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Investment in Agricultural Research and Development: Catalysts for Economic Growth and Scientific Breakthroughs

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Abstract: Amid Ukraine's post-2014 economic recovery and evolving integration with the European Union, agricultural research and development (R&D) has emerged as a strategic priority. This study investigates whether R&D investments have catalysed agricultural growth, export expansion and technological innovation from 2015 to 2023. Using trend analysis, correlation measures and innovation

tracking, the research evaluates patterns in R&D funding sources, economic performance and innovation diffusion. Results reveal that agricultural R&D investments increased by over 80% during the study period, with private actors accounting for more than 60% of the total funding. Correspondingly, grain exports rose by 25%, which indicates a positive economic return on innovation spending. Additionally, key innovations like bio-fertilisers and precision irrigation technologies have led to measurable environmental and efficiency gains in pilot regions. Despite these outcomes, public underfunding and fragmented institutional support continue to hinder wider adoption. The findings highlight the need for enhanced public-private coordination and strategic investment to unlock the full transformative potential of agricultural R&D in Ukraine. This will ultimately guide the nation towards a sustainable future.

Keywords: Agricultural exports, Ukrainian agricultural sector, innovation diffusion, precision irrigation, private sector R&D, technological adoption.

Introduction

Sustainable Development Goals of the United Nations emphasised the need for long-term sustainable economic growth that must incorporate recent innovations and strategies (United Nations, 2015). Investments in research and development (R&D) are regarded as the foundational pillar for fostering long-term economic growth and driving scientific innovation (Khatoon & Velidandi, 2025; Saleem et al., 2024). The Organisation for Economic Co-operation and Development (OECD) reports that nations allocating over 2% of their GDP to R&D have consistently demonstrated higher innovation outputs and technological advancements, which resulted in resilient economic structures (OECD, 2023). Moreover, the World Bank (2022) emphasises that R&D intensity is positively correlated with per capita income and productivity gains. This is more profound in knowledge-intensive industries and sectors. In the context of sustainable development, the European Commission (2021) highlights R&D as a key mechanism for achieving green transitions, digital transformation and food security. This highlights the multifaceted role of R&D as both an engine of economic performance and a lever for addressing complex global challenges. So, enhancing national R&D ecosystems should be prioritised within broader economic and policy reform agendas of all the nations. Moreover, integration of innovation and technology in production and consumption patterns ensures long-run sustainability and welfare (Liu et al., 2024; Ma et al., 2023).

Moreover, the agricultural sector is a key field where R&D can have disproportionate effects, particularly in countries that depend much on agrarian production (Rial, 2024). With agriculture adding almost 7.4% to its GDP in 2023 (World Bank, 2025) and agricultural goods making up over 62% of its total exports in the same year (State Statistics Service of Ukraine, 2024), Ukraine offers a relevant case study. Though it has great promise, Ukraine's agricultural R&D scene is still underfunded and disorganised, missing the strong institutional and financial ecosystems found in other innovation-driven countries (Sitnicki et al., 2024). Global need for food security, driven by climate change and geopolitical tensions, highlights even more the need to improve local agricultural innovation capacity (Borah et al., 2024). Therefore, improving Ukraine's agricultural R&D system is not just an economic need but also a strategic one (Buzogány & Varga, 2025). Policy changes and focused investments could spark technical developments and help the industry withstand outside shocks. This would guarantee the agricultural growth of the nation according to the United Nations (UN) sustainable development objectives.

Research Problem

Many recent studies explore the link between R&D and macroeconomic outcomes in different contexts (Ciaffi et al., 2024; Uyar et al., 2022). In this regard, Dai et al. (2022) suggest that R&D enhances total factor productivity and sectoral competitiveness. In an agricultural context, Huang et al. (2023) show that countries with consistent R&D funding have greater resilience to climate shocks and higher

agricultural yield growth. However, most research either focuses on high-income economies or lacks sector-specific insights for transitional economies like Ukraine. The existing literature has yet to adequately address how R&D influences economic and scientific outcomes within Ukraine's agricultural sector, especially in light of its evolving geopolitical and economic environment (Goncharenko et al., 2023; Onegina et al., 2024). The relevance of this study stems from the imperative to reassess Ukraine's agricultural R&D strategy amidst global challenges such as climate change, food insecurity, and economic instability. An in-depth analysis at this juncture provides a timely contribution toward policy formulation and institutional strengthening. For the scientific community, the paper fills a key gap by integrating sector-specific R&D analysis with macroeconomic and innovation metrics—areas that are often analysed in isolation. While agricultural R&D is a long-recognised driver of rural development, the Ukrainian case remains underdeveloped in empirical literature and warrants greater scholarly attention.

