SYNERGY OF RURAL AREA REVITALIZATION AND AGRICULTURAL PRODUCTION DEVELOPMENT IN THE CONTEXT OF WAR AND POST-WAR CHALLENGES IN UKRAINE: MANAGERIAL ASPECT

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Abstract
This study examines governance mechanisms that strengthen the synergy between rural revitalization and agricultural production development under wartime and post-war conditions in Ukraine. Rural territories perform important economic, social, and demographic functions, while agriculture remains a key contributor to national food security and economic resilience. Descriptive statistics, SWOT and PESTEL analyses were applied to identify the major challenges and development opportunities affecting rural territories and agricultural producers. The findings indicate that labor shortages, infrastructure destruction, limited access to finance, and institutional instability are the most significant barriers to sustainable rural development. At the same time, farmers demonstrate considerable adaptive capacity, willingness to cooperate, and interest in innovation. The study operationalizes synergy through three dimensions: economic, social, and institutional. Economic synergy is reflected in employment creation, investment attraction, and market diversification; social synergy is associated with community resilience and human capital development; institutional synergy emerges through stakeholder cooperation and governance effectiveness. Based on empirical findings, the paper proposes an evidence-based Governance Synergy Framework that integrates agricultural, infrastructural, social, and institutional recovery measures. The results emphasize that sustainable post-war recovery requires coordinated actions by public authorities, local communities, agricultural enterprises, financial institutions, and international partners. Strengthening such interactions can enhance rural resilience, support food security, and improve the long-term competitiveness of rural territories in Ukraine.
Keywords: rural revitalization, agricultural development, governance synergy, management mechanisms, post-war recovery.

Introduction

Rural territories represent complex socio-economic systems that perform multiple functions extending beyond agricultural production. They contribute to food security, employment, environmental sustainability, demographic stability, and territorial cohesion. In Ukraine, rural areas account for a substantial share of agricultural output and play a strategic role in maintaining national economic resilience. Consequently, the sustainable development of rural territories and the competitiveness of agricultural production are increasingly viewed as interdependent policy objectives rather than separate development domains.

The full-scale Russian invasion has significantly intensified long-standing structural challenges affecting rural territories. Military actions have resulted in the destruction of infrastructure, disruption of logistics chains, contamination of agricultural land, labor shortages, and increased investment risks. Simultaneously, rural communities have experienced population displacement, demographic decline, and reduced access to public services. These challenges have undermined both agricultural productivity and the socio-economic viability of rural territories, creating the need for integrated recovery approaches that simultaneously address economic, social, and institutional dimensions of development.

Despite these adverse conditions, the agricultural sector has demonstrated considerable resilience and remains one of the key contributors to Ukraine's economic stability and export revenues. However, the sustainability of agricultural production increasingly depends on broader territorial factors, including infrastructure quality, institutional capacity, labor availability, access to finance, and the effectiveness of local governance. This interdependence suggests that agricultural development and rural revitalization should not be analyzed separately but rather as mutually reinforcing processes.

In this study, rural revitalization is understood as a comprehensive process of restoring and enhancing the economic, social, environmental, and institutional capacity of rural territories. Agricultural development, in turn, is viewed not only as an increase in production volumes but also as a catalyst for local economic growth, job creation, innovation diffusion, and community resilience. The interaction between these processes generates what is conceptualized in this paper as synergy.

Unlike previous studies, synergy is not treated as a rhetorical concept but as an analytical category. It is defined as the mutually reinforcing interaction between agricultural production development and rural revitalization that generates outcomes exceeding those achievable through isolated interventions. From a governance perspective, synergy emerges when coordinated actions of public authorities, local communities, agricultural enterprises, financial institutions, and international partners simultaneously strengthen economic performance, social cohesion, and institutional capacity. Accordingly, three dimensions of synergy are distinguished in this research:

- economic synergy – manifested through employment growth, investment attraction, business diversification, and increased local revenues;
- social synergy – reflected in community resilience, demographic stabilization, human capital development, and improved quality of life;
- institutional synergy – generated through effective governance, stakeholder cooperation, public-private partnerships, and enhanced access to development resources.

This conceptualization provides a theoretical framework for analyzing the interaction between agricultural production and rural revitalization under wartime and post-war conditions.

