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ANALYSIS OF TRENDS AND PROSPECTS FOR THE DEVELOPMENT OF THE LEGUME MARKET IN THE CONTEXT OF MODERN ECONOMIC CHALLENGES

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Abstract. The study aims to assess current trends and prospects for the legume market, analyse factors affecting supply and demand, and identify ways to boost the industry's economic efficiency in the face of modern economic challenges. The study is reinforced by the following applied tasks: 'Development of agrobiotechnological approaches to the production of crop products to restore the fertility of soils affected by hostilities'. The study focuses on the legume market as part of agricultural production and as an element of the state's food security system. The study focuses on the economic, agroclimatic and institutional factors influencing market performance, as well as the structure of demand and supply, and the level of yield and profitability of production. Data analysis revealed that Ukraine is a leading exporter of leguminous crops in Europe. Soybeans are cultivated on 168 thousand hectares, yielding 3.4 million tons; peas on 347 thousand hectares, yielding 610 thousand tons; chickpeas on 40 thousand hectares, yielding 50 thousand tons; and beans on 45 thousand hectares, yielding 50 thousand tons. The authors' own research into crop yields at Vinnytsia National Agrarian University under conditions of economic activity proved that the yields exceeded the average Ukrainian level for soybeans (2.67 t/ha), chickpeas (3.02 t/ha), peas (4.16 t/ha) and beans (3.63 t/ha). This indicates the potential for increasing productivity. Market analysis demonstrates its sensitivity to a range of external and internal factors, including world prices, weather conditions, military risks, logistical constraints, and investment activity. A SWOT analysis reveals strengths such as favourable soil and climatic conditions, agrobiological potential and export experience, as well as weaknesses such as lower average yields compared to leading countries, limited internal processing and uneven technical support. The following strategic directions for market development are proposed: increasing yield through the introduction of zonal cultivation technologies and modern varietal composition; developing an internal programme to deal with processing based on the high added value of products; diversifying export markets and logistics; and improving state support mechanisms. The expected effects of implementing the measures are an increase in average yields by 15-25%, an increase in profitability by 10-18%, an increase in gross receipts, and a strengthening of Ukraine's export potential. This will ensure long-term food security and competitive advantages in the international market.

Keywords: food security, legume market, economic efficiency, risks, balanced environmental management.

JEL Classification: Q11, Q13, Q18, O13, R11, O13, D24

1. Introduction

The legume market is an important component of agricultural production and a key element of the state's food security system (Hetman et al., 2024; Lohosha et al., 2025; Honcharuk et al., 2024). Its economic significance lies in the production and economic relations between business entities involved in the production, exchange, distribution, and consumption of leguminous crops. In this market, demand and supply are generated for crops such as soybeans, peas, beans, lentils and chickpeas, which have food, feed and export value (Tomashuk et al., 2025; Bondarenko et al., 2023).

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The legume market is specific due to the biological characteristics of production, such as seasonality and dependence on natural and climatic conditions, as well as a relatively low level of material intensity compared to grain crops and a significant foreign trade factor. At the same time, legumes play an important role in agroecology by enriching the soil with nitrogen. This significantly reduces the cost of intensification methods while increasing the efficiency of crop rotation.

In the context of the global economy, the legume market is gaining strategic importance due to growing demand for vegetable protein, changing dietary habits, and the need to ensure food security (Hontaruk et al., 2024). Global trends indicate a gradual shift in consumer preferences towards more environmentally sustainable products, increasing interest in legumes as an affordable source of protein and a substitute for livestock products (Kaletnik et al., 2020; Tkachuk et al., 2025). However, the modern market is characterised by high prices, dependence on climatic conditions, and logistical risks, which have become particularly acute in the context of global economic crises and geopolitical instability (Palamarchuk et al., 2024).

The study of the legume crop market is relevant due to a variety of global and national factors that are creating new demands for agricultural production and the food system. The world economy is experiencing a steady increase in demand for vegetable protein, associated with changes in consumption patterns, the development of alternative foods, and greater focus on the environmental sustainability of production methods. In this context, legume crops are a strategic resource that can help to ensure food security and reduce dependence on imported protein-rich materials.

