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ANALYSIS OF TRENDS AND DEVELOPMENT PROSPECTS OF THE VEGETABLE MARKET UNDER CONDITIONS OF ECONOMIC REGIONALISATION

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Abstract. The **objective** of the present study is to analyse the trends and prospects for the development of the vegetable market of Ukraine in the context of regionalisation of the economy. In particular, the study will seek to identify the main factors that affect the effectiveness of the functioning of this market at the regional level. **Methodology.** A comprehensive approach was adopted for the research, incorporating theoretical, quantitative, and qualitative methods of analysis. The main methods applied in the study include the following: document and literature analysis (to assess theoretical approaches to economic regionalisation and its impact on the agrarian sector); SWOT analysis (to assess the strengths and weaknesses of the vegetable market in Ukraine in the context of regionalisation, as well as the opportunities and threats arising from changes in economic and environmental conditions); comparative analysis (to compare the state of the vegetable market in different regions of Ukraine and identify specific features and opportunities for local development); regression analysis (to identify the relationship between key economic factors and the results of vegetable market development); sustainability analysis (to examine the impact of internal and external factors on the stability of the vegetable market); case study method (to formulate recommendations and development strategies tailored to the needs of regional markets). The **results** of the study indicate that regionalisation promotes increased efficiency in vegetable production through regional specialisation, the development of agrifood clusters, and the optimisation of logistical processes. The analysis demonstrated that pivotal factors encompass adaptation to climate change, the integration of innovative agricultural technologies, and the development of organic vegetable production. Nevertheless, the market is confronted with challenges pertaining to infrastructure, access to financing, and inadequate government support. The prospects for development include the following: improved co-operation between producers, the development of regional export strategies, and enhanced product quality, with a view to accessing international markets. **Practical implications.** The regionalisation of Ukraine's vegetable market has been demonstrated to contribute to the development of local agrifood clusters, thereby reducing logistics costs and improving production efficiency. The implementation of innovative technologies and adaptation to climate change have been demonstrated to increase yields and ensure supply stability. It is anticipated that there will be an enhancement in the competitiveness of Ukrainian vegetables in both domestic and international markets. This will be driven by improvements in product quality and certification. The provision of state support for farmers, in conjunction with the establishment of favourable conditions for the development of organic vegetable production, is of significant importance. **Value / Originality.** The study provides a comprehensive analysis of the trends and prospects of the vegetable market's development in the context of economic regionalisation, which is crucial for the formulation of effective agricultural policies and regional development strategies. The text emphasises the pivotal role of innovative technologies, climate change adaptation, and the development of local

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agrifood clusters in enhancing production efficiency and the competitiveness of Ukrainian vegetable products in international markets.

Keywords: vegetable market, economic regionalisation, agrarian sector, innovative technologies, competitiveness, clusters, strategy, investments.

JEL Classification: Q11, Q13, Q18, O3, R58

1. Introduction

The development of the vegetable market is an important component of Ukraine's agricultural economy, as it directly affects food security, economic stability, and social well-being. In the context of globalisation and regionalisation processes, which are engendering profound changes in both internal and external economic conditions, the analysis and forecasting of this market's development has become of paramount importance.

The strengthening of regional economic ties, resource distribution and specialisation is changing the vegetable market. Regionalisation can stimulate local market development, improve logistics and reduce transportation costs, directly impacting product competitiveness.

Climate change, which is occurring worldwide, is having an impact on agriculture, particularly the cultivation of vegetables. Changes in temperature regimes and other natural factors require production methods to be adapted to new conditions, setting the task of assessing their impact on the development of the vegetable market. Economic crises, currency fluctuations and inflation create new challenges for the development of the vegetable market. Developing new market strategies, especially in the context of regional specialisation, is essential for ensuring the stability of the sector.

Growing interest in healthy eating and organic produce means agricultural producers must adapt their practices to meet new market demands. Understanding the potential of organic vegetable farming within the context of regional characteristics is essential for developing this sector. Thoroughly analysing the effectiveness of different vegetable growing approaches using advanced agricultural technologies and production methods will help improve the competitiveness of Ukrainian products.

Although Ukraine's vegetable market has significant export potential, a number of issues need to be addressed in order to improve product quality, comply with international standards and organise efficient supply chains. This research will examine regional opportunities for export development.

In view of the aforementioned points, the analysis of trends and prospects in the development of the vegetable market in the context of economic regionalisation is of paramount importance and essential for the delineation of strategic directions in agricultural sector development, increasing its competitiveness, and ensuring the country's food security.

The objective of the present article is to analyse the trends and prospects of the development of Ukraine's vegetable market in the context of economic regionalisation, specifically identifying the key factors that influence the efficiency of the market's functioning at the regional level.

In order to achieve this objective, the following tasks were established: firstly, to analyse the present state of the vegetable market in Ukraine; secondly, to investigate the impact of economic regionalisation on the vegetable market's development; thirdly, to analyse trends and factors affecting the vegetable market's development; fourthly, to identify prospective directions for improving the production and marketing of vegetable products under regionalisation conditions; fifthly, to assess regional opportunities to enhance the competitiveness of the vegetable market; sixthly, to propose main development directions for the vegetable market under regionalisation conditions; and seventhly, to formulate recommendations for regional policy supporting the vegetable market.

