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INCREASING THE ECONOMIC EFFICIENCY OF ORGANIC AGRICULTURE IN THE REPUBLIC OF MOLDOVA

521.03 ECONOMICS AND MANAGEMENT IN THE FIELD OF ACTIVITY

Abstract of the Doctoral Thesis in Economic Sciences

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Conceptual framework of the research

The relevance and importance of the research topic. Organic farming is one of the most relevant directions for the development of contemporary agriculture, with an essential contribution to protecting the environment, maintaining the natural balance of agricultural ecosystems and obtaining agri-food products with high biological value and which do not affect the health of the population. Through its fundamental principles, such as the rational use of natural resources, the preservation of soil fertility, the reduction of pollution and the exclusion of synthetic chemicals, organic farming simultaneously meets the economic, ecological and social requirements of sustainable development.

In recent decades, organic farming has experienced an accelerated development in most countries of the world, this process being determined by the increasingly pronounced reaction of society to the negative effects of intensive agriculture on the environment and the health of consumers. Soil degradation, water pollution, loss of biodiversity, accumulation of pesticide residues in agri-food products and the increase in the incidence of diet-related health problems are factors that have led to the reconsideration of the conventional agricultural model. In this context, organic farming asserts itself not only as a technological alternative, but as a viable agricultural model, capable of reducing the pressure on natural resources and responding to the growing demand for safe and quality products.

The Republic of Moldova has natural conditions favorable to the development of organic agriculture, determined by the pedoclimatic characteristics, the traditional agricultural structure and the potential to capitalize on local resources. Fertile soils, the diversity of agroclimatic areas and the relatively low share of the use of chemical inputs in certain regions create the premises for the expansion of organic production systems. In recent years, there has been a trend of increasing the share of organic farming within the national agricultural system, a process supported both by the external demand for organic products and by the need to adapt agriculture to climate and economic risks.

The development of organic agriculture in the Republic of Moldova is also supported by the existing regulatory framework, especially through the adoption of Law no. 115/2005 on organic agri-food production [1], as well as through a set of Government Decisions regulating the certification, control and promotion of organic products. This legislative framework reflects the national recognition of the strategic role of organic farming in the modernisation of the agricultural sector and its integration into the European and international economic circuit. The existence of the

regulatory framework does not automatically guarantee the economic efficiency of organic farms, which requires in-depth research in this area.

In the context of the importance of organic farming for the health of the population, increasing the quality of life and the rational use of natural resources, increasing the economic efficiency of this branch is a current and relevant issue of scientific research in the field of economics. The long-term viability of organic farming depends not only on its ecological advantages, but also on the ability of farms to achieve competitive economic results, manage resources efficiently and adapt to market demands. From this perspective, the analysis of the economic efficiency of organic farming is part of the strategic priorities of research and innovation, contributing to the substantiation of public policies and to the development of support mechanisms aimed at the sustainable development of the agricultural sector.

Description of the situation in the field. The issue of the economic efficiency of organic farming is addressed in the literature from the perspective of farm performance, resource efficiency and the impact of public policies on economic results. Studies highlight that organic farming contributes to the protection of the environment, the conservation of natural resources and the increase in the resilience of agri-food systems, but also involves specific economic constraints related to higher costs, increased labour intensity and risks associated with the conversion process [3, 16, 24].

The theoretical foundations of economic efficiency analysis are found in the theory of economic equilibrium and productive efficiency, developed by Arrow and Debreu (1954) and Farrell (1957), which were the basis for the development of modern methods of evaluating economic performance. Methodologically, production frontier analysis, especially stochastic frontier models (SFA) and data envelope analysis (DEA), are the dominant tools in empirical research on technical efficiency in agriculture [4, 5, 10, 14, 17, 21]. These methods have been extensively applied to assess the differences in efficiency between organic and conventional farms, as well as the determinants of economic performance [6, 7, 18].

The results of international studies indicate that the efficiency of organic farms is significantly influenced by size, cost structure, income level, human capital and market integration. In the European context, research shows that organic farms can achieve competitive levels of technical efficiency when they benefit from coherent support policies and are integrated into functional value chains [8, 18, 22]. Data from the literature underline the contradictory nature of subsidies: they do not automatically generate efficiency gains, but they can reduce financial constraints and mitigate the effects of high costs in the transition period, having an indirect impact on economic performance [20, 26].