Modern economic challenges, such as inflationary processes, unstable world prices, logistical constraints, geopolitical instability and climate change, have a significant impact on the functioning of agricultural markets (Koval et al., 2025). The legume market is particularly sensitive to these factors due to its export orientation and reliance on weather conditions (Petrychenko et al., 2024). This necessitates a thorough analysis of structural changes, market fluctuations, and long-term development trends. In addition to the economic aspect, the issue's relevance is enhanced by its environmental component. Legume crops play a vital role in establishing sustainable agroecosystems by enriching soils with nitrogen and reducing the need for mineral fertilisers. In this regard, their development is directly related to the implementation of sustainable development strategies and the 'green' transformation of the agricultural sector. Therefore, in order to develop effective measures for state regulation of the agricultural sector, increase the competitiveness of producers, strengthen export potential and guarantee food security in the face of modern economic challenges, a detailed study of the trends and prospects for the development of the legume market is necessary.

According to V. Petrichenko, legumes are a strategic resource that contributes to ensuring food security in Ukraine and on the global market. They are a significant source of vegetable protein (20–35%), amino acids, B vitamins, and minerals, making them an integral part of a balanced diet. In middle- and low-income countries, legumes often serve as the primary source of protein, compensating for a lack of animal products (Petrychenko et al., 2024).

According to Lutkovska, the economic importance of these products lies in their availability and relatively low production costs compared to livestock products. This contributes to the formation of stable food stocks and reduces dependence on imported protein raw materials. Developing domestic legume production increases a country's level of food self-sufficiency and strengthens its export potential (Kaletnik & Lutkovska, 2020).

From an agroecological point of view, leguminous crops contribute to improving soil fertility due to the fixation of atmospheric nitrogen. This reduces the need for mineral fertilisers and increases the sustainability of agricultural systems. This directly impacts the long-term stability of food production (Tkachuk et al., 2025).

In the context of global challenges such as climate change, demographic growth and unstable world markets, Kaletnik et al. (2019) emphasise that legumes are an important tool for diversifying agricultural production and strengthening food security while ensuring economic efficiency and environmental balance.

Demand for legumes is determined by a combination of food, feed and industrial needs. On the one hand, consumer demand for vegetable protein is increasing due to changes in the nutritional needs of the population and the growing popularity of healthy lifestyles. On the other hand, the feed sector accounts for a significant proportion of demand, since legumes are used as high-protein raw materials in animal husbandry (Petrychenko et al., 2022).

Another factor is the development of the processing industry, particularly the production of protein concentrates and food ingredients, which stimulates the expansion of the domestic market. Demand is characterised by relative elasticity in response to price fluctuations on the global market, as well as dependence on population income, government policies that support healthy nutrition, and foreign trade conditions. Export contracts play a significant role in forming solvent demand in exporting countries. The supply of leguminous crops is influenced by natural and climatic conditions, the level of technological support for production, the structure of cultivated areas, and state support for the agricultural sector.

The supply is seasonal and depends on the level of harvest, as well as the situation in related markets (e.g., grains and oilseeds). If world prices increase or incentive programmes are introduced, producers can quickly increase the area under cultivation, which gives rise to cyclical market dynamics. Thus, the supply and demand in the legume market are shaped by economic, social and environmental factors. Balancing these requires effective state regulation and strategic planning of the industry's development.

2. Materials and Methods

The objective of this study is to evaluate the current state of the legume market and its future prospects, analyse the factors that influence supply and demand, and suggest ways to improve the industry's economic efficiency in the face of modern economic challenges. The study solves the following applied tasks:

– To assess the current state of production of legume crops.
– To identify key factors in the formation of supply and demand.
– To identify problems in the functioning of the industry with the simultaneous development of production recommendations for its development, taking into account international standards and national characteristics.

The study is based on economic theory and modern concepts of agricultural market development. It also draws on the work of domestic and foreign authors regarding the regulation of the agricultural sector.

The study employed the dialectical method to understand economic phenomena, taking a systematic approach to analysing the relationships between the production, processing and sales of products. This involved using methods of analysis, synthesis and induction. To assess the current state of the industry, statistical and economic methods were employed, including comparison, grouping, analysis of dynamics and structure, the index method and calculation of relative and average values.

The economic efficiency of legume production was determined using indicators such as yield, cost price, profitability level, labour productivity and export orientation. To substantiate the development prospects, elements of economic and mathematical modelling and forecasting were applied.

The experimental and analytical part of the study was conducted at the 'Agronomichne' scientific and production farm (Vinnytsia region, Ukraine), as well as under production conditions at agricultural enterprises in the region. Field research involved observing the formation of legume crop yields, evaluating the economic indicators of their cultivation, and assessing the effectiveness of individual technological elements.