A substantial body of literature has examined the consequences of the Russian invasion for Ukrainian agriculture and rural development. M. Nehrey and R. Finger (2024) analyzed the initial impact of the war on Ukrainian agriculture and emphasized the importance of human capital development, support for small and medium-sized farms, integration into international markets, and digital transformation as prerequisites for post-war recovery (Nehrey & Finger, 2024).

O. Garafonova, H. Zhosan, V. Khudolei, N. Tiukhtenko, I. Tymkiv, and N. Riabets highlighted the role of diversified financing mechanisms, investment support, and innovative development models in revitalizing de-occupied territories. Their findings suggest that post-war reconstruction should be viewed as an opportunity for structural modernization rather than merely compensation for losses (Garafonova et al., 2023).

The growing role of digitalization in agricultural development has also attracted considerable scholarly attention. N. Zelisko, N. Raiter, N. Markovych, H. Matskiv, and O. Vasylyna demonstrated that the adoption of artificial intelligence, Big Data, blockchain technologies, drones, and precision farming systems contributes to greater efficiency, competitiveness, and economic security in agribusiness (Zelisko et al., 2024).

Similarly, R. Finger argues that digital innovations enhance productivity while simultaneously 1. strengthening the resilience and sustainability of agricultural systems. These findings indicate that technological modernization represents an important component of post-war rural recovery strategies (Finger, 2023).

Other studies emphasize the broader economic and geopolitical significance of Ukrainian agriculture. T. Glauben and co-authors demonstrated that disruptions in Ukrainian agricultural production have significant implications for global food security, particularly for countries dependent on grain imports from the Black Sea region (Glauben et al., 2022).

At the territorial level, I. Zamkova, I. Romaniuk, H. Zhosan, H. Matskiv, and O. Bodnar identified new development opportunities for affected communities through innovative approaches such as military tourism, emphasizing the importance of community engagement, local initiatives, and employment creation (Zamkova et al., 2025).

Thus, the analysis of existing studies indicates that scholars have extensively examined individual aspects of the problem, including the losses of the agricultural sector caused by the war, governmental responses to the crisis, financial mechanisms for post-war recovery, tools for the digitalization of agribusiness, as well as certain directions of revitalization of de-occupied territories (Boikivska & Honchar, 2024; Fedchyshyn et al., 2023; Abramiuk, 2023).

However, a comprehensive approach that would reveal the synergy between the revitalization of rural territories and the development of agricultural production during wartime and post-war periods, with particular emphasis on managerial aspects, remains underdeveloped. In particular, issues related to the coordination of actions among the state, local communities, businesses, and investors; the integration of agricultural, social, infrastructural, and digital components of recovery; and the formation of a holistic governance model capable of ensuring the long-term resilience and competitiveness of rural territories in Ukraine remain insufficiently explored. This gap determines the relevance of the chosen topic and defines the scientific niche of the proposed study.

The study aims to assess the synergy between revitalizing rural territories and developing agricultural production in the context of wartime challenges and post-war reconstruction in Ukraine, from a governance perspective. To achieve this aim, the following research objectives are defined:

1.To assess the impact of wartime conditions on the development strategies of small farming enterprises in Ukraine.

2. To identify the key economic, institutional, social, and infrastructural factors affecting both agricultural production and rural revitalization.

3.To determine governance mechanisms capable of strengthening the synergy between the development of agricultural production and the processes of rural revitalization.

Materials and Methods

This study employs an integrated mixed-methods research design aimed at identifying and assessing the synergy between rural revitalization and agricultural production development under wartime and post-war conditions in Ukraine. Given the multidimensional nature of rural development, the research combines quantitative and qualitative approaches, including sociological survey analysis, descriptive and inferential statistical methods, SWOT analysis, and PESTEL analysis.

The empirical basis of the study consists of a sociological survey conducted among 200 small farming enterprises located in different regions of Ukraine. The survey covered five macro-regions: Western, Central, Northern, Southern, and Eastern Ukraine. The regional distribution of respondents

enabled the identification of territorial differences in wartime impacts and development priorities.

A purposive sampling approach was employed to ensure the inclusion of farms differing in production specialization, scale of activity, and geographical location. Although the sample does not provide proportional representation of all Ukrainian farming enterprises, it adequately reflects the diversity of small-scale agricultural producers operating under wartime conditions.