The following research methods were applied in the article: document and literature analysis (to review scientific publications, official reports, and statistical data related to the development of the vegetable market in Ukraine and globally, as well as to analyse national and international standards for vegetable production, storage, and certification); SWOT analysis (to assess the strengths and weaknesses of Ukraine's vegetable market under regionalisation, as well as opportunities and threats arising from changes in economic and environmental conditions); comparative analysis (to compare the state of the vegetable market in different regions of Ukraine to identify specific features and opportunities for local development, and to assess international experiences and best practices in vegetable market development in countries with similar conditions); regression analysis (to identify the relationship between key economic factors and the results of vegetable market development); sustainability analysis (to assess the stability of the vegetable market based on adaptation to climate change, technological innovations, and economic conditions, and to analyse the impact of external and internal determinants on the stability of the vegetable market); case study method (to use examples of successful vegetable

market practices in Ukraine and other countries to formulate recommendations and development strategies focused on the needs of regional markets).

The article is dedicated to the analysis of the trends and prospects of the vegetable market's development in Ukraine in the context of economic regionalisation. The study discusses the key factors influencing this market's development, including climate change, technological innovations, and economic processes. The impact of regionalisation on local markets, opportunities for specialisation, and the development of agrifood clusters are given special attention. The analysis examines the impact of macroeconomic conditions on the competitiveness of vegetables in domestic and international markets. In light of the identified trends, forecasts and practical recommendations have been formulated with a view to enhancing the efficiency of the vegetable market in the context of economic transformations.

2. Theoretical Foundations of the Functioning of the Vegetable Market

The functioning of the vegetable products market as a significant segment of the agricultural market is determined by a combination of economic laws, institutional mechanisms, and socio-environmental factors that influence the production, circulation, consumption, and pricing of this type of product (Lohosha, Lutkovska, Pidvalna, Pronko, Kolesnyk, 2025). The theoretical underpinnings of this market are rooted in classical and neoclassical tenets of supply and demand, agricultural production, market equilibrium, and contemporary frameworks for sustainable development, food security, and global value chains (Kaletnik, Lutkovska, 2020).

In the context of globalisation and trade liberalisation, the analysis of the structural characteristics of the vegetable market becomes particularly relevant, including seasonality, high price elasticity, dependence on climatic conditions, limited storage life, and the significant influence of state agricultural policy. In practice, the global vegetable products market is characterised by a high level of vertical integration, the adoption of innovative logistics solutions, the digitisation of accounting and quality control processes, and the growth of organic farming practices (Logosha, Mazur & Krychkovsky, 2021).

The vegetable market in Ukraine is undergoing a transformation. On the one hand, it is characterised by growth potential, a variety of agro-climatic zones and sufficient production. On the other hand, it faces issues such as underdeveloped infrastructure, fluctuating domestic demand, limited access to international markets and a lack of investment in storage and processing. In order to develop a theoretical understanding of these processes, it is necessary to consider the concepts of institutional economics, behavioural economics, theories of agricultural markets, and sustainable agricultural production systems (Kravchenko, Kucher, Yanchuk, Stavska, 2020).

Furthermore, issues pertaining to state regulation of the vegetable products market are also salient: namely, the subsidising of producers, the support of exports, the assurance of food security, and the development of rural areas (Mazur, Tomashuk, 2019). Theoretically, such approaches form a multi-level model of the vegetable products market, based on the interaction of micro- and macroeconomic factors, domestic and global contexts, and traditional and innovative methods and technologies. The functioning of the vegetable products market is based on the principles of supply and demand, a competitive environment, the efficient distribution of resources, and state regulation. As illustrated in Table 1, the demand for vegetable products is influenced by a number of key factors. Among these factors, the income level of the population, vegetable prices, seasonality, consumer preferences, demographic characteristics, and the promotion of a healthy lifestyle play a pivotal role. These factors exert a profound influence on consumer behaviour, thereby affecting the volume and structure of demand in accordance with prevailing economic, social, and cultural conditions within the nation.

As illustrated in Table 2, the key factors influencing the supply of vegetable products can be categorised into several distinct domains. These include natural and climatic conditions, the level of technological provision, state support for the agricultural sector, market price conditions, logistical infrastructure, and access to quality seeds and fertilisers. These factors determine production volumes, supply stability, and

Table 1
Factors affecting the demand for vegetable products

No.	Factor	Nature of influence	Example of influence
1	Income level of the population	*Direct*	Income growth → demand for quality vegetables
2	Tastes and preferences	*Socio-cultural*	The popularity of healthy eating
3	Seasonality	*Natural-temporal*	Increased demand for tomatoes in the summer
4	Prices and substitutes	*Economic*	Cheap canned goods can replace fresh vegetables
5	Demographic changes	*Structural*	Urbanisation → demand for packaged products
6	Environmental awareness	*Behavioural*	Demand for organic vegetables

Source: compiled by the authors based on research results

Table 2

Factors affecting the supply of vegetable products

№	Factor	Nature of influence	Example of influence
1	Climatic conditions	*Natural*	Drought → reduced yield
2	Technological level	*Technical*	Irrigation, greenhouses → increased production
3	Resource cost	*Economic*	Higher fertiliser costs → reduced crop area
4	Government regulation	*Institutional*	Subsidies → stimulating vegetable cultivation
5	Infrastructure and logistics	*Organisational*	Lack of storage → product losses
6	Import/export	*Foreign economic*	Imports reduce prices on the domestic market

Source: compiled by the authors based on research results

the competitiveness of products in both domestic and international markets.