The information base comprised official statistical data, materials from relevant ministries and departments, regulatory legal acts, as well as the results of observations made and production calculations conducted. The findings of this study can be utilised to enhance the efficacy of state support mechanisms for the industry, formulate strategies for the development of the legume market, and enhance the competitiveness of domestic agricultural production.

3. Results and Discussion

The dynamics of legume production are characterised by cyclicality and dependence on domestic and foreign market conditions. In recent years, there has been a tendency to increase the area under cultivation during periods of rising world prices and growing export demand, which encourages commodity producers to diversify their crops. Conversely, during years of price instability or adverse weather conditions, the area sown is reduced in favour of more marginal crops. The area dedicated to growing legumes is influenced by economic factors such as profitability, state support and resource availability, as well as agro-climatic factors such as moisture conditions and soil fertility, and organisational factors such as farm specialisation and processing infrastructure availability. The structure of crops changes depending on the export attractiveness of individual crops on the domestic market. Production size depends not only on the area, but also on yield levels, which are determined by technological support, the quality of seed material, the use of modern agricultural technologies, and compliance with crop rotation. Increasing production intensity contributes to growth in gross yields, even with relatively stable sown areas. Thus, the dynamics of production and the area sown with leguminous crops reflect the agricultural sector's adaptability to market conditions, requiring strategic planning that takes long-term economic and environmental priorities into account (Petrychenko et al., 2022).

The analysis of these indicators shows that the scale of legume production in Ukraine differs significantly from that in the rest of the world. This is due to natural, climatic and economic factors affecting the development of the agricultural sector (see Table 1).

Soybeans remain the largest crop in both Ukraine and the world. With an area under cultivation of 168 thousand hectares, Ukraine's gross production is around 3.4 million tonnes, indicating increased production intensity and significant yield. Globally, soybeans occupy around 140 million hectares, yielding a gross harvest of 380 million tonnes, confirming their strategic importance to the global food and feed markets. A comparative analysis shows that, although Ukraine's share of global production is relatively small, it has a stable export orientation. Peas are grown in Ukraine

Table 1

Dynamics of production and sown areas of leguminous crops in Ukraine and the world as of 12/31/2025

Culture	Indicator	Ukraine (thousand hectares / thousand tons)	World (million hectares / million tons)
Soybean	Sown areas	168	140
	Gross production	3400	380
Pea	Sown areas	347	13
	Gross production	610	18
Chickpea	Sown areas	40	13
	Gross production	50	10
Bean	Sown areas	45	35
	Gross production	50	27

Source: (Kaletnik & Lutkovska, 2020; Tkachuk et al., 2025)

on an area of 347 thousand hectares, with a gross harvest of 610 thousand tonnes. This indicates their important role in the national legume production sector. Globally, the cultivated area is 13 million hectares, with a production of 18 million tonnes. The difference in these figures reflects the global concentration of production in individual countries, but Ukraine occupies a prominent position among exporters of this crop. In contrast, chickpeas are cultivated on much smaller areas in Ukraine – 40 thousand hectares with a gross production of 50 thousand tons – which highlights their niche nature. In contrast, chickpeas occupy 13 million hectares worldwide, with a gross harvest of 10 million tonnes, confirming their importance to the food systems of Asian and Middle Eastern countries. Ukraine's relatively small share of global production of this crop suggests potential for increased cultivation, provided stable demand is established and export channels are developed. Beans are grown in Ukraine on 45 thousand hectares, with a gross harvest of 50 thousand tonnes, which also highlights their specialised nature. Globally, the cultivated area is 35 million hectares, with a production of 27 million tonnes. These high global figures are due to significant demand in Latin America, Africa and Asia, where beans play an important role in people's diets. In summary, Ukraine lags behind the rest of the world in terms of absolute production figures for leguminous crops, but it has favourable agro-climatic conditions and export potential to increase production volumes, particularly of soybeans and peas. Niche crops such as chickpeas and beans require targeted state support and the development of processing infrastructure to increase their competitiveness in domestic and foreign markets.

The legume market is specific due to the biological characteristics of production, such as seasonality and dependence on natural and climatic conditions. It also has a relatively low level of material intensity compared to grain crops and a high level of foreign trade. The structure of the legume market is shown in Fig. 1.

The functioning of the market is influenced by the price situation, state agricultural policy, the level of investment activity, and global trends in the demand for vegetable protein. In modern conditions, the importance of diversifying sales channels, developing processing capabilities, and creating products with high added value is growing. Consequently, the legume market is a multi-level economic system combining production, trade and institutional components. This ensures the integration of the national agricultural sector into the global food market, creating a context in which competitiveness can be increased.