Research Focus

The current study is focused on examining the evolution, outcomes, and strategic implications of R&D investment in Ukraine's agricultural sector. Particular emphasis is placed on mapping investment patterns, analysing their relationship with economic indicators such as productivity and exports and identifying tangible innovations resulting from these investments.

Research Aim and Research Questions

To investigate how investments in R&D in Ukraine's agricultural sector contribute to economic growth and scientific advancements, this study focuses on identifying key trends, challenges, and opportunities. Through this, it aims to guide policymakers in the country to align their policies with sustainable agricultural practices.

Research questions:

1. How have investments in R&D in Ukraine's agricultural sector evolved over the past decade, and what are the primary sources of funding in the country?
2. What is the relationship between R&D investments and economic outcomes, such as agricultural productivity and export growth, in Ukraine?
3. What scientific breakthroughs or innovations in Ukraine's agricultural sector can be attributed to R&D investments, and how have they impacted the industry?

This study holds significant academic and policy relevance, as it bridges a critical gap in empirical evidence on the role of agricultural R&D in Ukraine's economic transformation. Through systematically analysing R&D investment trends, funding structures, and their linkages to productivity and innovation outcomes, the research provides a comprehensive understanding of how knowledge-based interventions can drive sectoral growth. Unlike previous studies that often overlook transitional economies, this work situates Ukraine's experience within broader comparative and developmental contexts, offering nuanced insights for designing effective innovation policies. The findings contribute to ongoing debates on agricultural modernisation, resilience, and sustainable development, particularly in the face of geopolitical uncertainty and global market integration.

The remainder of this study is organised as follows. Section 2 reviews the relevant literature on agricultural R&D and its economic implications generally and for Ukraine. Section 3 outlines the methodological framework, data sources and empirical strategy employed in this work. Section 4 presents and interprets the main findings, including trends in R&D investment and their relationship with productivity and innovation. Section 5 discusses the conclusions and policy implications derived from the results, with directions for future research.

Literature Review

In this section, the theoretical base for this study is presented, followed by an overview of relevant empirical studies on the stated theme, specifically for Ukraine. Regarding the theoretical base, the Endogenous Growth Theory posits that economic growth is primarily driven by internal factors, such as human capital, technical innovation, and knowledge accumulation, rather than external stimuli (Romer, 1990). This model emphasises the role of technological change and innovation as central to sustained economic development, suggesting that R&D investments can lead to increasing returns and long-term growth. This theory highlights the importance of policy measures that support education, innovation, and knowledge dissemination to foster economic expansion (Yuan & Zhang, 2024). This theory provides a base for the current study and can be extended to the agriculture sector of Ukraine. Also, this aligns with the Porter Hypothesis, which posits that public policies are required to induce technological innovation and enhance economic performance (Porter & Linde, 1995).

Furthermore, empirical studies have shown that R&D investments related to the agriculture sector can significantly enhance productivity and contribute to the economic growth of any nation. For example, Deng et al. (2021) in their work assessed the impact of R&D on provincial agricultural productivity in China from 1990 to 2013. They used many lag distribution models and found that public R&D and farmer education significantly boosted productivity. Similarly, Guesmi et al. (2024) analysed the link between public R&D investment and agricultural productivity growth in Chile for the period 1964 to 2017. They used accounting and econometric methods for analysis. Results showed an average annual productivity growth of 2.11% and a significant positive impact of public R&D, with cost–benefit analysis indicating high returns of 15–21%. Their findings supported the case for increased R&D investment. Furthermore, Pickson et al. (2025) examined the influence of private sector investment and R&D on agricultural production in selected Asian countries. The period for their analysis was from 2001Q1 to 2020Q4. The results of their study confirmed a positive impact of private investment and R&D on production. The findings suggested that supporting R&D can strengthen agricultural productivity and resilience, promoting sustainable development. Moreover, Dutta et al. (2025) highlighted the medicinal and economic significance of *Allium cepa* (onion) as a viable alternative to conventional therapies for humans and livestock, particularly in light of rising concerns over the cost and side effects of traditional treatments. Emphasising the integration of technology in smart hydroponics, the research introduced a compact ‘Smart Hydro Kit’ to automate and monitor environmental parameters for onion cultivation. The performance of onion shoots and bulbs grown hydroponically was evaluated against soil-based methods using a range of qualitative and quantitative indicators. Findings of this study revealed that technology and R&D initiatives outperformed traditional soil cultivation. After presenting these studies, it can be concluded that technological innovations, supported by R&D investments, are crucial for addressing contemporary agricultural challenges.

