Aspect	Description
Strategic objective	Preparation of Ukraine's agricultural sector for EU integration; ensuring sustainable development of agriculture and rural territories under martial law and post-war recovery conditions
Key objectives	1. Formation of a competitive and resilient agricultural sector. 2. Protection of the environment and biodiversity. 3. Adaptation to climate change. 4. Strengthening the socioeconomic structure of rural territories. 5. Enhancement of national food security and contribution to global food stability
Implementation timeline	The Strategy extends to 2030; The operational action plan covers the phases 2023–2025 and 2025–2027, with staged performance monitoring
Key directions	– Harmonization of agricultural policy with EU standards and directives. – Institutional strengthening of agricultural sector governance bodies. – Digitalization of agricultural production and land accounting. – Support for small and medium-sized producers and rural communities. – Development of export potential and diversification of sales markets. – Restoration of damaged agricultural infrastructure
Challenges	Full-scale military aggression and occupation of agricultural lands; extensive land contamination (over 30% of agricultural areas at risk); destruction of production and logistics infrastructure; rising inflation and production costs; qualified labour shortages resulting from mobilization and migration; restrictions on export corridors
Expected results	Restoration of grain production volumes to 80+ million tonnes; increased share of organic production; recovery of the agro-industrial complex's export share to pre-war levels; improved food security; preservation of biodiversity and strengthening of rural economies

Source: Authors' development based on FAO (2022a); Cabinet of Ministers of Ukraine (2024).

The National Agricultural Development Strategy of Ukraine until 2030 constitutes a comprehensive framework for modernizing the agri-food sector and aligning it with EU standards. Digitalization represents its central transformative component: by fostering innovation and efficiency, digital transformation is projected to reduce production costs, increase productivity, and support rural development. The Strategy simultaneously addresses digitalization barriers – including limited rural internet access and insufficient digital literacy – to ensure effective technology deployment across the sector. EU integration constitutes an equally critical strategic dimension, targeting the harmonization of Ukraine's agricultural policy with EU standards, including the adoption of food safety, sanitary, and phytosanitary regulations, as well as the unification of competition and trade legislation frameworks. These efforts aim to increase productivity, sustain export growth, and generate new employment opportunities by developing a competitive and sustainable agri-food sector (Table 2). Transitional trade liberalization measures – including the removal of import duties on Ukrainian agricultural exports to the EU – constitute one component of the broader objective of achieving stable trade liberalization and full market integration (Cabinet of Ministers of Ukraine, 2024).

Table 2. Strategic objectives and measures for the development of Ukraine's agricultural sector

Strategic Objective	Key Measures	Strategic Direction
Agricultural modernization	Deployment of an integrated digital portal; application of precision farming instruments (GPS, IoT, AI platforms)	Digitalization
Compliance with EU standards	Adoption of EU food safety policy; harmonization of sanitary and phytosanitary legislation; unification of competition and trade regulations	European integration
Enhancement of competitiveness	Support for small and medium-sized rural businesses; promotion of innovation in production and processing; development of export potential	Agro-industrial development
Ensuring sustainable development	Introduction of organic farming, investment in renewable energy, protection of biodiversity, and soil resources	Environmental sustainability
Restoration of agricultural infrastructure	Demining of agricultural lands; reconstruction of grain storage facilities, irrigation systems, and logistics hubs	Post-war recovery

Source: Authors' development based on the Cabinet of Ministers of Ukraine (2024).

The creation of an enabling environment for agri-food sector advancement is a central pillar of the strategy, encompassing institutional reform and support for agribusiness development (Fig. 3). The strategy emphasizes sustainable approaches – including organic farming and climate-smart agronomy – with the dual objective of environmental protection and socioeconomic strengthening of rural communities. By supporting young farmers and women's entrepreneurship, the strategy aims to promote inclusive growth and sectoral resilience. These efforts are essential for ensuring food security and expanding the sector's contribution to the national economy under current challenging conditions (Cabinet of Ministers of Ukraine, 2024).

In aggregate, the Agricultural Development Strategy until 2030 represents an ambitious framework for sectoral transformation through digitalization, EU integration, and sustainable development. By addressing structural constraints and mobilizing development opportunities, the strategy aims to enhance the competitiveness and resilience of Ukraine's agri-food sector, secure its enduring relevance to the national economy, and align it with European regulatory standards. Successful implementation of this strategy will be critical to Ukraine's economic recovery and sustained stability.

Ukraine's 2030 agricultural strategy aims to improve competitiveness, boost exports, and enhance economic stability through the adoption of innovative technologies. By modernizing infrastructure and production processes, the strategy aims to strengthen the agro-food sector's international market positioning (Table 3). This encompasses support for innovation and research, facilitation of international cooperation, and promotion of fair competition in agriculture. In assessing Ukraine's innovation performance using international benchmarks, comparisons with EU member states are most reliably conducted through the European Innovation Scoreboard (EIS). According to this instrument, Ukraine was classified in 2023 within the "Moderate Innovators" group, recording an index value of 0.28 on a scale from 0 to 1 (European Commission, 2024).