The questionnaire consisted of 24 questions grouped into four thematic blocks: 1) general characteristics of farming enterprises; 2) wartime impacts on agricultural activities; 3) development priorities and strategic adaptation measures; 4) cooperation, governance, and future development expectations. The survey instrument included closed-ended, open-ended, and mixed-format questions. Most attitudinal and perception-based variables were measured using a five-point Likert scale ranging from 1 ('very low importance/impact') to 5 ('very high importance/ impact').

Prior to the main survey, the questionnaire was reviewed by three experts in rural development and agricultural economics to assess content validity. A pilot survey involving 15 farming enterprises was conducted to evaluate clarity, consistency, and relevance of the questions. Minor modifications were introduced based on respondents' feedback before the final data collection stage.

The collected data were processed using IBM SPSS Statistics 21. Descriptive statistical methods, including frequency distributions, percentages, means, and standard deviations, were used to identify the most significant challenges, development priorities, and strategic orientations of farming enterprises.

To strengthen analytical interpretation, cross-tabulation analysis and Pearson's Chi-square tests were applied to examine relationships between regional location and perceived development challenges, as well as between development strategies and willingness to participate in cooperative initiatives. Statistical significance was assessed at the 0.05 level.

In addition, a Synergy Assessment Framework was developed to operationalize the concept of synergy introduced in the theoretical section. The framework evaluates three interrelated dimensions:

- economic synergy, reflected in production expansion intentions, investment needs, market diversification, and employment generation;
-social synergy**,** reflected in cooperation readiness, knowledge exchange, human capital development, and community engagement;
- institutional synergy, reflected in demand for governance support, participation in development programs, and interaction with local institutions.

The empirical findings were interpreted through these dimensions to identify mechanisms linking agricultural development and rural revitalization.

To complement the survey analysis, SWOT and PESTEL methodologies were employed.

The SWOT analysis was used to evaluate internal and external factors affecting the sustainable development of rural territories. Unlike traditional descriptive applications, the SWOT framework was structured according to methodological principles distinguishing internal factors (strengths and weaknesses) from external factors (opportunities and threats).

The PESTEL analysis was applied to assess the influence of political, economic, social, technological, environmental, and legal factors on rural recovery and agricultural development under wartime conditions. Particular attention was paid to wartime-specific challenges, including infrastructure destruction, labor migration, security risks, institutional instability, and access to international support programs.

Based on the integration of survey results, statistical analysis, SWOT and PESTEL findings, an evidence-based Governance Synergy Framework was developed. The model conceptualizes synergy as the outcome of interactions among economic, social, and institutional mechanisms that simultaneously stimulate agricultural development and rural revitalization.

The framework identifies governance mechanisms through which public authorities, local communities, agricultural enterprises, financial institutions, and international development partners contribute to strengthening territorial resilience and supporting post-war recovery.

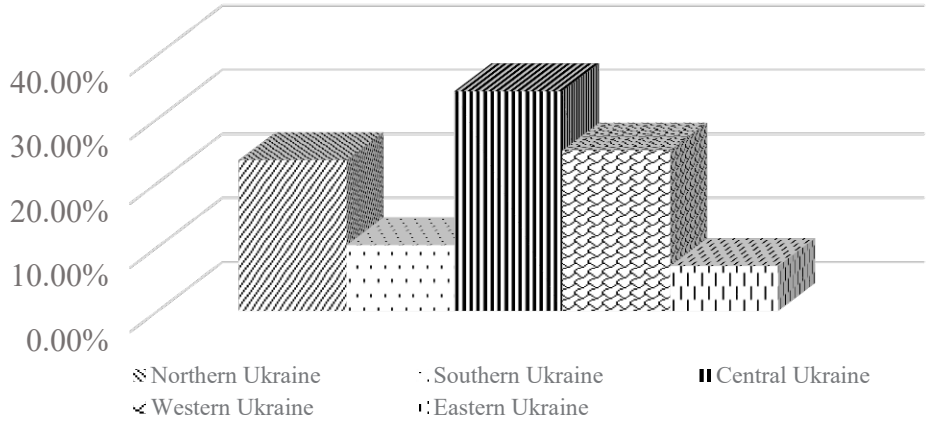
Several limitations should be acknowledged. First, the sample includes a higher proportion of respondents from relatively secure regions, reflecting wartime restrictions on data collection in frontline territories. Consequently, the results should be interpreted with caution when generalized to all rural regions of Ukraine. Second, the study relies primarily on self-reported perceptions of respondents, which may be influenced by subjective assessments. Nevertheless, the combination of quantitative survey data and strategic analytical tools provides a robust basis for identifying key governance challenges and opportunities for rural recovery.