In the Republic of Moldova, economic efficiency in agriculture was addressed in the works of Catan (2010), Cimpoieș and Racul (2008), Timofti (2009), Parmacli and Stratan (2010), Sârbu (2010-2012), Stratan (2024), Tomița et al. (2020), which consolidated an analytical framework for the study of the efficiency of local, predominantly conventional farms. Organic farming, on the other hand, is treated in the national literature especially from the perspective of sustainable development, soil fertility and agroecological practices, in the works of Boincean (2018; 2019–2020), respectively from the perspective of sectoral evolution and the economic and environmental benefits generated at the aggregate level (Zaharco 2022), remaining insufficiently analyzed from the perspective of economic efficiency. These contributions provide a valuable framework for understanding the phenomenon, but do not directly address the issue of economic efficiency at farm level. To date, there are no systematic and comprehensive analyses in the national literature to quantify the economic efficiency of organic farms in the Republic of Moldova, to identify specific determinants and to assess the impact of public support on their performance.

The synthesis of the literature highlights an important gap: although there is a solid theoretical framework and a mature methodological toolkit for assessing economic efficiency, the analysis of the economic efficiency of organic farms in the Republic of Moldova, treated as a distinct research object, remains practically unexplored. In particular, gaps persist in identifying concrete mechanisms to increase the economic efficiency of organic farming and quantitatively assessing the impact of public support under the specific conditions of the Republic of Moldova.

The aim of the paper: to substantiate the theoretical and methodological substantiation of the economic efficiency of agricultural holdings with organic production and to develop directions and instruments of public support, aimed at increasing the economic efficiency of organic farming.

The research objectives, established and carried out to achieve the purpose of the work, consist of:

- Studying the benchmarks/conceptual approaches and the evolution of organic farming, as well as highlighting its implications on the economic efficiency of farms;
- Systematization and analysis of methodological approaches for assessing the economic efficiency applicable to organic agricultural production;
- Analysis of the conceptual and normative framework of organic farming in European and national context, and assessment of the level of development of organic farming;
- Analysis of the level of development of organic agriculture in the Republic of Moldova and determination of the level of economic efficiency of agricultural holdings with organic production, identification of the main factors influencing their economic efficiency;

- Identifying and arguing the priority directions of public support for increasing the efficiency of agricultural holdings with organic production;
- Assessment of the impact of subsidization on the economic efficiency of organic farms ;
- Develop a public support framework for the promotion of strategic ecological areas on farms.

Research hypothesis: increasing the economic efficiency of organic agriculture in the Republic of Moldova is possible through the rational use of resources, the coherent application of ecological practices and the implementation of appropriate public policies, adapted to the specifics of agricultural holdings with organic production.

Synthesis of the research methodology. The objectives of the research were achieved by applying various research methods, selected according to the specifics of the investigated topic, the nature of the data used and the purpose of each stage of the research, as follows:

- The synthesis of the theoretical and methodological approaches on the economic efficiency of organic farming involved a detailed bibliographic and historiographical study, based on the methods of analysis, synthesis, abstraction, induction and deduction. These methods have made it possible to clarify key concepts, systematize the main economic theories on efficiency in agriculture and delineate the components of economic efficiency used in research.
- The analysis of the conceptual and normative framework of organic farming, in the European and national context, as well as the evaluation of the level of development of organic farming in the Republic of Moldova, involved the use of methods of comparative analysis, structural and dynamic analysis. At the stage of processing and presentation of the information, the methods of tabular and graphical representation were used, which facilitated the interpretation of the identified developments and trends.
- The evaluation of the economic efficiency of agricultural holdings with organic production and the identification of the determinants of economic performance were carried out through methods of economic-statistical analysis and comparative analysis, using economic indicators such as productivity of production factors, production costs, income structure and profitability of agricultural activity. For this purpose, both official and primary statistical data were used, obtained by applying surveys among organic agricultural producers.
- The analysis of the influence of subsidization on the economic efficiency of farms with organic production was carried out through logit regression econometric modelling, which allowed estimating the relationship between the explanatory variables and the binary dependent variable, highlighting the impact of public support, farm characteristics and other relevant factors on economic performance.

- The formulation of strategic directions to increase the economic efficiency of organic farming and the elaboration of the public support framework involved the use of synthesis, generalization, induction and deduction methods, which ensured the scientific substantiation of the proposed conclusions and recommendations.

The relevance of the selected research methods is justified by their correlation with the research objectives and by the results obtained, which allow a rigorous and coherent analysis of the economic efficiency of organic agriculture in the Republic of Moldova.