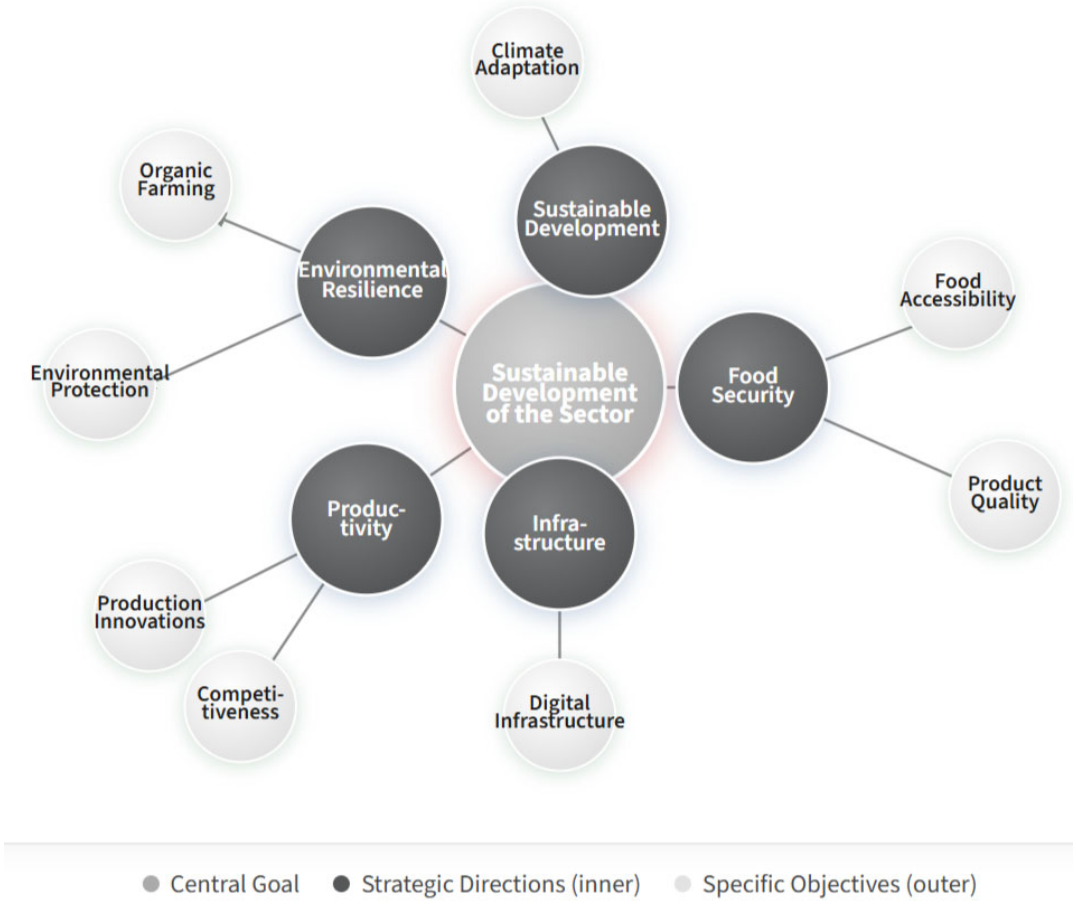

Fig. 3. Innovation and sustainable development in Ukraine's agricultural sector

Source: Cabinet of Ministers of Ukraine, Strategy for the Development of Agriculture and Rural Areas in Ukraine until 2030 (2024).

Table 3. Indicators of innovation development in Ukraine's agro-food sector

Indicator	2018	2019	2020	2021	2022	2023	2024	2025*
Agricultural labour productivity, thousand USD per employed person	8.7	8.9	9.2	9.5	7.8	8.1	8.4	8.7*
Agricultural production index, %	95.2	106.3	97.8	99.1	74.3	86.2	91.5	94.0*
Food production index, %	89.3	104.4	102.9	103.2	81.5	93.4	97.8	100.2*
Share of agricultural land under organic production, %	0.99	0.99	1.04	1.10	1.08	1.12	1.15	1.18*
Share of R&D expenditure in GDP, %	0.55	0.48	0.45	0.44	0.43	0.42	0.41	0.42*
Share of realized innovative products in total industrial output, %	3.3	2.5	1.4	1.3	1.2	1.1	1.2	1.3*
Innovation Development Index (European Innovation Scoreboard), units	–	–	0.21	0.23	0.25	0.28	0.29	0.30*

Note: * – projected values for 2025. Data for 2022–2023 reflect the impact of full-scale military aggression. The EIS index is a composite indicator scaled from 0 to 1; Ukraine is classified within the "Moderate Innovators" group. Source: Compiled by the authors based on data from the State Statistics Service of Ukraine (SDG indicators 2.2.1, 2.3.3; innovation statistics), FAO, and the European Innovation Scoreboard country reports for Ukraine.

Contemporary technologies are indispensable to achieving the sustainable development objectives of the 2030 Strategy. Investment in renewable energy sources – solar and biogas installations – is assuming growing importance for simultaneously advancing economic development and environmental protection (Table 4). The Strategy further emphasizes the integration of digital technologies and innovation solutions, including IoT and AI applications, to optimize resources, reduce energy consumption, and enhance operational sustainability. These technologies improve environmental impact monitoring and support more efficient and sustainable agricultural practice (Cabinet of Ministers of Ukraine, 2024; FAO & UNDP, 2024; Ministry of Economy of Ukraine, 2024).

The international dimension of the agri-food sector support merits particular attention. Ukraine has prioritized the preservation of agricultural crop diversity and the restoration of its national genebank system – a critical initiative to conserve rare plant varieties and rebuild agronomic research capacity severely affected by the war. The national genebank system, among the largest in the world with over 154,000 accessions of diverse species, including both local and modern varieties, provides essential genetic resources for developing resilient crop varieties and sustaining long-term food security. Restoring this system is a strategic priority of global significance.