Results and Discussion

The study of key aspects of rural development through the lens of the strategic priorities of small-scale farming served as the basis for a sociological survey of 200 farming enterprises across different regions of Ukraine, aimed at identifying regional specificities. The surveyed farms covered all five macro-regions of Ukraine. In particular, 33.00% of respondents represented the Western region (Lviv, Ternopil, Ivano-Frankivsk, Volyn, Rivne, Khmelnytskyi, Chernivtsi, and Zakarpattia oblasts); 30.25% the Central region (Vinnytsia, Kirovohrad, Poltava, and Cherkasy oblasts); 23.50% the Northern region (Zhytomyr, Kyiv, Chernihiv, and Sumy oblasts); 6.25% the Southern region (Zaporizhzhia, Kherson, Odesa, and Mykolaiv

oblasts); and 7.00% represented the Eastern region (Kharkiv and Dnipropetrovsk oblasts) (Figure 1).
Although the proportion of respondents from frontline regions was lower due to wartime security constraints, the sample reflects the diversity of Ukrainian small-scale farming and provides valuable insights into rural development processes under conditions of crisis and uncertainty.
According to the specialization of their activities, the surveyed farming enterprises exhibit significant diversity in production profiles, ranging from the cultivation of various crop products to livestock farming and processing of agricultural products (Figure 2).

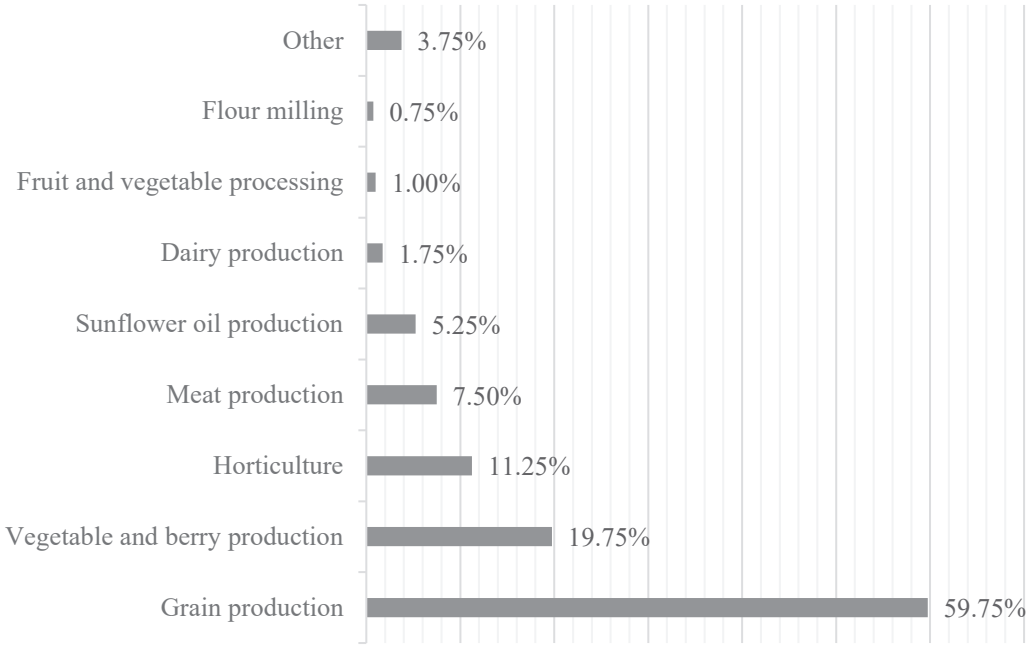
Figure 1
Geographic distribution of surveyed respondents representing farming enterprises



Source: compiled by the authors.