Analysing the above yield indicators for legumes (t/ha) in Ukraine, the USA and the EU, alongside the results of our own research, permits several scientifically sound conclusions to be drawn about

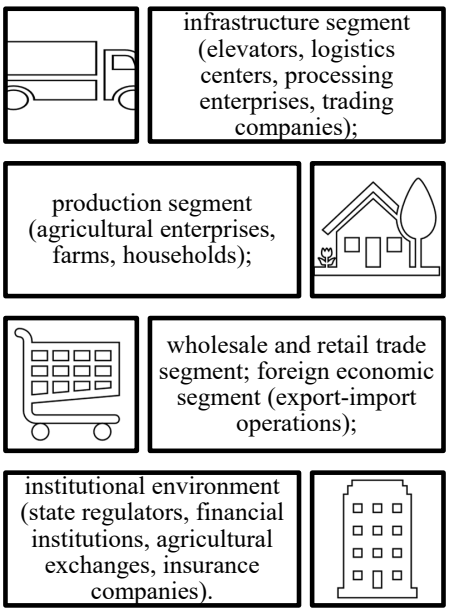

Figure 1. Elemental components of the structure of the legume market

Source: (Tkachuk et al., 2025; Kaletnik et al., 2019)

productivity levels and the potential for increasing production efficiency (see Fig. 2).

In Ukraine, the average productivity of soybean seeds is 2.04 t/ha, which is lower than in the USA (3.02 t/ha) and the EU (2.62 t/ha). The authors' own research results (2.67 t/ha) exceed the Ukrainian average by 0.63 t/ha (over 30%), demonstrating the potential for increased productivity through optimising cultivation technology, varietal composition, and nutrition systems. Chickpea productivity is lowest in Ukraine at 1.32 t/ha, compared to 2.51 t/ha in the USA and 1.49 t/ha in the EU. The authors' results are particularly striking at 3.02 t/ha, exceeding the national average by over twice as much. This confirms the significant potential for increasing chickpea production in Ukraine. The average grain yield of peas in Ukraine is 2.23 t/ha, which is lower than in the USA (3.04 t/ha) and the EU (2.63 t/ha). The authors' own research yielded the highest result of 4.16 t/ha, which is 1.93 t/ha higher than the Ukrainian average. This indicates the crop's high genetic and technological potential. In Ukraine, the bean yield is 2.71 t/ha, exceeding the EU average (3.05 t/ha) by a small margin, but significantly lower than in the USA (4.26 t/ha). The authors' own research (3.63 t/ha) confirms that it is possible to approach world leaders if innovative agricultural technologies are introduced. The lupine yield within the dezhava is 2.22 t/ha, which is slightly higher than the EU average (2.07 t/ha) but lower than in the USA (3.18 t/ha). The authors' own research yielded a result of 3.22 t/ha, which is actually equivalent to the American figure, thus confirming the crop's potential for increased production. Introducing innovative agricultural technologies, modern varieties and optimised nutrition systems could significantly boost the yield of leguminous crops in Ukraine, strengthening its competitiveness on the global market.

Today, risks have significantly altered the conditions in which the agricultural market operates, particularly in the legume sector. The negative impact is primarily evident in the reduction of cultivated areas in front-line regions, damage to production infrastructure, the exploitation of agricultural land for mining purposes, and a decline in the investment activity of agricultural enterprises (see Fig. 3).

An increase in production risks can lead to a change in crop composition in favour of cheaper or more liquid crops. War risks and logistical restrictions have a complex impact on the development of the legume market, reducing its investment attractiveness, export potential, and competitiveness. At the same time, adapting to new conditions by diversifying logistics,