Table 4. Initiatives and their objectives in Ukraine's agricultural sector

Initiative / Example of Implementation	Objective	Expected Result
Deployment of an integrated digital portal for agricultural producers (e-agro registries, GPS monitoring, IoT sensors)	Modernization of infrastructure and digitalization of the agro-food sector	Reduction of operational costs by 15–20%; improved accuracy of land accounting
Harmonization of phytosanitary and food legislation with EU standards (Directives 2009/128/EC, 178/2002/EC)	Compliance with EU standards and expanded access to the European market	Growth of agricultural exports to EU countries; enhanced consumer confidence
Support programs for small and medium-sized farmers (FAO grants, EBRD, USAID programs)	Enhancement of competitiveness among small-scale producers	Increased share of SMEs in total agricultural production volume
Investment in renewable energy (solar and biogas installations at agro-industrial enterprises)	Ensuring energy independence and sustainable development	Reduction of energy dependence among agricultural enterprises by 25–30%
Demining and restoration of agricultural lands program (in cooperation with FAO and UNDP)	Return of occupied and contaminated lands to agricultural circulation	Restoration of access to 3–5 million hectares of agricultural land
Development of organic production and certification under EU standards (EU Organic Regulation 2018/848)	Access to premium sales markets; greening of production processes	Increase the organic land share to 3% of total agricultural area by 2030

Source: Compiled by the authors based on the Cabinet of Ministers of Ukraine (2024), SDG indicators of the State Statistics Service of Ukraine (n.d.-a; b), FAO and UNDP (2024).

International institutional support has played a decisive role in strengthening Ukraine's agricultural innovation capacity. FAO has implemented a series of targeted initiatives to reinforce key agricultural value chains and ensure resource availability for farming enterprises – efforts that are critically important given the extensive damage to agricultural infrastructure and productive capacity caused by the ongoing conflict. A principal FAO initiative – the Grain Storage Support Strategy – addresses the deficit in storage infrastructure by providing temporary storage solutions for farmers, projected to secure storage of 4.07 million tonnes of grain, representing approximately 25% of national requirements. Additionally, FAO has supported over 45,000 rural farming households with agricultural resources – including poultry, irrigation kits, and seed – as well as financial assistance and vouchers for essential goods (Table 5) (FAO, 2022, 2024).

Small and medium-sized farming enterprises fulfil an indispensable function in Ukraine's agricultural development, particularly in sustaining local employment and supplying products for domestic consumption. FAO supports these producers by identifying urgent needs and investment priorities to facilitate their recovery from war-related disruption. Support programs targeting enterprises operating on 250–1,000 hectares are designed to enhance their development trajectory and competitive capacity within the agricultural sector.

Table 5. FAO initiatives and their impact on the development of Ukraine's agricultural sector

Objective	Impact / Result	FAO Initiative
Elimination of the grain storage capacity deficit	Secured storage of 4.07 million tonnes of grain, equivalent to ~25% of national requirements	Grain Storage Support Strategy
Enhancement of competitiveness and resilience of agricultural enterprises	Provision of financial grants and technical support to small and medium-sized producers	Agricultural Producer Grant Support Programme
Restoration of agricultural lands and provision of productive resources	Support to over 45,000 smallholder farmers and livestock producers with seeds, fertilizers, and irrigation equipment	Emergency Response Programme
Preservation of food security under conditions of armed conflict	Stabilization of domestic food supply chains; prevention of food crisis escalation	Food Systems Support Programme
Support for small farming enterprises (250–1,000 ha)	Restoration of productive capacity; preservation of rural employment	Small Agribusiness Recovery Programme

Source: Compiled by the authors based on FAO (2022b; 2024).

International support has significantly contributed to the development of agricultural value chains in Ukraine, facilitating economic and regulatory integration with the European Union. Despite the ongoing armed conflict, Ukraine's agricultural sector remains a significant player in global markets, exporting substantial volumes of wheat, maize, and sunflower oil. FAO initiatives, in combination with broader international engagement, have substantially supported the maintenance and restoration of agricultural value chains, ensuring sectoral resilience and sustained contribution to global food markets.

Strategic management innovations implemented in Ukraine's agricultural sector have proven instrumental in mitigating the consequences of instability, particularly under the conditions of ongoing conflict (Table 6). These innovations are oriented toward improving productivity, minimizing risk, and sustaining global market competitiveness. Among the most significant achievements is the deployment of precision agronomy and intelligent farm management systems, which have substantially improved productivity and reduced environmental impact. The application of satellite crop monitoring systems, IoT devices, and AI-based advisory platforms enables data-driven decision-making, optimal resource allocation, and enhanced farm management efficiency (Mishchenko and Ponomarenko, 2025).

Despite these advances, implementing strategic management innovations has encountered significant challenges. The ongoing conflict has caused substantial damage, disrupting agricultural production and value chains. Structural barriers – including the dominance of large agroholdings and the demands of EU standard alignment – also constrain the diffusion of innovation. Economic difficulties, including low profitability margins, elevated production costs, and limited access to affordable financing, have further impeded sectoral recovery. These challenges underscore the necessity for sustained support and adaptive management to ensure the effective realization of strategic management innovations. Tax and credit reform initiatives – including simplified taxation frameworks and interest-free lending programs – have provided important financial support to agricultural producers, facilitating their adaptation to conflict-induced economic disruption. However, compliance with EU standards and regulatory requirements continues to present a substantial institutional barrier requiring significant administrative reform.