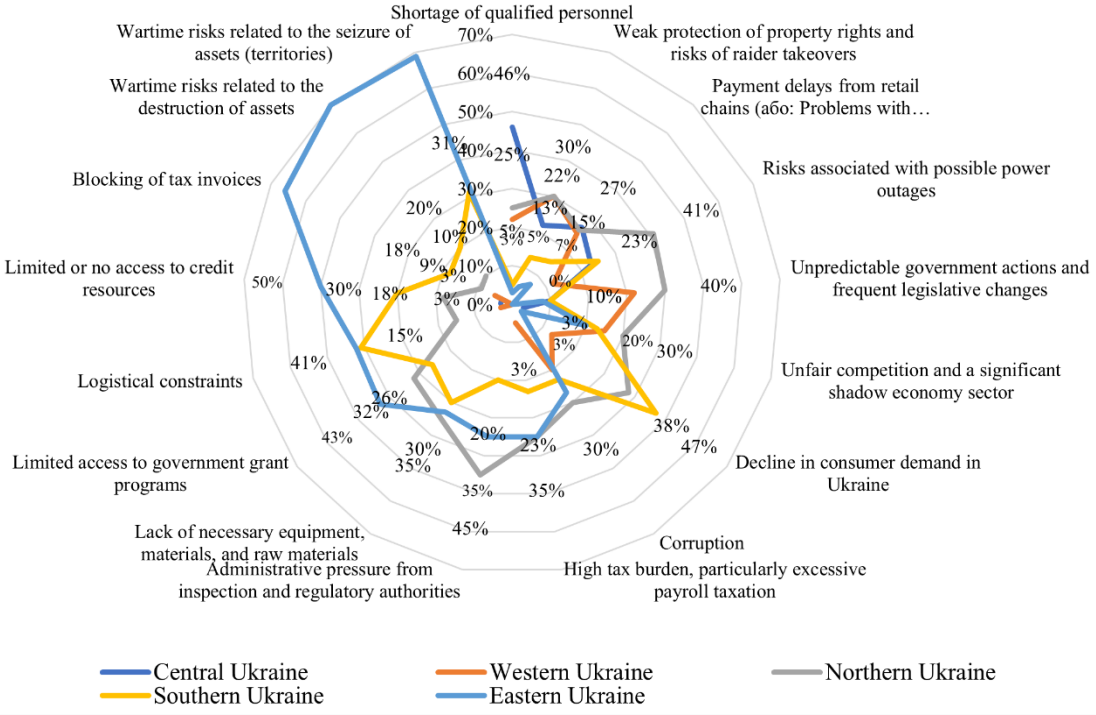
Grain production constituted the dominant activity (59.75%), followed by vegetable and berry production (19.75%), horticulture (11.25%), and livestock production (7.50%). Smaller shares of respondents were engaged in sunflower oil production, dairy farming, agricultural processing, and flour milling. Such diversity enables a comprehensive evaluation of the relationship between agricultural activities and broader rural development processes.
The analysis of strategic orientations demonstrates a predominance of adaptive rather than expansion-oriented behavior. Nearly half of the surveyed enterprises (46%) identified stabilization of current activities as their primary strategic objective, while 26.5% reported intentions to improve performance and expand business operations. In contrast, only 6.25% indicated plans to scale down activities or temporarily conserve assets. These findings indicate that despite severe wartime disruptions, the majority of small farms remain economically active and continue to play an important stabilizing role within rural communities. From the perspective of the proposed synergy framework, such behavior contributes to economic synergy, as the preservation of agricultural activity supports local employment, maintains value chains, and prevents further economic decline of rural territories.
The analysis of development challenges revealed substantial regional differences (Figure 3). The most frequently reported constraint was the shortage of qualified personnel, particularly in Eastern and Southern Ukraine. The problem is largely associated with labor migration, military mobilization, and demographic decline. Similar findings have been reported by Bohdanov, who emphasized the critical role of human capital in sustaining rural development. (Bohdanov, 2017).
A statistically significant association was observed between regional location and the perceived severity of labor shortages (χ^2, $p < 0.05$), indicating that farms operating closer to conflict-affected territories experience considerably greater workforce constraints than enterprises located in relatively secure regions.
Another important challenge identified by respondents concerns the protection of property rights and the risk of raider takeovers. More than one-third of surveyed enterprises considered institutional instability a serious barrier to development. Weak enforcement of property rights reduces investment attractiveness and increases uncertainty regarding long-term business planning. Consequently, institutional deficiencies negatively affect both agricultural competitiveness and territorial resilience.
Financial constraints constitute another critical barrier. Respondents reported payment delays from retail chains, difficulties in accessing credit resources, and limited participation in government support programs. Approximately 78.3% of surveyed farms indicated a need for external financial support, while 52.3% estimated their investment requirements at between UAH 500 thousand and UAH 5 million. These findings highlight the dependence of post-war rural recovery on accessible financing mechanisms and targeted support instruments.