Scientific and analytical publications in the field of agrarian economics, official statistical data of the National Bureau of Statistics of the Republic of Moldova, information from European and international databases, public policy documents, as well as primary data, obtained by surveying organic agricultural producers, served as the informational basis of the research.

The object of the research is the totality of the economic processes and functioning mechanisms of organic agriculture in the Republic of Moldova reflected by the formation and manifestation of the economic efficiency of agricultural holdings with organic production.

Scientific novelty and originality consist of:

1) Carrying out, for the first time at national level, an analysis of the economic efficiency of organic farming based on primary data and econometric modelling;

2) Proposing and using an operational definition of organic farming as a predominantly organic economic unit, based on the share of areas and/or revenues from organic production (≥50%), a definition that allows for a clear delimitation of the beneficiaries of public support and a differentiated assessment of the impact of policies on economic efficiency;

3) Identify economic, structural and institutional factors with a significant impact on the economic efficiency of organic farms, highlighting the role of conversion subsidies, production costs, farm size, labour use and financial performance, as well as the indirect mechanisms through which public support influences technical efficiency;

4) Integrating the dimensions of economic cooperation, human capital and managerial capacity in the analysis of the efficiency of organic farming, highlighting the role of associative forms and the agricultural knowledge and innovation system (AKIS) as complementary factors of economic efficiency, with an effect on transaction costs, market access and capitalization of organic production;

5) Elaboration of a set of strategic directions and a public support framework explicitly oriented towards increasing economic efficiency, differentiated, depending on the degree of ecological commitment and the level of cooperation of agricultural holdings, based on the empirical results of

research and adapted to the structural, institutional and economic conditions of the Republic of Moldova.

Important scientific problem solved: conceptual clarification of the economic efficiency of organic farming in the context of public policies; integration of economic, institutional and organizational dimensions in the analysis of the efficiency of organic farms; substantiation of a public intervention model, oriented towards economic efficiency and sustainability.

The theoretical significance of the thesis. The results obtained in this paper can be used as theoretical foundation of the concept of organic farming, in analyzing the relationship between economic and institutional factors, and of efficiency of farms with organic production, as well as in quantifying the influence of public support on the probability of achieving a higher level of economic efficiency.

The practical value of the research consists in the use and adaptation of economic and econometric analysis tools for the evaluation of the economic efficiency of agricultural holdings with organic production in the Republic of Moldova, as well as in the interpretation of the results obtained, in order to substantiate economic decisions and public policies supporting organic farming.

At the theoretical-methodological level, the results of the research can be capitalized in the process of initial and continuous professional training within higher education institutions in disciplines aimed at agricultural economics, agricultural policies and economic efficiency analysis. The analytical approaches used in the paper can serve as a support for researchers interested in applying methods of assessing economic efficiency and analyzing the impact of public policies in agriculture.

At the macroeconomic level, the results of the research can be used by central and local public authorities in the process of analysing and refining the mechanisms for subsidising organic farming, in particular in terms of directing public support towards increasing economic efficiency, reducing risks during the conversion period and increasing the competitiveness of organic farms.

At the microeconomic level, the conclusions of the research can be applied by organic agricultural managers and producers for a better understanding of the factors influencing economic efficiency, for substantiating decisions on resource use, accessing subsidies and strengthening the economic efficiency of farms.

Through its applicative nature, the research provides analytical support for assessing the effectiveness of public support for organic farming and for orienting the agricultural sector towards a sustainable development model, compatible with market requirements and agricultural policy objectives.

Thesis content

In chapter 1 of the thesis, entitled **"The theoretical and methodological bases of the economic efficiency of organic farming",** a theoretical-conceptual incursion into the issue of organic farming and economic efficiency in agriculture is made, analyzing the main scientific approaches that underpin the research of the performance of farms with organic production.

Organic farming is examined as a complex system of organizing agricultural production, which combines economic, ecological and social dimensions. Through the analysis of the literature, it is found that, in the understanding of contemporary researchers and international organizations in the field, organic farming is not reduced to a set of alternative agricultural techniques, but represents a model of sustainable development, based on the rational use of natural resources, the preservation of soil fertility, the maintenance of biodiversity and the reduction of dependence on synthetic chemical inputs. These principles have direct economic implications for the cost structure, income stability and resilience of farms.