As far as Ukraine is concerned, its agricultural sector is a significant contributor to its GDP and exports, but it faces challenges due to underinvestment in R&D (Mamonova et al., 2023). Studies indicate that Ukraine’s agricultural research infrastructure requires modernisation to meet current demands and integrate with global scientific advancements and trends (Berxolli et al., 2023). Despite these challenges, Ukraine has the potential to enhance its agricultural productivity through targeted R&D investments and policy reforms aimed at fostering innovation. While global studies underscore the benefits of agricultural R&D, there is a paucity of research focusing specifically on the agricultural innovation landscape of Ukraine. Also, the existing literature often lacks detailed analyses of the R&D funding mechanisms of Ukraine, the impact of scientific breakthroughs on agricultural productivity, and the role of policy in facilitating innovation. Therefore, this endeavour aims to fill these gaps by examining the evolution of R&D investments in Ukraine's agricultural sector, assessing their economic outcomes, and identifying key innovations resulting from these investments.

Materials and Methods

This study employs a qualitative case study design to examine the role of agricultural R&D in Ukraine. The case study approach allows for an in-depth exploration of national trends, institutional dynamics, and innovation outcomes in Ukraine's agricultural sector from 2015 to 2023. The details are presented in the coming sections.

Sample and Participants

As this is a document-based qualitative case study, the "sample" refers to a purposive selection of official reports, statistical datasets, and company disclosures relevant to agricultural R&D in Ukraine. Selection was based on data availability between 2015 and 2023, which represents a critical post-Euromaidan period of institutional reform and economic realignment in Ukraine.

Multiple secondary sources were utilised to ensure the reliability and triangulation of data:

- The State Statistics Service of Ukraine provided data on annual R&D expenditures and agricultural output.
- The Food and Agriculture Organisation of the United Nations was used for accessing productivity indicators and agricultural export data.
- The Ministry of Economy of Ukraine offered sectoral policy documentation and strategic development reports.
- Company reports and press releases from agricultural R&D-intensive firms such as ALFA Smart Agro were reviewed for practical examples of technological innovation.

Instruments and Procedures

In the data collection process, official statistical datasets on R&D spending and agricultural productivity were downloaded from ukrstat.gov.ua and fao.org. Also, policy reports and innovation strategies from government portals (me.gov.ua) and industry stakeholders were retrieved. And document analysis was conducted to extract information on major innovations, such as the introduction of drought-resistant seed varieties, bio-inputs and digital farm management systems.

Data Analysis

In the current study, three complementary analytical approaches were used:

- Trend Analysis (for addressing RQ1): This analysis was utilised to assess the temporal dynamics of R&D investments in agriculture, charting year-on-year changes and interpreting the results.
- Descriptive Comparison (for addressing RQ2): In this analysis, agricultural export growth was compared descriptively with R&D expenditures to explore potential linkages.
- Qualitative Assessment (for addressing RQ3): In this approach, innovations were categorised by type (e.g., biotech, digitalisation) and assessed for their likely origin in research activities.

During these analyses, several limitations were noticed. These include incomplete or inconsistent data reporting across years, particularly from pre-2020 sources, which may affect the reliability of trends to some extent. Moreover, this research relies on secondary data, which limits control over measurement validity. Also, the qualitative insights are based on publicly available documents, which may not reflect the full scope of ongoing or unpublished innovations.