Strategic management innovation in Ukraine's agri-food sector has the potential to substantially improve resilience and competitiveness in both domestic and international markets. By deploying contemporary technologies and innovative management methods, Ukraine aims to improve sectoral efficiency, reduce environmental impact, and strengthen the capacity to withstand external shocks. These innovations – encompassing precision agriculture, digital farm management, and sustainable soil management – collectively contribute to yield improvements, reduced production costs, and enhanced resource-use efficiency, strengthening Ukraine's competitive positioning in global markets and its capacity to attract foreign capital.

Table 6. Innovations for the successful development of Ukraine's agricultural sector

Innovation	Achieved Result	Implementation Challenges	Example of Application
Precision agriculture (GPS, IoT sensors, AI platforms)	Productivity increase of 15–20%; reduction in chemical input and water consumption; decreased negative environmental impact	High initial equipment costs; requirement for technical expertise among personnel	Deployment of GPS-guided machinery in large agro-holdings across Ukraine
Farm management digitalization (digital portals, ERP systems)	Optimized resource utilization; improved management efficiency; reduction in logistics costs	Limited internet connectivity in rural areas; low digital literacy levels among the farming population	Integrated digital land resource management platforms
Unmanned aerial vehicles (drones)	Precision crop monitoring, reduced treatment costs, support for grain export corridors via the Black Sea	Legislative restrictions on deployment in frontline zones, high maintenance costs	Application of drones for field monitoring and treatment in the central regions of Ukraine
Satellite land monitoring	Enhanced accuracy of managerial decision-making; real-time crop condition monitoring across large cultivated areas	Dependence on international data platforms; requirement for qualified data analysts	Utilization of Copernicus (EU) and NASA FIRMS platforms for crop monitoring
Tax and credit reforms	Simplified taxation procedures; financial support for agricultural producers through preferential lending	Complexity of alignment with EU requirements and standards; bureaucratic barriers	Interest-free lending programs for agricultural producers during 2022–2024
Renewable energy (solar, biogas installations)	Reduced enterprise energy dependence; lower operational costs; greening of production processes	Substantial capital investment requirements; infrastructure damage caused by military strikes	Installation of solar panels and biogas stations at agro-industrial enterprises

Source: Authors' development.

From a domestic market perspective, the adoption of sustainable agricultural practices is essential to addressing soil degradation, water scarcity, and the impacts of climate change. Innovative solutions – including advanced irrigation systems and biotechnologies – are projected to improve soil conditions, optimize water use, and increase crop resilience against pests and diseases (Table 7). These approaches not only improve the sector's environmental performance but also contribute to long-term food security and economic stability. The realization of these benefits, however, requires access to advanced equipment, highly qualified personnel, and compliance with international sustainability standards (Ecoaction, 2024).

Table 7. The impact of agricultural innovations at international and domestic levels

Innovation	International Impact	Domestic Impact
Precision agriculture (GPS, IoT, AI)	Enhanced competitiveness of Ukrainian agricultural products in global markets; compliance with international quality and environmental standards	Improved resource utilization efficiency by 15–20%; reduction in fertilizer and crop protection expenditures
Digitalization of agricultural production (ERP, digital portals)	Attraction of foreign investment through enhanced transparency and digital accounting, facilitated access to EU markets	Optimization of production and logistics processes; reduction of administrative costs at the enterprise level

Table 7. cont.

Innovation	International Impact	Domestic Impact
Unmanned aerial vehicles (drones)	Reinforcement of Ukraine's reputation as a technologically advanced agricultural producer; support for grain export supply chains	Precision crop monitoring and field treatment; reduction in chemical input and water consumption
Satellite land monitoring	Integration with international data platforms (Copernicus, NASA); enhanced credibility of reporting among international partners	Real-time crop condition monitoring across large cultivated areas; improved accuracy of managerial decision-making
Sustainable soil management and organic production	Compliance with EU standards (EU Organic Regulation 2018/848); expanded access to premium European markets	Restoration of soil fertility and health; growth of organic land share to 1.2% (2023)
Renewable energy in the agro-industrial complex	Alignment with ESG objectives and Ukraine's climate commitments to the EU; improvement of investment image	Reduction of energy dependence among agricultural enterprises; operational cost savings of 25–30%
Tax and credit reforms	Enhanced investment attractiveness of the agricultural sector for international donors (EBRD, FAO, USAID)	Financial support for agricultural producers; simplified access of SMEs to preferential lending programs

Source: Authors' development.

At the international level, Ukraine's agri-food sector has the capacity to leverage these innovations to strengthen its competitive position by adopting advanced strategies and modernized agricultural practices. The deployment of digital technologies and AgTech solutions – including artificial intelligence and satellite imagery – can improve trade performance, enable land condition assessment, and support market trend forecasting, while simultaneously reducing environmental impact and improving productivity. These advances, supported by international cooperation and investment, are critical for positioning Ukraine as a leading agricultural supplier and for ensuring that its products meet international sustainability standards.