The conceptual analysis highlights the fact that the definitions of organic agriculture promoted by IFOAM, FAO and USDA converge on the idea of an agricultural system adapted to local conditions, based on biological processes and natural cycles, which supports the health of soils, ecosystems and population. From an economic perspective, this model assumes an orientation towards knowledge- and management-intensive agriculture, with a focus on added value rather than maximizing short-term yields. In this context, organic farming offers development opportunities for small and medium-sized farms, especially through access to niche markets and obtaining premium prices.

Table 1. Comparative analysis between organic and conventional farming

Criterion	Organic farming	Conventional agriculture
Production model	Natural processes, regeneration	Chemical intensification
Factors of Production	Natural, without synthesis	Fertilizers and pesticides
Soil fertility	Compost, rotations, legumes	Mineral fertilizers
Plant protection	Prevention, biological control	Chemical control
Crop structure	Diversification, integration	Monoculture
Biodiversity	High	Reduced
Soil quality	High organic matter	Risk of degradation
Yields	Long-term stability	High immediate returns
Costs	Reduced inputs in the long run	High variable costs
Workforce	More intense	Lower
Environmental impact	Minimum	Significant
Product quality	Residue-free, nutritionally superior	Potential residues
Certification	Required	Not required
Orientation	Sustainability, resilience	Maximizing production

Source: elaborated by the author based on [9, 15, 16, 23, 25, 27, 28]

A distinct element analyzed is the historical evolution of organic farming, from traditional agricultural practices to the institutionalization of the sector through the emergence of international standards and the European regulatory framework. The stages of formation of modern organic farming, the role of biodynamic and organic currents, as well as the contribution of the founding of IFOAM to the unification of the principles and standards of organic production are highlighted. At the same time, it is underlined that the development of organic farming has been accelerated by the negative effects of intensive agriculture on the environment and by the increase in demand for safe and quality agri-food products.

At the European level, the legal framework regulating organic farming is analyzed, highlighting the terminological peculiarities existing between the Member States, without affecting the conceptual unity of the field. It is noted that European regulations create favorable premises for the development of organic farming, but the economic efficiency of farms depends on how these regulations are transposed into national policies and supported by public support mechanisms.

Next, the chapter addresses the concept of economic efficiency, starting from the classical theoretical foundations and reaching the modern approaches used in the analysis of agricultural performance. The opinions of researchers who distinguish between technical, allocative and economic efficiency are analyzed, arguing that the evaluation of the efficiency of organic farming requires a broader approach than the one based exclusively on physical productivity. In the case of organic farms, economic efficiency must be analysed in relation to the use of natural resources, cost structure, income stability and the ability to adapt to climate and market risks.

On this basis, the main methodological approaches used in the evaluation of economic efficiency in agriculture are systematized, with a focus on the analysis of production frontiers. The advantages and limitations of the DEA and SFA methods, frequently used in empirical research on the technical efficiency of organic farms, are examined. The analysis shows that these methods make it possible to identify existing inefficiencies and reserves for increasing economic performance, providing an adequate analytical framework for the comparative study of agricultural holdings.

The chapter ends with the analysis of the normative and institutional framework of organic agriculture in the Republic of Moldova. The particularities of the process of development of the organic sector at national level, the role of certification, control bodies and organizations in the field, as well as the importance of public support during the period of conversion and maintenance of organic practices are highlighted. It is noted that, although there are favourable prerequisites for the development of organic farming, economic and structural constraints persist that affect the efficiency of farms, justifying the need for in-depth economic analysis and better targeted public policies.

The results of the theoretical and methodological analysis confirm that the economic efficiency of organic farming must be examined in a distinct logic, adapted to the specifics of this sector, characterized by structural constraints, specific institutional mechanisms and sustainable development goals.

Chapter 2 of the thesis, **"The current state of the development of organic agriculture at national level",** begins with the analysis of the level of development of organic agriculture in the Republic of Moldova, which allows the identification of the structural particularities of the sector and the main economic constraints.

Understanding the structural diversity of organic farms is essential not only for characterising the sector, but also for analysing their economic performance. In this context, a quantitative perspective on the evolution of the number of farms and ecologically managed areas makes it possible to highlight the internal dynamics of the sector, the pace of expansion, as well as the differences between certified farms and those in conversion. In particular, the comparison of organically cultivated areas, differentiated by crop categories and certification stages, provides important clues about the direction of production, about the changes in the behavior of agricultural producers and about the economic efficiency of organic farming in the Republic of Moldova.