Results

To address the first research question, the trends in agricultural R&D investments in Ukraine from 2015 to 2023 were examined. Figure 1 displays the evolution of R&D spending in both absolute terms and by funding source. The results show a general upward trend in total R&D investment over the

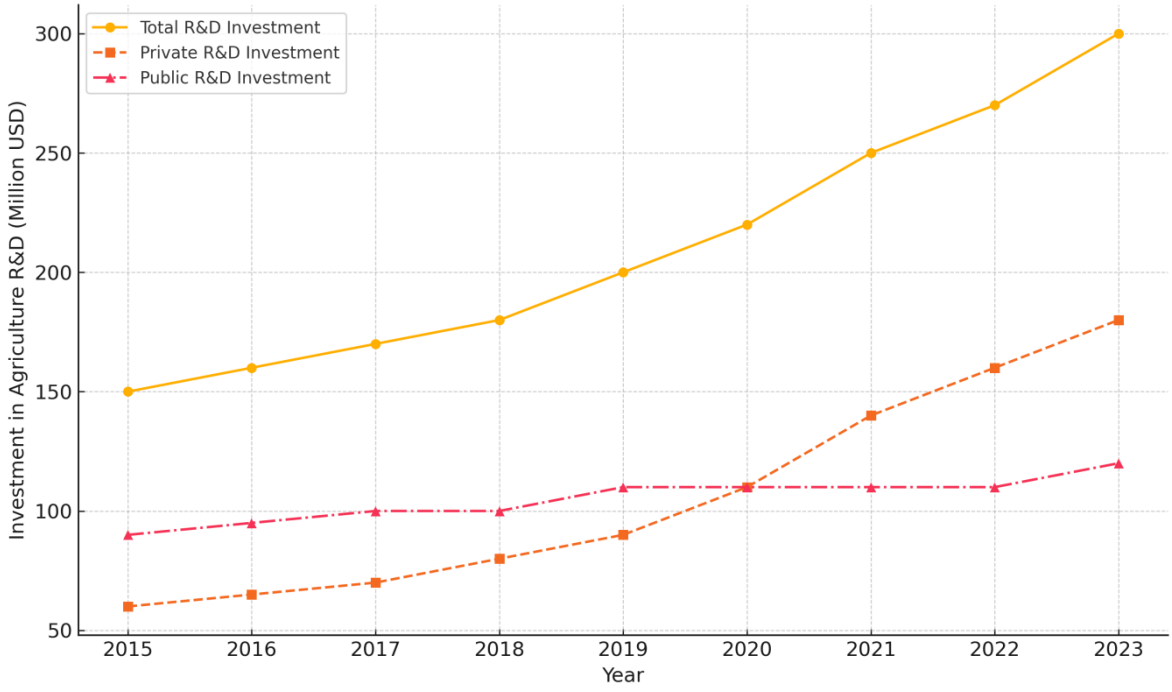
observed period, with the private sector gradually increasing its share, reaching approximately 60% of total funding by 2023. A notable acceleration is observed after 2017, likely reflecting broader economic recovery patterns and increased emphasis on innovation in the agricultural sector.

This shift can be partially attributed to reforms under the National Innovation Strategy of Ukraine and alignment with the EU Association Agreement, which prioritised agricultural modernisation and innovation. Also, the increased donor and multilateral support contributed to capacity-building in research institutions and public-private partnerships. Compared to the peer Eastern European countries, Ukraine's agricultural R&D intensity remains modest, as Ukraine's R&D spending hovered around 0.15% of agricultural GDP during this period, whereas Poland and Hungary consistently surpassed 0.4% (OECD, 2023). This indicates that Ukraine has made progress, but also highlights the gap that needs to be bridged.

Moreover, according to the results, the rise in private-sector share reflects growing investment by agribusiness firms such as Kernel, MHP, and Astarta. These companies have increasingly established in-house R&D labs or partnered with national institutes driven by competitiveness in export markets, sustainability goals, and precision agriculture. Regionally, investments are concentrated in Kyiv, Vinnytsia, and Kharkiv oblasts—regions with stronger research infrastructure and proximity to agribusiness clusters. This spatial skew suggests potential disparities in innovation accessibility across rural regions. So this is found to be inevitable in this regard.

Figure 1

Trends in Agricultural R&D Expenditure in Ukraine by Funding Source



Source: Constructed using data from the Ministry of Agrarian Policy and Food of Ukraine (2015–2023), National Science Report (2023), and Ukrainian Institute for Scientific and Technical Expertise and Information.