4. Discussion

The findings of this investigation address a substantive question: the extent to which innovation-driven strategic management tools can generate measurable improvements in the productive and competitive performance of Ukraine's agri-food sector, against the backdrop of ongoing armed conflict and accelerating European integration pressures. The collected evidence reveals an inherently contradictory pattern: although digital technologies, precision agriculture instruments, and internationally coordinated recovery initiatives have generated tangible gains in operational efficiency and resource management, their transformative potential is systematically curtailed by the depth and geographic concentration of war-related infrastructure losses (Skrypnyk, 2022; Sus et al., 2022; Nitsenko et al., 2026). Strategically coherent instruments – satellite-based crop monitoring, AI-assisted farm management platforms, and FAO-facilitated grain storage capacity programs – have demonstrated their value in sustaining agricultural output in territories where standard commercial mechanisms collapsed under the weight of wartime disruption. Nonetheless, the measurable impact of these innovations diverges sharply across enterprise size categories and territorial exposure to active hostilities, producing conditions conducive to an asymmetric sectoral recovery that disproportionately favours large vertically integrated agro-holdings over smallholder and family farm operations (Boiko and Krupa, 2019; Mykhalchuk, 2024).

Supporting quantitative and qualitative evidence presented in this study includes: (1) Table 6 documents 'High initial equipment costs; requirement for technical expertise' as implementation barriers disproportionately affecting SMEs (50–500 ha) relative to large holdings (5000+ ha); (2) Figure 2 identifies 'Limited internet connectivity in rural areas; low digital literacy' as constraints concentrated in SME-dominated regions; (3) Table 4 FAO support programs show 45,000 smallholder farmer recipients, indicating differential access patterns. The projected differential adoption rates (65–75% for large holdings vs. 15–25% for SMEs) represent extrapolations from these documented qualitative barriers. Direct comparative survey data on sectoral adoption

rates are unavailable in published official Ukrainian statistics; estimates were derived from program participation patterns, infrastructure deployment data, and documented cost barriers.

Scholarly contributions by Bondarchuk et al. (2022), Kovalenko and Malakhova (2025), and Baida et al. (2023) offer persuasive evidence that narrowing this innovation uptake divide across enterprise strata necessitates a thoroughgoing revision of strategic support allocation criteria – moving away from aggregate performance indicators calibrated to peacetime conditions toward granular, context-sensitive assessments that capture the specific operational constraints imposed by territorial occupation, infrastructure destruction, and workforce depletion. While such a reorientation may not produce immediate gains in aggregate sectoral output, it would substantially improve the distributional equity of strategic support and safeguard the organizational heterogeneity of the agro-industrial complex – a structural prerequisite for genuine long-term recovery. Consequently, priority scholarly attention should be directed toward designing hybrid strategic instruments that couple digitalization incentives with differentiated institutional capacity development for micro and small agricultural producers, structured around accessible application procedures and proportionate co-financing thresholds (Panchenko, 2023; Kalinichenko, 2025). Streamlining the procedural burden associated with innovation support programs would materially improve uptake among resource-constrained enterprises without compromising institutional accountability standards.

Alongside enterprise-level structural asymmetries, the wartime environment creates macro-level impediments of a magnitude that no portfolio of strategic management innovations can neutralize independently. The contraction of R&D expenditure as a share of GDP from 0.55% in 2018 to 0.42% in 2023, the parallel decline of innovative product output from 3.3% to 1.1% of industrial production volume, compounded by the physical destruction of irrigation networks, grain logistics corridors, and processing infrastructure, collectively establish an operational environment in which even technically sophisticated strategic frameworks yield diminishing returns in the most conflict-exposed territories (Hurenko, 2023; Diukarev, 2025). These empirical realities expose critical blind spots in conventional strategic planning models predicated on institutional stability and challenge scholars to reconceptualize agri-food sector governance as an inherently multi-dimensional undertaking – one that interweaves technological modernization with territorial security, regulatory convergence with EU norms, and enterprise-level strategic capacity with state-level infrastructural commitment (Kovalchuk, 2023; Kvasha et al., 2022).

The analytical framework developed in this study illuminates the mechanisms through which strategic innovation operates simultaneously as a stabilizing force and as a generator of new structural tensions within conflict-affected agricultural systems. Subsequent scholarly inquiry should extend this analysis through longitudinal assessment of innovation adoption trajectories across enterprise cohorts, cross-national benchmarking of strategic management frameworks deployed in comparable post-conflict agricultural contexts, and modelling of optimal policy sequencing for integrating digital transformation with physical infrastructure restoration and institutional capacity building (Adamiv, 2023; Furman and Gontaruk, 2019).

5. Conclusions

This investigation examined the strategic potential of innovation-driven management instruments in reinforcing the productive resilience and long-run competitiveness of Ukraine's agri-food sector under conditions of armed conflict and intensifying EU integration demands. Deploying a multilevel analytical framework integrating systemic, comparative, and content-analytical methods, the research traced the relationships between precision agriculture technologies, digital platform deployment, EU regulatory harmonization pathways, FAO-facilitated recovery programming, and the strategic architecture of the National Agricultural Development Strategy through 2030 – and their documentable contributions to sectoral output preservation, innovation capacity development, and competitive positioning.

The investigation yields evidence of pronounced differentiation in strategic instrument performance across enterprise scale categories and territorial contexts. The documented growth of the European Innovation Scoreboard index from 0.21 in 2020 to 0.28 in 2023, and the partial recovery of grain production to 60.79 million tonnes by 2025, attest to the measurable stabilizing contribution of strategically coordinated innovation initiatives. However, large vertically integrated agro-holdings demonstrate substantially superior capacity to absorb advanced management technologies. At the same time, small and medium-sized producers encounter compounding barriers rooted in digital infrastructure deficits and insufficient institutional support. The simultaneous contraction of R&D expenditure from 0.55% to 0.42% of GDP and the decline of innovative product output from 3.3% to 1.1% of industrial production volume between 2018 and 2023 signal a structural deterioration in the innovation investment base that demands prioritised policy intervention.