Figure 2
Main specialization of the surveyed farming enterprises



Source: compiled by the authors.

Figure 3
Key challenges in the development of the surveyed farming enterprises



Source: compiled by the authors.

The survey also identified infrastructure-related challenges as a significant determinant of development prospects. Frequent electricity disruptions, logistical bottlenecks, and transportation difficulties negatively affect production efficiency, storage capacity, and market access. Such constraints are particularly problematic for farms engaged in processing activities, where uninterrupted energy supply is essential for maintaining product quality and competitiveness.

At the same time, the survey results demonstrate considerable potential for strengthening social and institutional synergy. Approximately 76% of

respondents expressed willingness to participate in knowledge-sharing activities and professional cooperation networks. Although only 39% were prepared to engage in joint projects, this finding nevertheless indicates substantial opportunities for developing local partnerships and cooperative initiatives. Cross-tabulation analysis revealed a positive relationship between willingness to cooperate and intentions to expand production, suggesting that farms with stronger growth ambitions are also more likely to participate in collective development activities.

The findings further indicate a substantial demand for advisory and consulting services. More than half of respondents (55%) reported the need for support in financial management, investment attraction, supply-chain development, and market expansion. Such demand highlights the importance of institutional support mechanisms capable of facilitating access to knowledge, financial resources, and innovation.

The strategic priorities identified by respondents provide additional evidence supporting the existence of synergy between agricultural development and rural revitalization. While 43% of farms plan to maintain their current scale of operations, 28% intend to expand production and 19.5% seek entry into new markets, including the European Union. However, only eight surveyed enterprises currently consider themselves fully prepared for international market participation. This gap reflects not only production-related limitations but also institutional and infrastructural deficiencies that constrain broader territorial competitiveness.

Consequently, the sustainable development of rural territories depends not only on supporting agricultural production itself but also on strengthening the governance mechanisms that facilitate interaction among farms, local authorities, communities, financial institutions, and development partners. These findings provide empirical support for the proposed concept of economic, social, and institutional synergy and establish the foundation for the subsequent SWOT and PESTEL analyses (Hutorova et al., 2023; Stepanets, 2024; Vdovichen et al., 2016) (Table 1, Table 2).

The findings suggest that rural revitalization and agricultural production should not be viewed as parallel processes. Instead, they function as mutually reinforcing components of a broader territorial development system. The ability of governance institutions to coordinate these interactions determines the scale of synergistic effects and the long-term resilience of rural territories (Babenko, 2020; Harastovska et al., 2023).

From the perspective of the proposed Governance Synergy Framework, the combined results of SWOT and PESTEL analyses provide empirical evidence for the existence of three interconnected dimensions of synergy.

Based on the integration of survey results, statistical analysis, SWOT assessment, and PESTEL evaluation, an evidence-based Governance Synergy Model was developed (Figure 4).

Table 1

SWOT matrix of synergy-based rural development under wartime conditions in Ukraine

Strengths	**Weaknesses**
1. High agricultural potential and fertile land resources. 2. Significant experience and professional knowledge of farmers. 3. Strong local identity and community cohesion. 4. Diversified agricultural production structure. 5. Existing experience in adaptation to crisis conditions.	1. Aging population and demographic decline in rural areas. 2. Insufficient transport, energy, and social infrastructure. 3. Limited access to financial resources and investment capital. 4. Low level of technological modernization among many small farms. 5. Dependence on external financial and humanitarian assistance.
Opportunities	**Threats**
1. EU integration and access to European support programs. 2. International reconstruction and donor funding initiatives. 3. Development of digital agriculture and smart-village solutions. 4. Expansion of agricultural exports and market diversification. 5. Growth of public-private partnerships and local development projects.	1. Continued military actions and security risks. 2. Destruction of infrastructure and logistical networks. 3. Labor shortages caused by migration and mobilization. 4. Environmental degradation and land contamination. 5. Macroeconomic instability and investment uncertainty.