The vegetable market is characterised by high seasonality, sensitivity to price fluctuations, and dependence on climatic conditions. This necessitates the establishment of a balanced system for production, storage, transportation, and distribution of products. The effective functioning of such a market is ensured through the harmonisation of interests between producers, intermediaries, and consumers, as well as the implementation of innovations and integration with global food chains.

3. Analysis of the Current State of the Vegetable Market in Ukraine

The vegetable production market constitutes a substantial segment of Ukraine's agricultural sector, exerting considerable influence on the country's food security, the socio-economic development of rural areas, and the formation of domestic consumer demand. In the preceding two decades, the area dedicated to the cultivation of vegetable crops in Ukraine has diminished by almost 30%. As demonstrated in Figure 1, there has been a decline in the area dedicated to the cultivation of potatoes, vegetables, and melon crops in Ukraine from 2000 to 2023. This phenomenon is associated with the restructuring of the agricultural sector, increasing production costs, the decline in the number of household farms, and the impact of economic and climatic factors.

In the context of global transformations, climate change, military risks and integration into world markets, it is becoming increasingly important to analyse the current state of the vegetable market and search for effective mechanisms to regulate and support it.

Vegetable production in Ukraine is primarily concentrated in the southern and central regions, particularly in the Kherson, Odesa, Vinnytsia, and Dnipropetrovsk regions. Table 3 illustrates the regional features of Ukraine's vegetable market in 2024, where certain regions, such as Kherson and Vinnytsia, lead due to their climate and infrastructure, while the western regions, such as Lviv and Ivano-Frankivsk, are developing through organic production and export. Regional differences are determined by natural-climatic and economic factors.

Table 4 demonstrates the dynamics of vegetable crop production by regions of Ukraine from 2000 to 2023, highlighting the leadership of certain regions (Dnipropetrovsk, Lviv). Overall, an upward trend in vegetable production in Ukraine is observed.

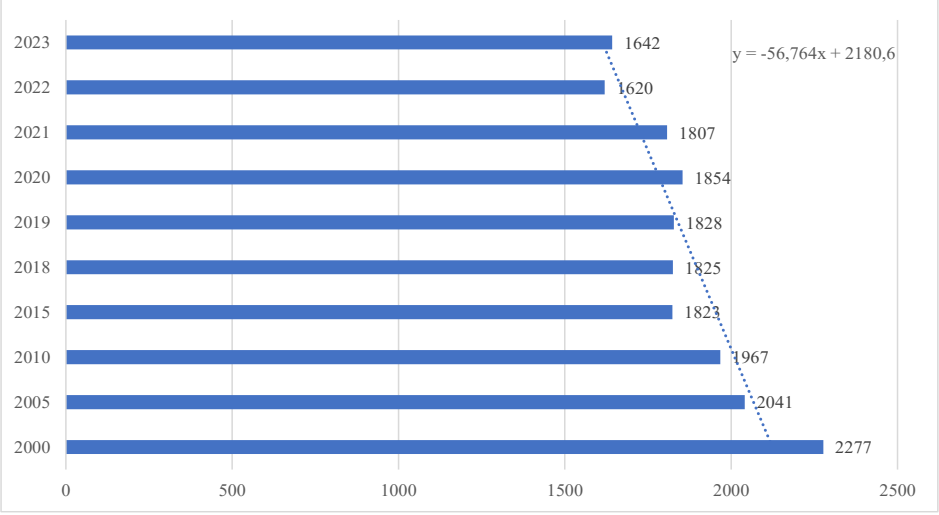

Figure 1. Sown areas of agricultural crops (potatoes, vegetable and melon crops), 2000–2023, "000 ha"

Source: (https://ukrstat.gov.ua)

Table 3
Regional features of the development of the vegetable market in Ukraine, 2024

Region	Main crops	Share in total production (%)	Availability of irrigation	Processing infrastructure	Main problems	Development potential
Kherson	Tomato, onion, pepper	15	High	Limited (due to war)	Mining, loss of irrigation, logistics	Recovery after deoccupation, export
Vinnytsia	Cabbage, beetroot, carrot	10	Medium	Developed	Weather risks, pricing	Industrial vegetable growing, domestic market
Kyiv	Cucumbers, lettuce, radish	7	Low	High	Urbanisation, land shortage	Greenhouse cultivation, sales in megacities
Lviv	Carrot, cabbage	6	Low	Uneven	Insufficient processing, small-scale farming	Organic production, export to the EU
Dnipropetrovsk	Beetroot, potato	9	Medium	Partially destroyed	Military risks, unstable sales	Domestic market, processing
Odesa	Tomato, eggplant	8	High	Limited	Droughts, water shortages	Irrigation development, export equalization
Ivano-Frankivsk	Cabbage, carrot	5	Low	Low	Farm fragmentation	Co-operation, logistics with the EU

Source: (https://ukrstat.gov.ua; Shvets, 2023)

Table 4
Vegetable crop production by regions in Ukraine, 2000-2023, "000 tonnes"