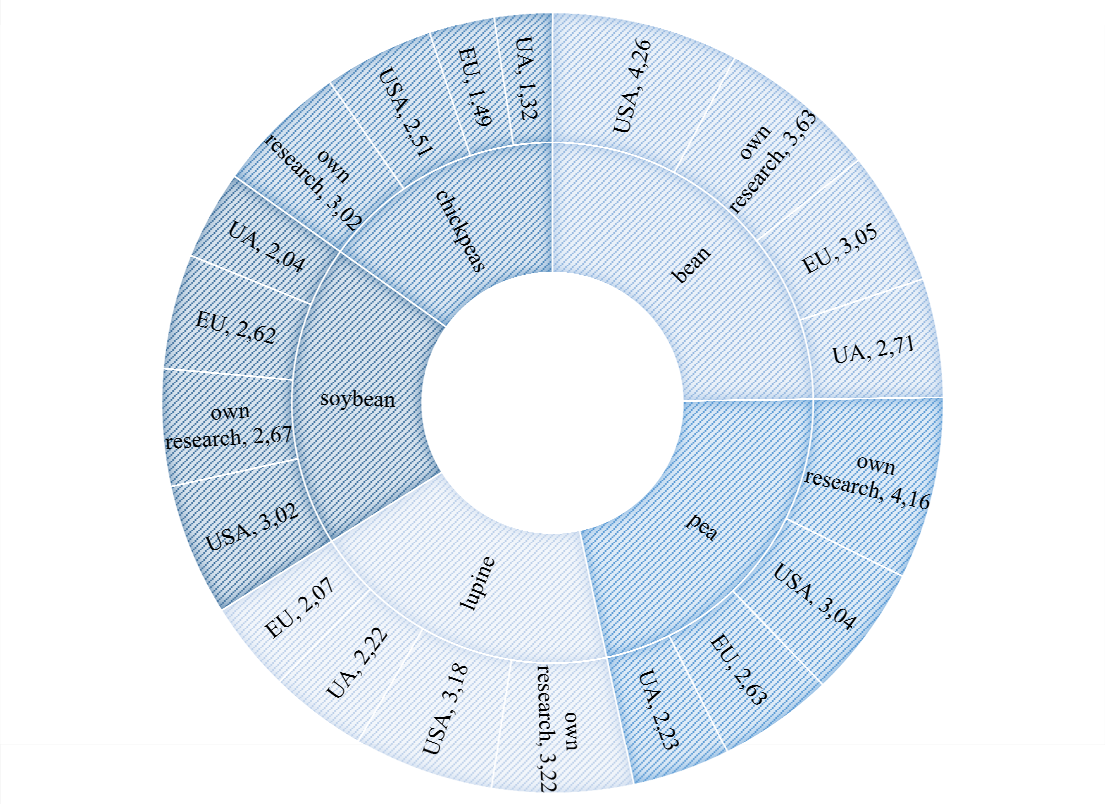

Figure 2. Average yield of leguminous crops in Ukraine, the EU and the USA (t/ha)

Source: (Hontaruk et al., 2024; Palamarchuk et al., 2024; Didur & Pantsyreva, 2025)

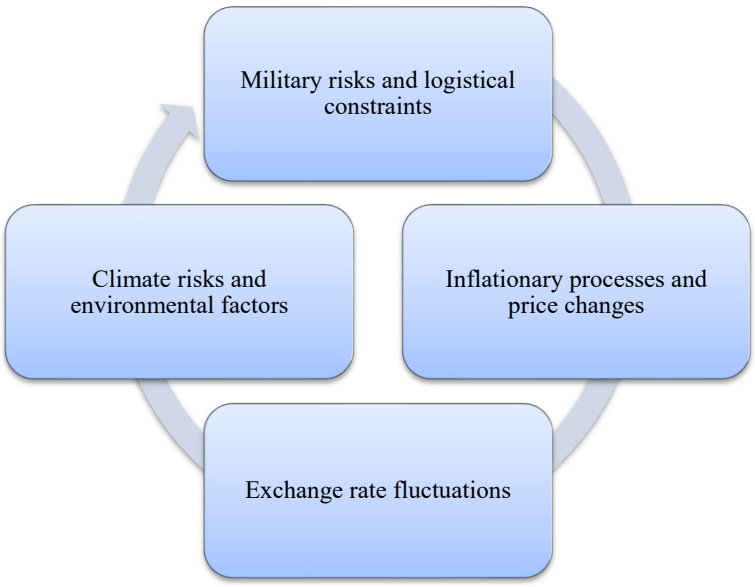

Figure 3. System of risks in the formation of the market conditions of legume crops

Source: (Hetman et al., 2024; Hontaruk, et al., 2025)

developing internal processing and securing state support for insurance and lending are key to ensuring the industry's stability in the face of crisis.

A SWOT analysis shows that, although the Ukrainian legume market has significant natural and economic conditions that promote development, its competitiveness is constrained by structural and institutional restrictions (see Table 2). Strategic development should focus on increasing yields, diversifying exports, developing internal processing and minimising logistical risks. Implementing these measures will enable existing opportunities to be transformed into long-term competitive advantages.