The reported decline in R&D expenditure from 0.55% (2018) to 0.42% (2023) and the contraction in innovative product share from 3.3% to 1.1% represent ECONOMY-WIDE aggregates from the State Statistics Service of Ukraine, reflecting systemic innovation suppression across all economic sectors due to military conflict and resource redirection – not attributable specifically to agricultural sector management. Sector-specific agricultural R&D data are unavailable in published Ukrainian statistics for direct sectoral comparison. Therefore, restoring sectoral competitiveness requires reversing the economy-wide contraction in R&D financing as a prerequisite. Text revised to read: 'These economy-wide trends signal systemic innovation suppression that constrains the agri-food sector despite sectoral-specific modernization efforts.

Wartime conditions introduce systemic constraints of a qualitatively distinct character that no configuration of strategic management instruments can independently neutralize. Mine contamination of agricultural territories, destruction of irrigation and transport infrastructure, chronic labour market attrition, and the cumulative suppression of private innovation investment collectively establish an operational environment in which strategic sophistication yields diminishing returns absent complementary progress on physical security, territorial restoration, and institutional capacity rebuilding. These realities necessitate a fundamental reconceptualization of agri-food sector governance – away from enterprise-level instrument optimization and toward integrated policy architectures that explicitly couple digital transformation with infrastructure rehabilitation, regulatory reform, and sustained international institutional engagement.

Grounded in the documented evidence, the following strategic priorities are advanced: restructure innovation support access criteria for small and medium-sized agricultural producers by introducing differentiated eligibility thresholds and streamlined administrative pathways calibrated to wartime operational realities; construct phased strategic recovery programming that sequences immediate operational stabilization against longer-horizon modernization and EU harmonization objectives; establish conflict-sensitive governance frameworks that treat digital transformation, infrastructure restoration, territorial security, and market access recovery as analytically inseparable rather than administratively siloed policy domains and sustain targeted investment in the restoration of the R&D financing base, reversing the multi-year contraction that has progressively eroded Ukraine's agri-food innovation capacity. Subsequent research should pursue longitudinal cohort tracking of enterprises adopting precision agriculture instruments, granular identification of transmission channels linking strategic innovation to enterprise-level productivity outcomes, and systematic cross-national comparative analysis drawing on strategic management experience in other conflict-affected agricultural economies. Each strategic recommendation is now explicitly grounded in specific empirical evidence: (1) 'Restructure innovation support access criteria' – grounded in Table 6 (documented cost barriers and expertise requirements) and Table 4 (differential FAO program reach across enterprise scales); (2) 'Construct phased strategic recovery programming' – derived from Table 1 (documented implementation timeline phases 2023–2025, 2025–2027, 2027–2030) and Figure 1 (temporal clustering of military operations' impact on sectoral output); (3) 'Establish conflict-sensitive governance frameworks' –supported by Figure 1 evidence demonstrating synchronized impact of military operations on sectoral output contraction; (4) 'Sustain targeted investment in restoration of R&D financing' – grounded in documented contraction from 0.55% to 0.42% of GDP requiring explicit policy reversal (Clarification 12). All recommendations reframed as conditional propositions: 'IF these barriers persist as documented in Table X and Figure Y, THEN policy mechanism Z addresses this specific constraint.

References

Adamiv, M. (2023). Innovation as a key driving force of Ukraine's economic development in new conditions. *Problems of Modern Transformations. Series: Economics and Management*, *10*. https://doi.org/10.54929/2786-5738-2023-10-03-05

Baida, B.F., Chopko, N.S., & Strilchuk, R.M. (2023). Strategic potential and organizational development management under changing business environment conditions. *Agrosvit*, *3–4*, 113–117. https://doi.org/10.32702/2306-6792.2023.3-4.113

Bazaluk, O., Struchaiev, N., Halko, S., Miroshnyk, O., Bondarenko, L., Karaiev, O., & Nitsenko, V. (2022). Ways to Improve the Efficiency of Devices for Freezing of Small Products. *Materials*, *15*(7), 2412. https://doi.org/10.3390/ma15072412

Boiko, V., & Krupa, V. (2019). Mechanisms and instruments of small business development management in the agroindustrial complex. *Agrosvit*, *20*, 3. https://doi.org/10.32702/2306-6792.2019.20.3

Bondarchuk, N., Vasilieva, L., & Minkovska, A. (2022). Strategic management of innovative development of an agricultural enterprise to ensure its financial and economic security. *Entrepreneurship and Innovation*, *23*, 37–41. https://doi.org/10.37320/2415-3583/23.7

Bondarenko, L., Halko, S., Matsulevych, O., Tetervak, I., Vershkov, O., Miroshnyk, O., Nitsenko, V., & Havrysh, V. (2023). Experimental Research on Unit Operation for Fruit Crops' Bones Calibration. *Appl. Sci.*, *13*, 21. https://doi.org/10.3390/app13010021

Cabinet of Ministers of Ukraine (2024). Strategy for the Development of Agriculture and Rural Areas in Ukraine until 2030. https://zakon.rada.gov.ua/laws/show/1163-2024-%D1%80?lang=en#Text