Region	Year										Deviation 2023 (+/-) 2022
	2000	2005	2010	2015	2018	2019	2020	2021	2022	2023	
Ukraine	**5821**	**7295**	**8122**	**9214**	**9440**	**9688**	**9653**	**9935**	**7512**	**8297**	**785**
Autonomous Republic of Crimea	186	128	395	…	…	…	…	…	…	…	…
regions											
Vinnytsia	196	293	311	461		456	430	503	500	512	12
Volyn	111	215	249	276	280	282	280	274	292	297	5
Dnipropetrovsk	433	494	560	728	749	727	684	793	674	860	186
Donetsk	444	475	415	208	236	270	241	288	112	113	1
Zhytomyr	194	203	209	272	340	394	403	377	350	400	50
Zakarpattia	123	218	246	267	284	271	281	260	272	266	-6
Zaporizhzhia	231	298	282	436	274	274	254	256	107	20	-87
Ivano-Frankivsk	134	127	122	170	178	181	185	193	198	207	9
Kyiv	295	402	455	511	604	566	566	708	669	759	90
Kirovohrad	213	269	218	235	258	261	254	259	256	264	8
Luhansk	249	278	257	163	164	178	148	154	147	115	-32
Lviv	269	380	412	484	513	709	807	829	847	859	12
Mykolaiv	174	267	354	483	516	478	575	630	148	474	326
Odesa	301	526	474	437	271	289	247	241	277	267	-10
Poltava	199	350	406	517	524	546	563	567	557	563	6
Rivne	134	171	216	214	265	269	275	273	274	288	14
Sumy	138	140	154	189	201	203	205	209	213	195	-18
Ternopil	140	145	194	255	265	283	273	270	281	305	24
Kharkiv	416	523	464	690	694	676	579	568	279	389	110
Kherson	421	526	841	1252	1317	1320	1316	1231	…	…	…
Khmelnytskyi	155	225	209	187	263	249	225	224	230	236	6
Cherkasy	344	296	281	365	355	359	388	379	397	457	60
Chernivtsi	146	184	219	222	238	248	254	256	238	252	14
Chernihiv	175	162	175	192	190	199	220	193	194	199	5
City of Sevastopol	…	…	4	…	…	…	…	…	…	…	…

Source: (https://ukrstat.gov.ua)
Note: … information missing

It is estimated that approximately 70% of vegetable production originates from household farms. This phenomenon has the effect of reducing the level of industrial concentration and complicating the formation of an organised market. The level of mechanisation, utilisation of contemporary agricultural technologies, and application of certified seeds remains inadequate. As demonstrated in Figure 2, the analysis indicates a notable contribution of vegetable crop production by household farms during the 2021–2023 period. This finding suggests a gradual transition towards a reduction in the role of agricultural enterprises in supplying the market, accompanied by a decline in the concentration of production within the commercial sector.

Price formation in the vegetable market is unstable and subject to significant seasonal fluctuations. The highest prices are observed during the autumn-winter period, due to a combination of limited supply and high storage costs. Inflationary processes, rising prices for energy resources, fertilisers, and logistics also have an impact, rendering production and sales planning more challenging.

As demonstrated in Figure 3, there has been a steady rise in the average prices of vegetable products sold by enterprises in Ukraine from 2000 to 2023. This increase can be attributed to a number of factors, including inflationary processes, rising production and logistics costs, and fluctuations in domestic market demand.

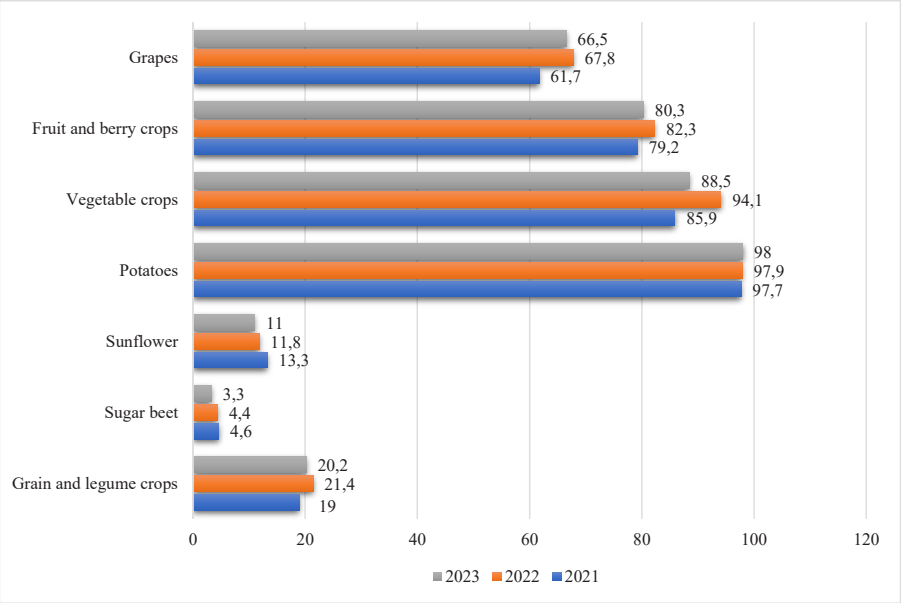

Figure 2. Share of agricultural production by household farms (vegetable crops), 2021–2023, %

Source: (https://ukrstat.gov.ua)