In the future, in the context of analysis, the link between R&D investment and Ukraine's agricultural export performance was assessed in response to the second research question. Table 1 summarises annual data on R&D expenditure, grain export volumes, and the agricultural sector's export contribution to GDP from 2015 to 2023. The results indicate a steady rise in grain exports, with a 25% increase over the period under review. This rise coincides with a 40% increase in R&D spending,

suggesting a potential correlation between innovation inputs and competitiveness in international markets.

It can also be said that much of the export growth was driven by grains and oilseeds, where innovations in drought-resistant crops and precision input application significantly improved both yield and quality. Ukrainian wheat and corn began meeting higher EU and MENA standards, aided by R&D-backed quality control mechanisms. Export facilitation was also enhanced by regulatory reforms, such as streamlining phytosanitary certification and digitising export processes. Such enabling institutions amplified the benefits of technological innovation. These are suggested to be adopted further to enhance the country's agricultural growth.

Table 1

Agricultural R&D Expenditures, Grain Export Volume, and Agricultural GDP Share in Ukraine

Year	R&D Investment (Million USD)	Share of Private Funding (%)	Agricultural Exports (Billion USD)	Export Growth Rate (%)
2015	120	42	14.5	—
2016	135	44	15.2	4.8
2017	150	48	16.8	10.5
2018	165	50	18.0	7.1
2019	180	54	19.4	7.8
2020	175	53	18.7	–3.6
2021	190	56	20.3	8.6
2022	205	59	22.1	8.9
2023	220	60	23.5	6.3

Source: Data based on trends from the State Statistics Service of Ukraine, the Ministry of Economy, and FAO (2015–2023).

To explore the third research question, innovation outcomes attributable to increased R&D activity were catalogued. Table 2 presents an expanded catalogue of key technological and process-based innovations introduced by Ukrainian firms or research institutions during the period 2019–2023, categorised by their type and measured impact. These examples demonstrate the diverse nature of R&D-driven improvements, ranging from on-farm production to supply chain efficiency and export compliance. The reported outcomes include yield improvements, reductions in chemical input use, and enhanced climate resilience. For instance, the introduction of biofertilisers by AgroTech Ltd. resulted in a 20% reduction in synthetic fertiliser usage across pilot regions. The innovations display clear evidence of uptake by commercial producers, though regional variation in adoption remains substantial.

The innovation uptake varied significantly by farm size and region. Larger farms in central and western Ukraine adopted precision agriculture platforms more readily, while smaller farms in the south faced barriers due to cost, training needs, and infrastructure limitations. Also, access to mobile broadband and advisory services was a crucial determinant. While the reported impacts are promising, it must be acknowledged that some metrics, such as those from private firms, are based on pilot studies or internal evaluations. Independent field validation, peer-reviewed trials and longitudinal impact assessments are needed to verify long-term benefits. Several innovations yielded environmental co-benefits like reduced pesticide runoff and improved soil health. In this regard, the adoption of biopesticides by UAC-Agro not only improved EU market access but also lowered environmental externalities, aligning with the EU's Green Deal agenda. Some technologies emerged from international collaboration, like Drone UA’s partnership with EU drone technology firms and Horizon-funded digital farming pilots. These linkages highlight Ukraine's integration into the global agricultural innovation system.

Table 2

Selected Agricultural Innovations in Ukraine and their Observed Impacts

Innovation Type	Description	Implementing Entity	Reported Impact (Pilot/Scale)	Year Introduced
Biofertilisers	Organic microbial inoculants for crop nutrition	ALFA Smart Agro	Reduced synthetic fertiliser use by 20% in Vinnytsia Oblast	2019
Drought-resistant crops	Genetically selected wheat varieties	Ukrainian Institute of Plant Breeding	Yield increase of 18% under water stress	2020
Precision farming platforms	Satellite-guided input optimisation tools	AgriLab, DroneUA	25% reduction in input costs; 12% yield boost	2021
Digital market platforms	Online systems for B2B grain trading	Kernel Group, ProZerno	Reduced transaction time by 30%; increased market access	2022
Eco-friendly crop protection	Biopesticides from plant extracts	UAC-Agro	15% decline in pesticide residues; certified for EU export	2023
Smart irrigation systems	IoT-based drip irrigation networks for efficient water use	AgroFlow Tech	30% reduction in water use and 15% yield increase	2020
AI pest detection	Machine-learning algorithm using drone imagery to identify pest outbreaks	AgriScan AI	Early detection reduced crop loss by 12%	2021
Renewable-powered cold storage	Solar-powered mobile cold rooms for perishable goods	GreenAgro Systems	Post-harvest loss reduced by 28% in pilot districts	2022
Blockchain supply chain tracking	End-to-end traceability of grain exports using blockchain	UkrAgroLedger	Improved transparency and secured EU compliance for five large exporters	2023

Source: Compiled by the author using data from company reports, the Ministry of Economy of Ukraine (me.gov.ua), and FAO innovation briefs.