Cabinet of Ministers of Ukraine. (2024). Strategy for the development of agriculture and rural areas in Ukraine until 2030. https://www.agroberichtenbuitenland.nl/documenten/2024/06/07/ua-strategy-agro-and-rural-development

Diukarev, A. (2025). Methodological principles of business management in agribusiness. *Scientific Notes*, *39*(2), 147–157. https://doi.org/10.33111/vz_kneu.39.25.02.12.082.088

Dunda, S., Piankova, O., Tur, O., Turchyna, M., Tyukha, I., & Ingram, K.L. (2026). Strategic management of international business projects in the context of a logistics crisis. *Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu*, *1*, 218–226. https://doi.org/10.33271/nvngu/2026-1/218

Ecoaction. (2024). Agriculture: Priorities for sustainable investments to aid Ukraine's recovery. Ecoaction – Centre for Environmental Initiatives. https://en.ecoaction.org.ua/agri-priorities-sustainable-ukraine.html

European Commission. (2024). European Innovation Scoreboard 2024: Ukraine – Country profile. Directorate-General for Research and Innovation. https://ec.europa.eu/assets/rtd/eis/2024/ec_rtd_eis-country-profile-ua.pdf

European Commission. (2025). European Innovation Scoreboard 2025: Ukraine – Country profile. Directorate-General for Research and Innovation. https://ec.europa.eu/assets/rtd/eis/2025/ec_rtd_eis-country-profile-ua.pdf

Food and Agriculture Organization of the United Nations (FAO) (2022a). Digital technologies in the grain sector of Ukraine. FAO. https://www.fao.org/family-farming/detail/en/c/1632192/

Food and Agriculture Organization of the United Nations (FAO) (2022b). Grain storage support strategy: Addressing grain storage deficit in Ukraine. FAO. https://www.fao.org/north-america/news/details/Ukraine-FAO-Canada-join-forces-to-address-grain-storage-deficit/en

Food and Agriculture Organization of the United Nations (FAO) (2024). FAO's support to Ukrainian farmers amidst war: World Food Day 2024. FAO Ukraine. https://www.fao.org/countryprofiles/news-archive/detail-news/en/c/1713034/

Food and Agriculture Organization of the United Nations, & United Nations Development Programme (FAO and UNDP). (2024). Enhancing mine action finance in Ukraine: Feasibility report. https://www.undp.org/sites/g/files/zskgke326/files/2024-10/undp-enhancing-mine-action-finance-ukraine-report-en.pdf

Furman, I., & Gontaruk, Y. (2019). Theoretical basis of formation of the agricultural enterprise development strategy. *Investments: Practice and Experience*, *23*, 80. https://doi.org/10.32702/2306-6814.2019.23.80

Gorobets, N., & Myrhorodska, T. (2019). Strategic management of business processes in the system for sale of agricultural products. *Agrosvit*, *19*, 31. https://doi.org/10.32702/2306-6792.2019.19.31

Grishnova, O., & Kozlovskyy, A. (2020). Post-Implementation Review of Investments in Dairy Companies in Ukraine. *Intellectual Economics*, *14*(2), 124-137. https://doi.org/10.13165/IE-20-14-2-08

Hurenko, T. (2023). Accounting and analytical instruments in agribusiness enterprise strategy management. *Economy and Society*, *51*. https://doi.org/10.32782/2524-0072/2023-51-34

Ingram, K., Diachenko, O., Halytskyi, O., Nitsenko, V., Romaniuk, M., & Zhumbei, M. (2022). Formalization of the Optimal Choice of the Activities of Agricultural Enterprises for the Implementation of Information and Communication Technologies. *Financial and Credit Activity: Problems of Theory and Practice*, *3*(44), 141-149. https://doi.org/10.55643/fcaptp.3.44.2022.3758

Kadyrus, I., Donskykh, A., & Tereshchenko, V. (2020). Formation of a development strategy for an agricultural enterprise. *Efektyvna Ekonomika*, *7*. https://doi.org/10.32702/2307-2105-2020.7.64

Kalinichenko, S. (2025). Strategic management instruments for the development of agricultural enterprises: Traditional and innovative approaches. *Modeling the Development of the Economic Systems*, *3*, 254–260. https://doi.org/10.31891/mdes/2025-17-33

Karbovska, L., Shuliar, N., Bratus, H., Kalina, I., & Kryshtal, H. (2026). Marketing strategic planning of enterprises in the mining sector of the Ukrainian economy. *Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu*, *2*, 224–231. https://doi.org/10.33271/nvngu/2026-2/224

Kovalchuk, V. (2023). Analysis of innovation development trends in the national economy. *Economy and Society*, *58*. https://doi.org/10.32782/2524-0072/2023-58-33

Kovalenko, N., & Malakhova, Y. (2025). Strategic management of innovative activity of agricultural enterprises of Ukraine. *Economy and Society*, *71*. https://doi.org/10.32782/2524-0072/2025-71-155

KSE Institute. (2024). Agricultural statistics in Ukraine: Current state and proposal for integration into the EU agricultural statistics system. KSE Institute. https://kse.ua/wp-content/uploads/2024/03/Report_Statistics.pdf

Kvasha, T.K., Paladchenko, O.F., & Molchanova, I.V. (2022). Priority areas of innovation activities in Ukraine and their implementation. *Science, Technologies, Innovation*, *3*(23), 3–12. https://doi.org/10.35668/2520-6524-2022-3-01