Source: compiled by the authors.

Table 2

PESTEL matrix of rural revitalization and agricultural development under wartime conditions in Ukraine

Category	Positive impacts	Negative impacts	Strategic actions
Political	International support in the form of grants and humanitarian assistance; government programs for rural recovery.	Military conflict leads to infrastructure destruction and security threats; political instability complicates long-term strategic planning.	Involvement of international partners in rural recovery; integration of security measures into development strategies.
Economic	Strong export demand for Ukrainian agricultural products; support for small and medium-sized businesses through international programs.	Destruction of logistics routes and rising fuel prices; limited access to financing for farmers and rural communities.	Development of local markets; attraction of investment in cooperatives and agricultural processing.
Social	Community cohesion encourages mutual support; willingness to implement local recovery initiatives.	Large-scale migration of the working-age population; psychological stress caused by war; limited access to education and healthcare in remote rural areas.	Implementation of psychological support programs; investment in education and healthcare for rural communities.
Technological	Introduction of modern agricultural technologies (drones, automation); development of digital platforms for farmers; use of renewable energy.	Limited access to advanced technologies due to wartime conditions; high cost of implementing innovative solutions.	Attraction of international technical assistance for innovation implementation; training farmers to use modern technologies.
Environmental	Potential for the development of renewable energy; application of environmentally friendly agricultural practices.	Land contamination due to mining and military activities; destruction of natural ecosystems.	Implementation of soil and land restoration programs; development of environmental standards for agriculture.
Legal	Integration into international legal standards, particularly EU regulations; opportunities to update the regulatory framework to support farmers.	Insufficient protection of land property rights; weak enforcement of environmental and agricultural legislation.	Reform of land legislation to simplify access to resources; strengthening legal protection of property rights and creating incentives for investors.

Source: compiled by the authors.

Unlike normative conceptual frameworks frequently presented in previous studies, the proposed model directly reflects the empirical findings of the present research (Tomashuk, 2023; Tymoshenko, 2018).

The model demonstrates how wartime challenges influence agricultural enterprises and rural communities, how governance mechanisms mediate these impacts, and how coordinated interventions generate economic, social, and institutional synergy contributing to sustainable post-war recovery.