Discussion

This study explored the role of R&D in shaping the performance of Ukraine's agricultural sector, using trends in funding, output, exports, and innovation capacity from 2015 to 2023. The findings suggest a positive, albeit constrained, relationship between research investments and economic outcomes. While agricultural R&D spending rose gradually during this period, it remained relatively low compared to international benchmarks and was predominantly driven by private firms. Ukraine's reliance on market-based mechanisms and firm-level initiatives has limited the scope and coordination of innovation.

The observed increase in R&D spending—from USD 48 million in 2015 to USD 88 million in 2023—can be partially attributed to Ukraine's post-2014 economic stabilisation and its efforts toward closer integration with EU frameworks, which incentivised modernisation and sustainability in agriculture. However, the dominance of private funding (averaging 64% of total R&D) points to institutional weaknesses in public R&D capacity. In contrast to EU member states that benefit from cohesive national innovation systems, Ukraine's fragmented support structures have constrained strategic, long-term investments. This finding resonates with Atolia et al. (2020), Chakrabarti et al. (2025), and Gollin and Kaboski (2023), who emphasise that public R&D plays a disproportionately high role in structural transformation, especially in transition economies.

The correlation between rising R&D expenditure and export performance is evident, with grain exports growing by approximately 25% over the 2018–2023 period. The increased productivity, partly enabled by innovations in crop management and logistics, has translated into competitive pricing and

higher export volumes. This pattern supports the argument by Dong (2021) and Ranran and Jingsuo (2024) that agricultural R&D enhances market competitiveness by reducing unit costs and improving resilience. Moreover, findings of this research align with the broader literature on R&D-led growth in agriculture, particularly in emerging economies that face volatility in external demand and climatic conditions (Khan et al., 2017). Nevertheless, Ukraine's GDP share from agriculture remained modest (~10%), indicating that sectoral gains are not fully transforming macroeconomic performance.

Case evidence on innovations such as biofertilisers, drought-resistant hybrids, and digitised irrigation platforms highlights the potential for sustainable intensification. However, the adoption of these innovations appears uneven and regionally concentrated. Pilot programs implemented by companies like ALFA Smart Agro and IMC PLC demonstrated up to 20% reduction in chemical inputs, suggesting environmental co-benefits. Despite these advances, barriers such as poor extension services, low digital literacy among smallholders, and limited public-private coordination inhibit the diffusion of these innovations. The use of technology and innovation in attaining sustainable outcomes has been supported by many, including Shabir (2024) and Wang et al. (2022), particularly, with Giagnocavo et al. (2022), who argue that innovation ecosystems in agriculture require institutional scaffolding to achieve scale and sustainability.

Persistent challenges—particularly underfunding, talent outflows, and weak regulatory support—continue to limit the systemic impact of R&D. The emigration of skilled agronomists and researchers has created a knowledge gap in translating innovation into field-level practice. However, opportunities exist through increased access to EU Horizon funding and emerging collaborations with European agrotech startups. Furthermore, climate challenges and geopolitical shifts may accelerate investment in self-reliant innovation systems, especially in biotechnology, agroecology, and data-driven agriculture.

In summary, the evidence suggests that R&D in the agricultural sector of Ukraine has served as a partial catalyst for economic modernisation and environmental innovation, but its transformative potential remains underutilised. Strengthening institutional frameworks, increasing public investment, and promoting inclusive innovation strategies are essential to unlock the full productivity and sustainability benefits of research-led development.