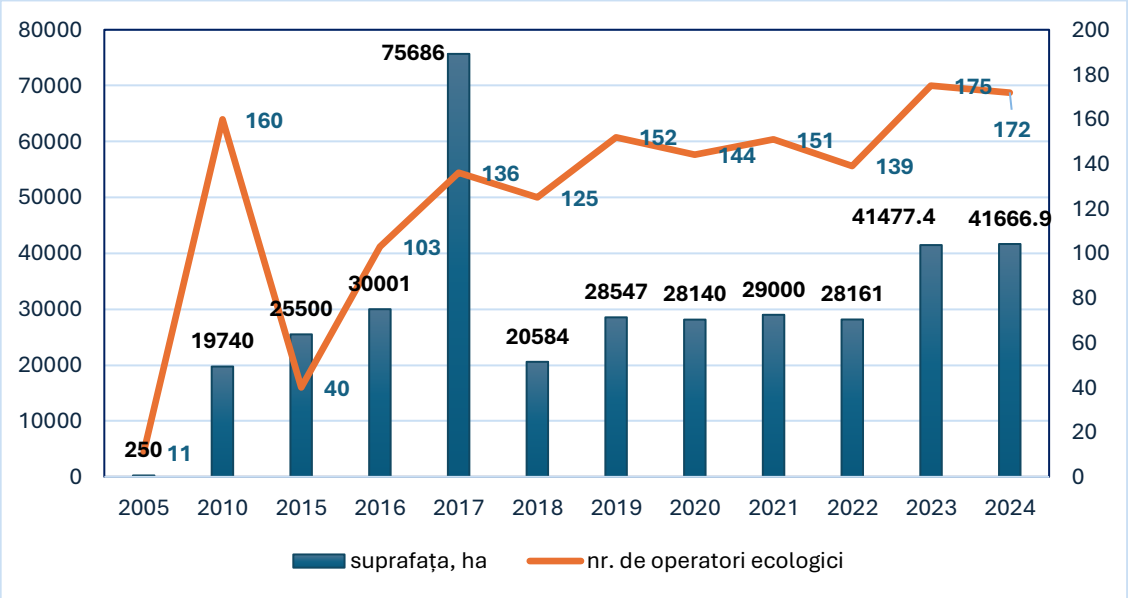

Figure 1. Area of agricultural land under the organic system and number of registered organic operators

Source: elaborated by the author based on data provided by the Ministry of Agriculture and Food Industry.

The structural development of the organic farming sector, evidenced by the increase in the number of organic operators, the diversification of types of activity and the strengthening of export capacity, is also reflected in the dynamics of managed agricultural areas. The expansion of organically cultivated land is an important indicator that reflects the development of the organic

farming sector, as it shows the confidence of agricultural producers in the economic viability of the organic system, as well as the institutional capacity to support the transition to sustainable practices.

The analysis of the data in Figure 1 highlights an uneven evolution of organic agricultural areas and the number of operators in the Republic of Moldova. After an early stage of slow development (2005-2010), the period 2010-2017 was marked by an accelerated expansion of the area, amid the entry of large export-oriented farms. Starting with 2018, there has been a significant reduction in the area, followed by a phase of stabilization and, subsequently, relaunch. In 2024, the organic area reached 41,666.9 ha, and the number of operators to 172, confirming the consolidation and gradual expansion of organic farming at national level.

The territorial distribution of organic farming in the Republic of Moldova is highly unequal, with the North concentrating about 50% of operators, followed by the Center (33%) and the South (17%). The ecological areas are mainly located in the north and center, with districts such as Soroca, Sângerei and Hâncești, characterized by medium and large farms, oriented towards cereal crops and export. The municipality of Chisinau plays a strategic role in the ecological value chain, and the region on the left bank of the Dniester concentrates the largest ecological area, due to large farms. The South and some districts remain poorly represented, reflecting pedoclimatic, institutional and market constraints.

Moldovan organic producers' access to EU markets is limited by strict quality, volume, traceability and certification requirements, as well as dependence on few external intermediaries. The weaknesses of the national certification system, including the loss of accreditation of domestic bodies and the previous obligation of double certification, have generated additional costs and structural vulnerabilities. The forced shift towards international certification has facilitated access to the EU market, but has increased the pressure on small and medium-sized farms. In this context, harmonisation of the legislative framework and the elimination of administrative burdens become essential for increasing competitiveness and expanding the green sector.