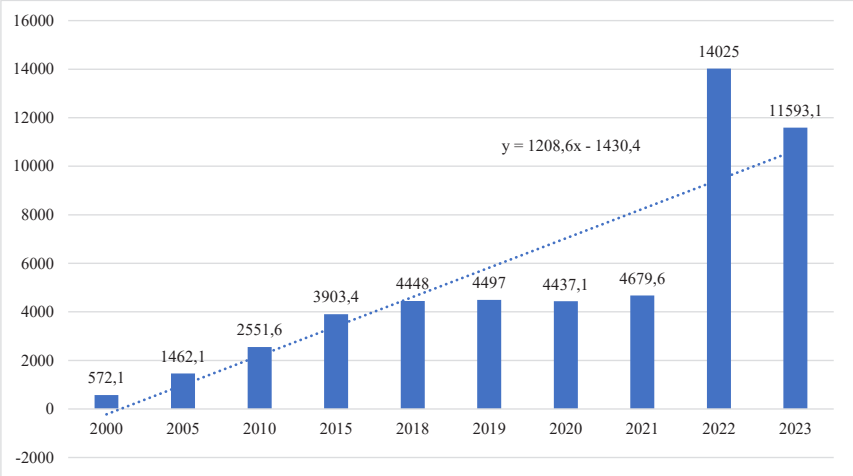

Figure 3. Average agricultural product prices in Ukraine (vegetable crops), sold by enterprises, 2000–2023, UAH/t

Source: (https://ukrstat.gov.ua)

The demand for vegetable products has remained stable, although there has been a gradual shift towards products with enhanced quality characteristics (i.e., organic, local, packaged products).

The proportion of retail trade networks in sales channels is increasing, while some of the population continues to purchase vegetables at open markets, particularly in rural areas.

The inadequate infrastructure for the storage and processing of vegetables, in conjunction with the paucity of investment in contemporary vegetable storage facilities, refrigeration units, sorting and packing lines, results in a substantial diminution of the efficiency of supply chains and the competitiveness of the products. However, the processing of vegetables is in a state of limitation, with only a small proportion of vegetables being processed, thus restricting the creation of added value. Despite the existing export potential for vegetable products, volumes remain low. The main obstacles include a lack of proper certification and non-compliance with EU standards, as well as underdeveloped logistics and an absence of a cluster approach. Nevertheless, there is promise in niche crops and organic products.

The vegetable market in Ukraine is in need of comprehensive modernisation and support. The key directions identified for the future include the stimulation of the development of industrial vegetable production, the improvement of logistics infrastructure, government support for export and processing, and the enhancement of co-operation among producers. In order to address the challenges posed by modernity, it is essential to implement innovative, ecological, and market management mechanisms (Amons, Krasnyak, 2021). Table 5 provides a synopsis of the outcomes emanating from a SWOT analysis of the regional vegetable market in Ukraine. The analysis accentuates the strengths (including favourable climatic conditions and the availability of production potential), weaknesses (such as the absence of adequate logistics and storage infrastructure), opportunities (for example, the development of exports and the implementation of innovations), and threats (including climate risks, market instability and war).

A thorough analysis of the contemporary state of the vegetable market in Ukraine discloses a decline in production volumes due to a reduction in cultivated areas, economic and climatic factors, as well as changes in the structure of producers, particularly a shift towards commercialisation and a diminishing role of agricultural enterprises.

4. Prospects for the Development of the Vegetable Market in the Context of Regionalisation

In the context of contemporary challenges, i ncluding war, changing climatic conditions, the transformation of logistical routes, and the reorientation of Ukraine's agricultural policy, the approach of regionalising the development of the vegetable market is becoming increasingly relevant. This necessitates the consideration of the specific conditions, resources, and potential of each region in order to construct resilient local food systems and ensure effective integration into the national and international economy.

Table 6 delineates the pivotal prospective trajectories for the advancement of Ukraine's vegetable market in the context of regionalisation. These include

Table 5
SWOT analysis of the regional vegetable market in Ukraine

Strengths	***Weaknesses***
The presence of favorable natural and climatic conditions in most regions	High level of fragmentation of production (domination of individual farms)
Traditions of vegetable growing in certain regions (South, Center)	Insufficient level of mechanization and application of modern technologies
Domestic demand for vegetable products remained stable	Seasonality of production and high price fluctuations
Development of organic production, especially in the western regions	Lack of storage, processing and logistics capacities
Export potential to EU countries, especially from border regions	Low level of co-operation and weak integration into value chains
Opportunities	***Threats***
Development of greenhouse and drip irrigation for sustainable cultivation	Destruction or damage to infrastructure due to military actions
State support for the agricultural sector, in particular small and medium-sized farmers	Climate change: droughts, reduced water resources
Search for new sales markets and conclusion of export contracts	Inflationary pressure and rising costs for fertilisers, fuel, logistics
Development of logistics hubs in the central and western regions	High level of competition with imported products
Use of digital technologies (agromonitoring, marketplaces, yield forecasting)	Limited access to financing for small farms

Source: (Semenda, Korman, 2024; Razanov, Piddubna, Gucol, Symochko, Kovalova, Bakhmat, Bakhmat, 2022; Kirieieva, Pryshliak, Shamanska, Salkova, Kucher, 2019).

the expansion of organic vegetable production, the improvement of logistics, the development of regional clusters, and the investment in modern storage and processing technologies. It is anticipated that such measures will enhance product competitiveness and increase export potential.

The conditions of regionalisation create opportunities for deeper integration of the vegetable sector into local economies, thereby strengthening food security, reducing product losses, and increasing added value. Appropriate state policies and investment support could position regionalisation as a pivotal catalyst for Ukraine's agricultural sector's recovery and modernisation. As illustrated in Table 7, the report includes a series of recommendations for regional policy measures designed to support the vegetable market. These recommendations encompass proposals to augment investment in infrastructure, promote the development of organic farming, provide financial support for farming enterprises, and encourage the adoption of advanced agrotechnologies to enhance production efficiency.