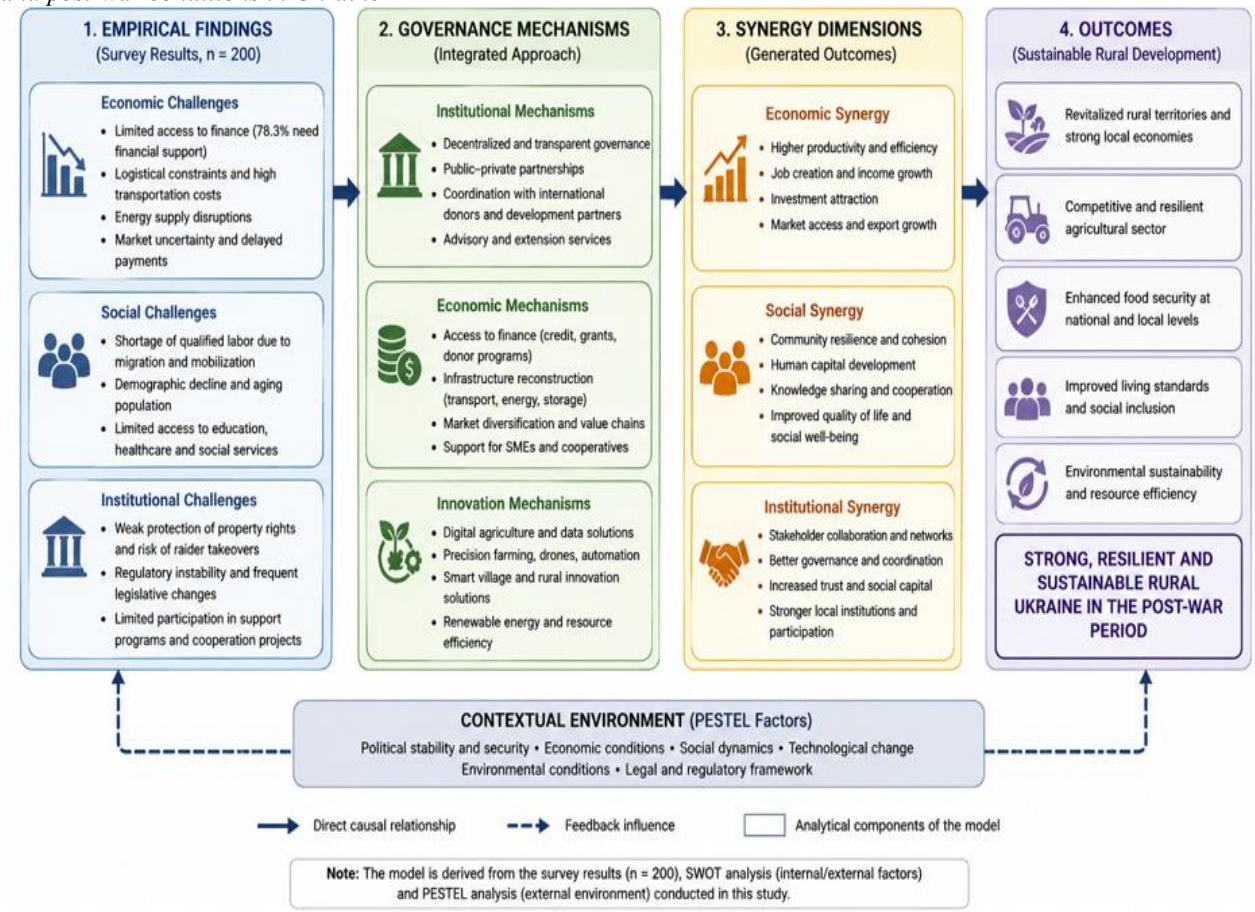
Conclusions

Based on the survey of farming enterprises and the results of SWOT and PESTEL analyses, the research provides empirical evidence that agricultural development and rural revitalization represent mutually reinforcing processes rather than independent development trajectories. The sustainable development of rural territories under wartime and post-war conditions depends on the interaction between agricultural production, local socio-economic systems, and governance institutions.

1. A key contribution of the study is the operationalization of the concept of synergy through three interconnected dimensions: economic synergy, reflected in production stability, employment generation, investment attraction, and market diversification; social synergy, reflected in community cohesion, knowledge exchange, local entrepreneurship, and human capital development and institutional synergy, reflected in stakeholder cooperation, governance effectiveness, public-private partnerships, and access to financial and advisory support.

Figure 4

Evidence-based governance synergy model for rural revitalization and agricultural development under wartime and post-war conditions in Ukraine



Source: compiled by the authors.

2. The SWOT and PESTEL analyses reveal that the future development of rural territories will largely depend on the ability of governance institutions to transform existing strengths and external opportunities into sustainable development outcomes while mitigating wartime threats and structural weaknesses. In particular, labor shortages, infrastructure destruction, limited access to finance, and institutional instability remain the most significant barriers to the formation of synergistic effects.

3. Based on the research findings, several policy priorities can be identified: strengthening targeted financial support programs for small and medium-sized farms; accelerating the reconstruction of transport, energy, and digital infrastructure in rural territories; improving legal protection of property rights; expanding advisory services and managerial training programs for farmers; increasing the involvement of international donors and development agencies in community-based recovery projects; promoting digital transformation and innovation adoption within the agricultural sector.

4. The scientific contribution of this study lies in the conceptualization and empirical interpretation of synergy between rural revitalization and agricultural development as a multidimensional governance phenomenon. Unlike previous studies that examined these processes separately, this research provides an integrated analytical framework linking agricultural production, rural development, and governance mechanisms.

5. Future research should focus on the development of quantitative synergy indicators, comparative analysis of regional recovery trajectories, and assessment of the role of digital and green transformations in strengthening the long-term resilience of rural territories.

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