The analysis of the economic efficiency of organic farms in the Republic of Moldova is based on primary data, as official statistics do not provide detailed information at farm level. To this end, a survey was carried out between March and June 2023 among 63 farms with organic production, which manage 19,456 ha, of which 27.3% are organically worked. Farms are predominantly concentrated in the northern and central regions, reflecting the uneven development of organic farming and the role of farm size and access to resources in determining economic efficiency.

The analysis of the comparative evolution of the quantities marketed, the production costs and the average production prices for the main organic crops (Table 2a, 2b) makes it possible to identify

crops with high economic potential, as well as those exposed to increased risks of negative profitability, especially in adverse climatic conditions or market volatility.

Table 2a. Economic efficiency of the main organic crops (2020–2022 average)

	Wheat	Maize	Barley	Rye	Sunflower	Soybeans	Peas
Cultivated area, ha	1522,52	639,17	22,42	278,75	1085,33	188,80	619,78
Harvest obtained, t/ha	4830,22	2035,55	9,77	537,84	1814,63	320,29	675,52
Production cost, lei/kg	4,35	1,82	1,43	3,53	6,58	3,08	5,66
Quantity sold, t	2630,73	1259,70	9,77	512,67	1355,03	240,87	633,93
Revenue from sales, thousands of lei	11544,41	4961,66	33,35	1848,05	12094,04	1335,27	5220,87
Total cost of production, thousands of lei	21977,29	3114,81	92,80	1873,58	12180,59	955,08	3661,88
Profit, thousands of lei	-10432,87	1846,84	-59,45	-25,54	-86,54	380,19	1558,99
Productivity per 1 ha, kg/ha	3086,67	3060,00	1393,33	1730,00	1670,00	1616,67	1086,67
Average selling price, lei/kg	4,38	4,10	2,17	3,94	8,72	5,52	7,39
Income per 1 ha, lei/ha	7642,26	7937,62	926,59	5500,30	11118,06	7255,16	8394,13
Profit per 1 ha, lei/ha	-6417,31	2642,02	-2043,41	-647,97	-88,81	2375,72	2465,46
Profit per 1 kg, lei/kg	-4,48	-3,47	-4,83	-0,93	-0,39	0,91	-0,90
Profitability level, %	-73,00	-289,57	-221,60	-19,66	-3,06	32,62	-42,52
Profitability of sales, %	-108,47	-73,27	-152,25	-19,82	-5,93	17,08	-44,89

Source: prepared by the author based on data from the questionnaires (March – May 2023).

The data presented above indicate that the level of production costs varies significantly, being influenced both by the fluctuations of input prices (seed material, fuel, mechanized works) and by the level of productivity. The year 2020 was an extremely difficult one for farmers, with severe drought and hail falling substantially affecting agricultural production. Under these circumstances, for certain crops, the cost of production exceeded the marketing price, generating financial pressures on farms (Table 2a, 2b).

The results show that wheat and maize, although they register high production volumes, frequently generate low or negative profitability, as a result of the increase in production costs, fluctuations in marketing prices and the influence of adverse climatic conditions. In contrast, crops such as soybeans, sunflowers, nuts and grapes have demonstrated more stable levels of profitability, due to steady demand and more advantageous conditions for recovery.

The data confirm the existence of significant differences between crop groups in terms of economic efficiency and ability to adapt to market requirements. The horticultural and oilseed crops sector has the most favorable economic profile, characterized by unit profits and superior

profitability, while medicinal plants or mustard show high vulnerability to market and technological risks. Overall, the results highlight the need to orient the structure of organic production towards crops with stable profitability and greater potential for integration into value chains, in order to ensure the financial sustainability of farms.

Table 2b. Economic efficiency of the main organic crops (2020–2022 average)