It is imperative that regional policy in support of the vegetable market is comprehensive, integrated, and focused on the long-term development of agriculture. The development of infrastructure, the provision of support for farmers, the implementation of innovative technologies, and the expansion of export opportunities are all key elements that will ensure the sustainable development of Ukraine's vegetable sector (Kaletnik, Lutsiak, Melnichuk, Dovhan, Malicki, 2019).

Investment in the vegetable growing sector is of critical importance for the modernisation of production processes, the implementation of new technologies, and the enhancement of product competitiveness. The effectiveness of such investment can be assessed using a range of indicators that make it possible to determine the feasibility of capital allocation and its impact on the sector's economic development, namely (Logosha, Mazur, Krychkovsky, 2021):

1. NPV – Net Present Value determines the difference between the present value of future cash flows *(CF)* from vegetable cultivation and the initial investment costs *(IC)*. *It is calculated using the following formula:*

$$\mathrm{NPV} = \sum_{t=1}^{n} \frac{\mathrm{CF}_t}{(1+r)^t} - IC.$$

If *NPV* > 0 – the project is profitable.

R – discount rate (e.g., average market rate or cost of capital).

N – number of periods (years).

2. IRR – Internal Rate of Return is the rate of return of a project that makes the net present value *(NPV)* equal to zero. *It is calculated by the formula:*

$$\sum_{t=1}^{n} \frac{\mathrm{CF}_t}{(1+r)^t} - IC = 0.$$

IRR – this is the value of r at which:

if *IRR* > *WACC* (weighted average cost of capital) – the project is attractive.

3. PP – Payback Period – is the number of periods (usually years) required to return the invested funds. *It is calculated by the formula:*

PP = Time over which profit was accumulated ≥ Investment costs

The shorter the period, the less risky the investment project is.

Table 6

Key prospective directions for the development of the vegetable market under regionalisation

No.	*Development vector*	*Main characteristics*
1	*Formation of regional centers of vegetable production*	Each region has its own competitive advantages in vegetable production. A promising direction is to support specialisation: for example, the development of greenhouse farming in the central and western regions, irrigated vegetable growing in the south (if irrigation is restored), and organic production in border regions. The formation of such centres will optimise costs, ensure stability of supply and improve product quality.
2	*Development of local value chains*	A full production cycle in the regions – from cultivation and storage to processing and sale – is an important prerequisite for sustainable development. Regionalisation enables the formation of local agri-food clusters, which reduce logistics costs, increase employment and stimulate investment.
3	*Regional logistics and infrastructure*	One of the most important factors is restoring and modernising transport, energy and storage infrastructure. This is particularly important for regions hosting internally displaced persons and experiencing demographic pressure. Creating regional vegetable hubs and logistics platforms to ensure a prompt supply to major markets is a promising approach.
4	*Increasing sustainability through diversification*	Regionalisation also means diversifying production, which reduces dependence on individual crops or export destinations. This increases the adaptability of farms in the face of climate change and market instability and prevents price shocks.
5	*Supporting local initiatives and co-operation*	The successful development of the regional vegetable market requires the involvement of local governments, agricultural co-operatives, public organisations and businesses. Supporting local rural development strategies, subsidy programmes, advisory services and training helps to improve agricultural production at a community level.

Source: (Tomashuk, Timhenko, Zakharova, 2024; Sakhno, Polishchuk, Salkova, Kucher, 2019)

Table 7

Recommendations for regional policy to support the vegetable market

No.	Main characteristics of the recommendations
	1. Supporting the development of regional agri-food clusters
1.1.	Creating agro-industrial clusters at the regional level to coordinate the activities of producers, processors and distributors. This will reduce logistics costs, improve market access and stimulate regional production.
1.2.	The creation of specialised zones, as each region has its own competitive advantages in growing certain vegetables, so state support should focus on these strengths.
	2. Increasing access to finance and investment
2.1.	Microcredits and subsidies for small and medium-sized farmers, i.e., the introduction of special financing programmes for small vegetable producers to cover the costs of modernising technology, storage and transport.
2.2.	Stimulating private investment through tax incentives and grants for the establishment of modern vegetable storage facilities, processing plants and greenhouse complexes.
	3. Creating infrastructure to support vegetable growing
3.1.	Modernisation of logistics chains, in particular the development of regional hubs, storage and processing of vegetables, which will reduce product losses and optimise transport costs.
3.2.	Support irrigation and water supply by investing in the restoration of irrigated land and water supply, especially in the south of the country, in order to increase the stability of vegetable yields.
	4. Development of modern technologies and implementation of innovations
4.1.	Encouraging the transition to smart farming systems that will promote the use of precision farming, drones, and sensors to monitor crop conditions, which will significantly increase yields and reduce costs.
4.2.	Supporting vegetable cultivation in greenhouses by providing subsidies for greenhouse construction and the use of energy-saving technologies.
	5. Developing exports and access to international markets
5.1.	Certification and promotion of Ukrainian vegetable products on international markets, in particular, facilitating the certification of vegetables in accordance with international standards (e.g., GlobalGAP), which will open access to markets in the EU, the US and the Middle East.
5.2.	Creating export-oriented logistics routes that will ensure fast and cost-effective delivery of vegetables to international markets.
	6. Increasing the level of education and information support for farmers
6.1.	Training farmers in the latest technologies and methods of vegetable cultivation, including organic farming and the introduction of innovative agricultural technologies.
6.2.	Information campaigns to raise awareness of the benefits of co-operation between small farmers and support the development of agricultural co-operative organisations.
	7. Integration of mixed and organic production methods
7.1.	Encouraging organic vegetable production through financial instruments and programmes for farmers who switch to organic production, including subsidies and tax breaks.
7.2.	Programmes for soil restoration through crop rotation, improving soil fertility and introducing environmentally friendly methods.
	8. Market regulation and monitoring
8.1.	Develop mechanisms for monitoring and controlling vegetable prices in order to prevent price manipulation and maintain price stability. Ensure market transparency and information exchange between producers, consumers and government agencies to respond effectively to changes in supply and demand.
8.2.	Develop mechanisms for monitoring and controlling vegetable prices in order to prevent price manipulation and maintain price stability. Ensure market transparency and information exchange between producers, consumers and government agencies to respond effectively to changes in supply and demand.