The strategic development of the Ukrainian legume market should be based on a combination of export orientation, technological modernisation and institutional support (see Fig. 4).

In the short term, the priority is to develop and implement strategies that minimise military and logistical risks. In the medium and long term, the dominant strategies should focus on creating competitive advantages and increasing the added value

Table 2
SWOT analysis of the development of the Ukrainian grain and legume market

Internal environment	Strengths	Weaknesses
Production and resource potential	Favorable soil and climatic conditions; high agrobiological potential of crops	Lower average yield compared to leading countries
Technological level	Possibility of intensification of production; introduction of modern varieties	Uneven technical support of farms
Export potential	Experience in entering the agricultural markets of the EU, Asia and the Middle East	Exports are mainly raw materials without added value
Environmental benefits	Nitrogen fixation, soil structure improvement, role in crop rotations	Limited spread of organic production
External environment	**Opportunities**	**Threats**
World market	Growing demand for plant protein; diversifying exports	Regulatory instability; limited access to financing
Institutional environment	Harmonisation of standards with the EU; investment in recycling	Regulatory instability; limited access to financing
Logistics and infrastructure	Development of alternative logistics routes	War risks; infrastructure damage; increased transportation costs
Climatic conditions	Expansion of the range of thermophilic crops (chickpeas, soybeans)	Climate change, droughts, extreme weather events

Source: (Tomashuk, 2025; Lohosha et al., 2025; Pronko et al., 2020)

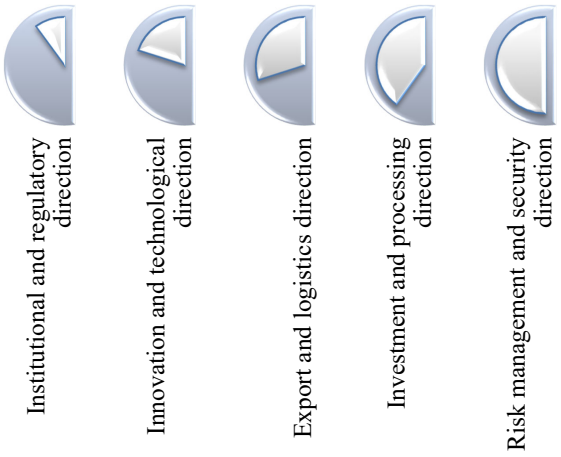

Figure 4. Strategic directions of state agrarian policy regarding the development of the grain legume market of Ukraine

Source: (Petrychenko et al., 2022; Bondarenko et al., 2023; Chikov et al., 2022)

of products by maximising the yield of leguminous crops. This should be achieved by applying the developed zonal technological methods of cultivation, which take into account modern ecological, soil-related and climatic challenges.

The results of the study show that the strategic development of the leguminous crops market should be based on transitioning to an innovative, intensive management model. Increasing yields through the implementation of zonal cultivation technologies, modern varietal composition and optimised nutrition systems is key to increasing gross production without significantly expanding cultivated areas. At the same time, developing internal processing to create products with high added value is important. This will reduce the reliance of exports on raw materials and increase profitability. Diversifying export markets and logistics routes, improving state support mechanisms and insuring against agricultural risks will stabilise the industry in the face of external challenges. The projected economic results of implementing the proposed measures are an increase in the average yield of leguminous crops by 15-25%, an increase in production profitability by 10-18%, and an increase in gross receipts due to technological intensification and strengthened export potential for Ukraine. These measures will strengthen the economic sustainability of agricultural enterprises, enhance the country's food security, and establish long-term competitive advantages for Ukraine in the global legume market.

4. Conclusions

The research confirms that the development of the grain legume market in Ukraine is systemic and multifactorial, incorporating production, economic and institutional elements. While the dynamics of sown areas and gross yields demonstrate the agricultural sector's adaptability to changes in the global market, significant dependence on external demand and price volatility remains. A comparative analysis with leading countries shows significant potential for increasing yields, as confirmed by the authors' own research results, which exceed the national average. This indicates the feasibility of scaling up innovative technologies, improving varietal composition, and optimising plant nutrition systems. At the same time, however, military risks and logistical restrictions highlight the need to diversify export channels and develop domestic processing. Implementing a comprehensive state policy that focuses on technological modernisation and supports producers, while also stimulating the production of high-value products, will strengthen Ukraine's competitive position in the global grain legume market in the long term.

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