	Grapes	Plums	Nuts	Berries	Medicinal plants	Mustard	Honey
Cultivated area, ha	15,81	8,02	371,54	41,88	128,03	194,80	50,00
Harvest obtained, t/ha	466,05	5,61	149,46	53,50	540,89	276,26	0,93
Production cost, lei/kg	3,75	2,17	58,33	5,93	20,00	11,57	16,00
Quantity sold, t	448,39	5,56	149,46	53,33	541,97	264,83	0,93
Revenue from sales, thousands of lei	3533,62	14,46	11802,97	354,00	10839,33	2807,31	56,00
Total cost of production, thousands of lei	1864,34	12,22	9586,00	317,14	10817,81	2098,16	52,80
Profit, thousands of lei	1669,28	2,24	2216,97	36,86	21,52	709,15	3,20
Productivity per 1 ha, kg/ha	28000,00	700,00	40,99	1276,67	4246,67	1703,33	6,22
Average selling price, lei/kg	7,77	2,57	131,73	6,67	20,00	14,44	20,00
Income per 1 ha, lei/ha	205485,14	1802,99	3190,79	8446,00	85120,50	16792,15	373,33
Profit per 1 ha, lei/ha	99668,47	279,66	554,13	878,67	187,17	4906,35	21,33
Profit per 1 kg, lei/kg	3,79	0,38	14,08	0,72	0,04	0,25	1,14
Profitability level, %	102,89	16,84	24,60	11,99	0,21	18,32	2,38
Profitability of sales, %	48,77	14,08	17,31	10,40	0,21	9,02	1,90

Source: prepared by the author based on survey data (March – May 2023).

The data confirm the existence of significant differences between crop groups in terms of economic efficiency and ability to adapt to market requirements. The horticultural and oilseed crops sector has the most favorable economic profile, characterized by unit profits and superior profitability, while medicinal plants or mustard show high vulnerability to market and technological risks. Overall, the results highlight the need to orient the structure of organic production towards crops with stable profitability and greater potential for integration into value chains, in order to ensure the financial sustainability of farms.

Economic efficiency can be approached as the relationship between the resources used (land, labor, capital and public support) and the economic and financial results obtained, expressed as income and profit. An important role in this process is played by public support, which, in organic farming, is not only an instrument to support income, but also a mechanism to compensate for the additional costs and risks specific to this production system. Therefore, the analysis of the

relationship between the level of public support and the economic performance of organically produced farms makes it possible to assess the efficiency of the use of public funds and their capacity to stimulate income growth and profitability (Table 3).

Analyzing the evolution of the subsidies accessed and the main economic indicators of organic farms in the period 2020–2022 (Table 3) we observe a significant increase in both public support and economic results obtained by organic farms, which suggests the existence of a positive relationship between subsidization and economic efficiency. The total subsidies accessed increased by 13.3% in 2022 compared to 2020, despite the fluctuations recorded in 2021, reflecting a constant interest of agricultural producers in the use of financial support instruments made available by the state.

Much more pronounced, however, is the dynamics of subsidies explicitly intended for organic farming, which registered an increase of 43.9% in the period analyzed. This evolution indicates an increasing orientation of public policies towards supporting environmental practices, but also an increased capacity of agricultural producers to access these financial resources, especially in the context of adjustments to the regulatory framework and the increase in subsidy ceilings.

Table 3. Public support and economic performance of organic farms

Indicators	YEARS			2022 vs. 2020, %
	2020	2021	2022	
Revenue from sales (thousands of lei)	937 901,0	1 832 249,0	1 757 769,0	187,4
Total subsidies accessed (thousands of lei)	19 338,4	17 266,8	21 916,3	113,3
Profit (losses) for the period (thousands of lei)	29 176,4	180 313,0	228 617,2	783,6
Income from sales from organic farming (thousands of lei)	83 460,2	105 362,3	111 174,8	133,2
Subsidies accessed to stimulate organic agriculture (thousands of lei)	4 809,9	6 028,2	6 919,5	143,9
Total Income Productivity, %	48,50	106,11	80,20	31.7 p.p.
Income productivity from organic farming, %	17,35	17,48	16,07	-1.28 p.p.
Rate of return on sales, %	3,11	9,84	13,01	9.9 p.p.

Source: prepared by the author based on survey data (March - May 2023).

In the context of the increase in public support, the total income of agricultural holdings experienced a positive evolution, increasing in 2022 by 87.4% compared to 2020. Revenues from organic farming increased at a more moderate pace, by 33.2%, but this dynamic confirms the gradual consolidation of organic farming as a stable source of income within the farms analysed. Total profit increased sharply, more than sevenfold, reflecting both revenue growth and cost optimization, including as a result of public support.

In the period 2020-2022, the profitability of agricultural holdings registered a significant improvement, with the rate of return on sales increasing from 3.11% to 13.01% (+9.9 p.p.), which reflects a clear strengthening of the capacity to generate profit from the revenues obtained. This evolution of farm profitability is supported by the much faster growth of profit compared to revenues, indicating an efficiency of the activity and an optimization of costs.