Source: (Goncharuk, Tomashuk, 2022; Chikov, Radko, Marshalok, Tepliuk, Petrenko, Sharko, Sitkovska, 2022).

4. ROI – Return on Investment shows what share of profit is received from each invested hryvnia. *Calculated by the formula:*

$$\text{ROI} = \frac{\text{Net profit}}{\text{Investments}} \times 100\%.$$

For example, *ROI = 30%* means that every 1 UAH of investment brought 0.30 UAH of profit.

5. PI – Profitability Index is the ratio between the present value of cash flows and the initial investment. *Calculated by the formula:*

$$PI = \frac{\sum_{t=1}^{n} \frac{CF_t}{(1+r)^t}}{IC}.$$

If *PI > 1* – the investment is advisable.

If *PI < 1* – the project is unprofitable.

These indicators enable agricultural enterprises and investors to assess the efficiency and risk of vegetable production as a business and investment project. Investment in infrastructure, as well as modern methods of processing and storage of vegetables, has the potential

to significantly improve production indicators and ensure steady market growth.

The application of a new model for developing a strategy for financial support of the vegetable market by the government is crucial for ensuring the stable development of the industry. This is to be achieved by overcoming infrastructure and investment barriers, stimulating production modernisation, and increasing the competitiveness of the products. A strategy of this nature facilitates the more effective allocation of budgetary resources, with consideration for regional specifics, thereby supporting the development of small and medium-sized agribusinesses and ensuring the country's food security (Figure 4) (Goncharuk, Tomashuk, 2022).

As illustrated in Figure 4, the conceptual model for developing a financial support strategy for the agro-industrial complex comprises key stages, including analysing the sector's needs, identifying state funding priorities, developing support tools, and assessing their effectiveness. It is imperative to take into account regional specifics and sustainable development goals in this process.

The present study puts forward the innovative ***SMART-FINANCE*** strategy for supporting the agro-industrial complex. This strategy represents a system of state financial support combining digital tools, climate resilience, and regional adaptability. The strategy is based on five key principles:

S – Sustainability (Funding is provided to projects that meet environmental standards, utilise renewable energy sources, reduce emissions, and promote biodiversity, with the introduction of green coefficients for priority access to financing).

M – Modularity and Flexibility (Implementation of tailored funding modules for various groups of beneficiaries (small farmers, co-operatives, processing enterprises), and the possibility of phased financing with performance milestones).

A – Analytics and Transparency (Use of a digital platform for resource allocation, performance analytics and real-time monitoring of results, with mandatory impact assessment of projects on food security, employment, and exports).

R – Regionalisation (Allocation of funds based on agro-climatic zones, risk levels, and regional specialisation, as well as encouragement of cluster initiatives in priority regions).

T – Technology and transformation (Priority is given to projects involving innovation, digital farming, precision agriculture, and the introduction of agricultural innovation vouchers–financial instruments for attracting new technologies from research institutions and startups).

The implementation tools of this strategy include:

1) Agricultural Digital Data Bank – to monitor creditworthiness and support history.

2) Conditional Repayable Subsidies–if the project succeeds, part of the funds is returned as tax.

3) "e-AgroIndustrialComplex" (e-AIC) Platform–a unified online portal for farmers to submit applications, receive decisions, and manage communication.

This strategy will not only enhance the efficiency of state support but will also render it dynamic, transparent, and resilient to future risks.

In the context of regionalisation, the study of prospects for developing the vegetable market highlights the importance of adapting production processes to local conditions. This can be achieved by improving infrastructure, supporting organic production and developing regional clusters. These measures will enhance production efficiency and the competitiveness of products in both domestic and international markets.

5. Conclusions

The regionalisation of Ukraine's economy engenders novel opportunities for adapting the vegetable market to local conditions and market demands. It is evident that each region possesses its own unique set of conditions for vegetable production, which are contingent on natural and climatic factors, infrastructure availability, resource potential, and socio-economic conditions. The establishment of local production and distribution centres is a consequence of this, and helps to reduce logistics costs, improve production efficiency, and optimise supply chains.