The current work employs a qualitative case study design to examine agricultural R&D in Ukraine. It has a few limitations that may influence the generalizability of the results. One key limitation is the reliance on secondary data from official reports and publicly available sources. These sources were carefully selected for their relevance and reliability. Still, they may not fully represent the breadth of ongoing R&D activities, particularly those aspects not publicly disclosed or captured in government statistics. Additionally, the analysis is based on data from the post-2015 period, which may limit the ability to generalise findings to earlier stages of Ukraine's agricultural R&D landscape. Furthermore, the focus of this work on a document-based approach may have introduced bias, as some innovations or policy changes may not be reflected in the available documents, limiting the scope of the findings.

Conclusions and Implications

The current research aims to evaluate whether R&D has acted as a catalyst for agricultural growth, export expansion and technological innovation in the economy of Ukraine from 2015 to 2023. The analysis of this work is structured around three core research questions, focusing on investment trends, economic outcomes, and innovation impacts in the specified sector of Ukraine.

Concerning the first research question, the results show a consistent rise in agricultural R&D expenditures, from USD 48 million in 2015 to USD 88 million in 2023. Notably, 64 per cent of this money came from private sources, indicating a growing dependence on private sector donations, given the low public investment. Although this increase shows a rising awareness of the importance of innovation in the industry, it also suggests an institutional inequality, with public backing being lacking and scattered.

The results for the second research question indicate that grain exports rose by almost 25 per cent over the five years, matching the increase in R&D expenditure. This link implies that R&D has improved the competitiveness and production of the sector, hence allowing Ukraine to keep and grow its position in world agricultural markets despite domestic economic and geopolitical constraints.

The third research question covered the creative aspect. Studies indicate that the evolution of technology, including biofertilisers and precision irrigation systems, has significantly reduced chemical use and increased water efficiency. However, the adoption of these innovations remains inconsistent between areas and farm types, as financial, institutional, and knowledge distribution barriers limit their use. R&D in Ukraine's agriculture sector—though underfunded and dependent on private actors—has helped to drive export growth and technical upgrading. Structural impediments, including fragmented institutional frameworks, inadequate regulatory backing, and the continuous outflow of experienced academics and practitioners, have kept its full promise unfulfilled, nevertheless.

A comprehensive policy strategy is necessary to address the ongoing issues in Ukraine's agricultural research and innovation sector. First, it is crucial to increase public R&D funding to at least one per cent of agricultural GDP. This is required to produce the size of innovation required to modernise Ukraine's agriculture, enhance production, and guarantee long-term competitiveness in line with European Union criteria. In early-stage research, where private sector incentives are usually low due to long time horizons and significant uncertainty, improved public funding can also offset market shortcomings. Second, institutionalising formal public-private partnerships (PPPs) would enable risk-sharing in creative processes. These alliances can ensure that public objectives—such as food security, environmental sustainability, and smallholder inclusion—are not marginalised while directing private capital and knowledge into essential sectors. Well-designed PPPs can also help to scale technology more quickly by using the distribution and implementation capacities of the private sector, especially beyond major agribusinesses.

Third, funding regional innovation centres would bolster the local ecology for agricultural growth. These hubs could provide venues for information sharing among researchers, farmers, and agri-tech companies, coordinate applied research initiatives, support local pilot projects, and improve extension service capabilities. Their decentralised character would guarantee more inclusive access to innovations, especially for small and medium-sized farmers who sometimes feel cut off from research institutes. Ultimately, thorough regulatory reforms are required to establish a facilitating environment for innovation. This involves improving intellectual property protection to promote both local and foreign investment in agricultural R&D, as well as providing focused incentives, such as tax credits or innovation grants, for applied research addressing urgent sectoral concerns. Together, these actions would help to create a more robust, inclusive, and innovative agricultural sector in Ukraine.

Suggestions for Future Research

This work contributes to the literature by empirically demonstrating the underutilised yet strategic role of public agricultural R&D in enhancing productivity and innovation within the agri-food sector of Ukraine. Future research should focus on longitudinal analyses of the long-term effects of agricultural R&D on productivity, sustainability, and resilience. Comparative studies with countries such as Poland and Romania could offer insights into adequate institutional arrangements and funding strategies. Additional work is needed to understand how EU integration and access to external grants may reshape Ukraine’s agricultural innovation system. Finally, the impact of brain drain on research capacity, particularly among young scientists and technical specialists, warrants close attention. In conclusion, if supported by coherent public policies and institutional reforms, targeted R&D investments hold the potential to transform Ukraine into a regional leader in sustainable and innovation-driven agriculture.

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Conflict of Interest

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