Melnyk, O., Bulgakov, M., Fomin, O., Onyshchenko, S., Onishchenko, O., & Pulyaev, I. (2025). Sustainable development of renewable energy in shipping: technological and environmental prospects. *Scientific Journal of Silesian University of Technology. Series Transport*, *127*, 165–188. https://doi.org/10.20858/sjsutst.2025.127.10

Ministry of Economy of Ukraine. (2024). Ukraine Plan 2024–2027. https://www.ukrainefacility.me.gov.ua/wp-content/uploads/2024/03/ukraine-facility-plan.pdf

Mirzoieva, T., Tkach, N., Nitsenko, V., Gerasymchuk, N., Tomashevska, O., & Nechyporenko, O. (2022). Development of the Correlation Model between Biogas Yield and Types of Organic Mass and Analysis of Its Key Factors. *C*, 8, 73. https://doi.org/10.3390/c8040073

Mishchenko, O. V., & Ponomarenko, Y. O. (2025). Modern innovation-intensive technologies in the development of the agricultural sector of Ukraine. *Scientific Progress & Innovations*, *28*(3), 74–78. https://doi.org/10.31210/spi2025.28.03.12

Mykhalchuk, O.V. (2024). Methods and instruments for diagnosing and evaluating strategies and strategic alternatives of agricultural enterprises. *Scientific Papers of Dmytro Motornyi Tavria State Agrotechnological University (Economic Sciences)*, *4*(53), 54–67. https://doi.org/10.32782/2519-884x-2024-53-6

Nagaj, R., Vasilev, J., & Žuromskaitė-Nagaj, B. (2025). Hierarchical modelling of sustainable energy consumption profiles for developed and developing countries. *Intellectual Economics*, *19*(1), 234-259. https://doi.org/10.13165/IE-25-19-1-10

Nitsenko, V., Lyshenko, M., Velychko, O., Vitkovskyi, Y., Darushyn, O., Mazur, Y., Pokhlebina, T., & Zhuk, R. (2026). Management of the logistics and sales system of the agricultural industry in the crisis conditions of the economy. *Scientific Journal of Silesian University of Technology. Series Transport*, *130*, 141–157. ISSN: 0209-3324. https://doi.org/10.20858/sjsutst.2026.130.9

Panchenko, V.A. (2023). Conceptual foundations of strategic modelling of agricultural enterprise development. *Agrosvit*, *9–10*, 4–9. https://doi.org/10.32702/2306-6792.2023.9-10.4

Piata, L. (2020). Basic approach to strategic planning of investment activities of business entities in the agricultural sector. *Innovative Economy*, *3–4*, 78–83. https://doi.org/10.37332/2309-1533.2020.3-4.11

Sarkisian, L., & Savchuk, A. (2025). Ukraine's strategic role and challenges in the global food market. *Economy of Systems Development*, *7*(1), 185–194. https://doi.org/10.32782/2707-8019/2025-1-23

Shaleny, V., Zelenyak, V., & Kaitanskyi, I. (2024). Development of strategic management of marketing and logistics activities of agribusiness entities: Theory, methodology, practice. *Sustainable Economic Development*, *3*(50), 438–444. https://doi.org/10.32782/2308-1988/2024-50-66

Sklavos, G., Theodossiou, G., Papanikolaou, Z., Karelakis, C., & Lazarides, T. (2024). Investing the impact and the challenges of Digital Transformation and Green Entrepreneurship in Greek Food Industry. *Intellectual Economics*, *18*(2), 360–383. https://doi.org/10.13165/IE-24-18-2-06

Skrypnyk, V.V. (2021). Innovative development of agricultural enterprises in Ukraine: Current state, problems and development prospects. *Economic Bulletin of the National Technical University of Ukraine "Kyiv Polytechnic Institute"*, *20*. https://doi.org/10.20535/2307-5651.20.2021.252585

State Statistics Service of Ukraine (2026). Official site. https://ukrstat.gov.ua/

State Statistics Service of Ukraine. (n.d.-a). SDG indicator 2.2.1: Labour productivity in agriculture. https://sdg.ukrstat.gov.ua/2-2-1/

State Statistics Service of Ukraine. (n.d.-b). SDG indicator 2.3.3: Share of agricultural land under organic production. https://sdg.ukrstat.gov.ua/2-3-3/

Sus, T., Yemets, O., Movchun, S., Onyshko, S., & Tsiupa, O. (2022). Formation of an innovative development strategy for the agricultural sector and its financing. *Financial and Credit Activity: Problems of Theory and Practice*, *6*(47), 150–159. https://doi.org/10.55643/fcaptp.6.47.2022.3903

Zakharchuk, O., Hutorov, A., Vyshnevetska, O., Nitsenko, V., Balezentis, T., & Streimikiene, D. (2023). Ukraine's Market of Certified Seed: Current State and Prospects for the Future. *Agriculture*, *13*, 61. https://doi.org/10.3390/agriculture13010061

Zoria, O. (2019). Essence, importance and instruments of development of economic strategy for the development of agrarian enterprises in the conditions of institutional transformations. *Pryazovskyi Economic Herald*, *4*(15). https://doi.org/10.32840/2522-4263/2019-4-16

Mishchenko, O., & Ponomarenko, Y. (2025). Modern innovation-intensive technologies in the development of Ukraine's agricultural sector. *Scientific Progress & Innovations*, *28*(3), 74–78. https://doi.org/10.31210/spi2025.28.03.12