In the context of regionalisation, a significant trend pertains to the establishment of agri-food clusters, encompassing not only the production of vegetable products but also their processing, storage, and marketing. The specialisation of regions in the cultivation of specific types of vegetables enables the focus of resources and technologies on the most efficient areas. Such approaches have been shown to enhance product competitiveness, develop local markets, and contribute to increasing export opportunities.

The development of the vegetable market is contingent upon the capacity to adapt to climate change. The process of regionalisation facilitates the mitigation of risks associated with climate change by distributing production across a range of natural and climatic zones. In order to ensure the sustainability of the market, it is necessary to implement innovative agro-technologies, including irrigation systems, energy-efficient technologies in greenhouse farming, and the use of modern precision farming methods.

State support is an important factor in developing the vegetable market under regionalisation. This includes funding infrastructure projects, providing subsidies for equipment and materials, and offering tax benefits to small and medium-sized farming enterprises. State support should focus on encouraging

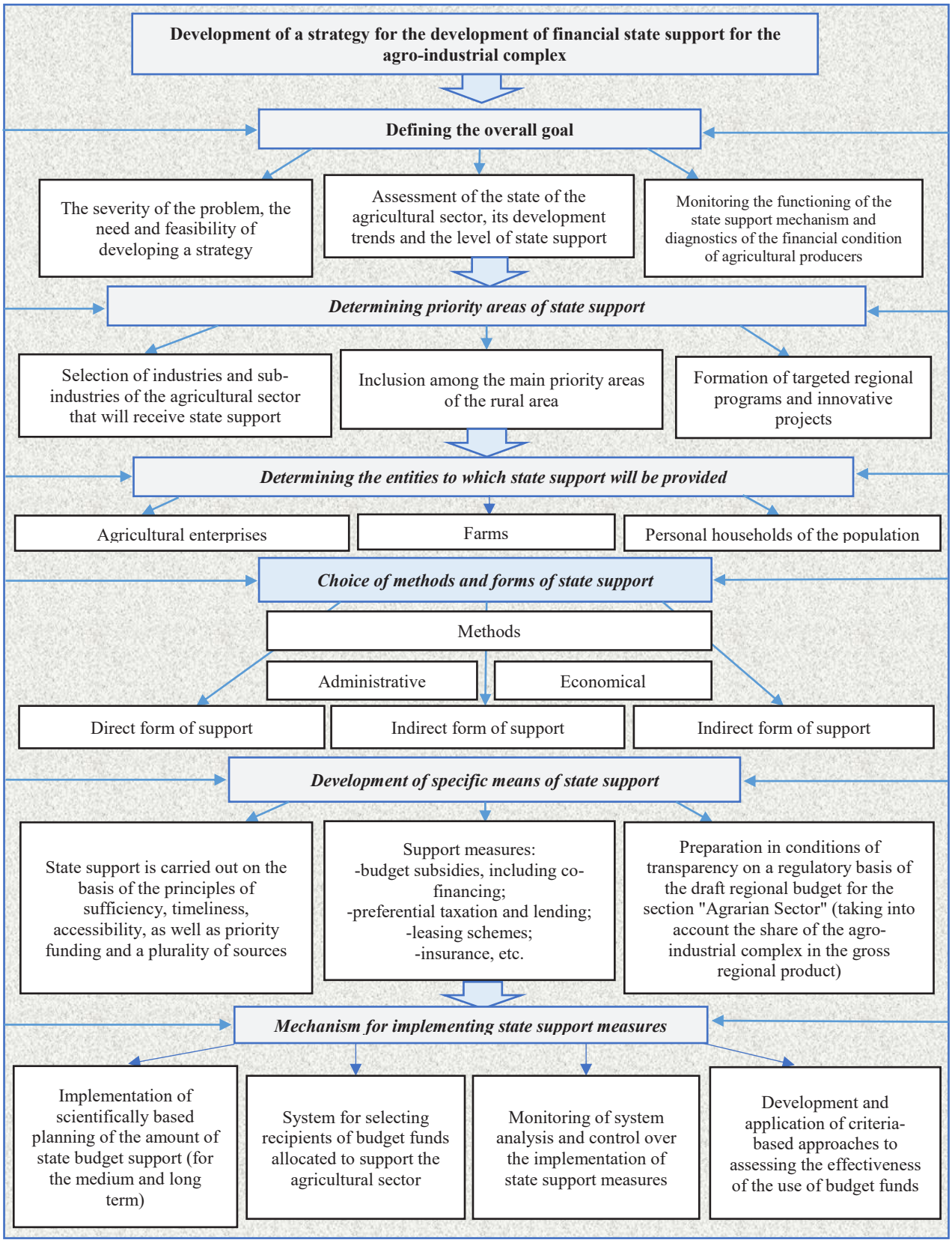

Figure 4. Conceptual model for developing a financial support strategy for the agro-industrial complex by the state

Source: created by the authors based on the research findings

collaboration between local producers and processors to optimise supply chains, reduce costs and enhance product quality.

Ukraine's vegetable market possesses considerable export potential, particularly with regard to the European Union and other countries. In a regionalised economy, the development of regional export strategies is of crucial importance, with the potential to optimise logistics routes and reduce costs.

In view of global trends towards increased demand for organic products, the development of organic vegetable production constitutes a pivotal component of the strategy for developing the vegetable market in Ukraine. The establishment of specialised organic farms is facilitated by regionalisation, with the potential to receive support through subsidy and certification programmes. This strategy is expected to attract new consumers both domestically and internationally.

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