However, for a rigorous assessment of economic efficiency, it is necessary to report the results to the unit area and the volume of subsidies, ensuring the comparability of economic performance between farms (Table 4).

Table 4. Indicators of economic efficiency of organic farms

Indicators	YEARS			2022 vs. 2020, %
	2020	2021	2022	
Sales income, total per 1 ha (thousand lei/ha)	48 669,0	96 019,8	90 345,9	185,6
Income from sales from organic farming per 1 ha (thousand lei/ha)	17 176,8	20207,9	20 897,5	121,7
Profit (losses) of the period per 1 ha (thousand lei/ha)	1 514,0	9 449,4	11 750,5	776,1
Profit (losses) of the period per 1 leu subsidy (lei)	1,51	10,44	10,43	690,7
Share of revenues from the sale of organic production in total revenue (%)	35,3	21,1	23,1	-12.2 p.p.

Source: prepared by the author based on on survey data (March – May 2023).

The economic efficiency indicators highlight a significant improvement in the performance of organic farms in the period 2020-2022. The total income per hectare increased by 85.6%, and the income obtained from organic farming advanced more moderately (+21.7%), confirming the stable, but still consolidating, character of this segment. Profit per hectare increased more than sevenfold, reflecting both revenue growth and cost optimization, including through subsidy support. The increase in surface profit indicates a significant leverage effect of public funds, while the decrease in the share of green revenues in total income suggests a strategy of diversifying activities to reduce economic risks [12].

The assessment of technical efficiency is particularly relevant in organic farming, where technological restrictions and dependence on biological processes increase the importance of resource management. Differences in efficiency between farms reflect distinct levels of organisation, managerial experience, production structure and access to innovations. In this context, the technical efficiency of organic farms is analysed using the *Data Envelopment Analysis* (DEA) method, which allows the identification of efficiency frontiers and the potential for improving the use of inputs. The

analysis is based on a cross-sectional dataset of 34 organic farms, characterised by a high diversity of production systems and market strategies.

Table 5. Classification of organic farms in relation to the level of technical efficiency

Efficiency Category	Number of holdings	Share (%)
High efficiency (TE > 0.7)	3	8,6
Moderate efficiency (0.4 < TE ≤ 0.7)	10	28,6
Low efficiency (TE ≤ 0.4)	22	62,9
Total	35	100

Source: author's calculations [11].

The results of the DEA analysis indicate a low level of technical efficiency among most of the organic farms analysed. About 62.9% of farms fall into the low efficiency category (ET ≤ 0.4), confirming an inefficient use of resources and operating at less than 40% of productive potential. Moderately efficient farms account for 28.6% of the sample, while only 8.6% achieve a high level of technical efficiency (Table 5).

The disparities between farms are pronounced: some establishments with large ecological areas record very low incomes, which indicates land underutilization and managerial deficiencies. In contrast, high-efficiency farms, regardless of size, are characterised by better conversion of inputs into income, optimised production structures and more efficient access to markets. These results confirm that eco-certification, in the absence of effective management and effective integration into the value chain, does not automatically guarantee economic performance.

The analysis highlights clear geographical differences in the level of technical efficiency of organic farms in the Republic of Moldova. Districts such as Falesti, Anenii Noi, Orhei, Telenesti and Sângerei concentrate farms with high technical efficiency scores (TE > 0.75), which suggests the existence of sources of performance, supported by efficient management, better access to consulting services, infrastructure and markets. In contrast, districts such as Floresti and Riscani are characterized by very low levels of technical efficiency, including in the case of farms with large ecological areas, indicating structural and managerial inefficiencies.

In addition to economic and institutional factors, the efficiency of organic farms is also influenced by the behavioural dimension of agricultural producers, in particular by their perceptions of cooperation, coordination and neighbourhood effects in the adoption of agro-ecological practices. To include this dimension, the questionnaire asked four questions concerning respondents' attitudes towards collective schemes and the interdependence of decisions at local level (Table 6).

The results obtained indicate a high openness of agricultural producers towards cooperation mechanisms, with 86% of respondents considering that collaborative efforts between neighbouring agricultural producers in adopting organic practices should be rewarded by public support

instruments (Table 6). At the same time, 70% of respondents say they are interested in participating in agroecological schemes in which the level of subsidy depends not only on their own involvement, but also on the degree of adoption of practices by local producers.

Table 6. Attitude of organic farms towards cooperation and collective agro-ecological schemes

Rated Claim	Total + partial agreement (%)	Neutral (%)	Total + partial disagreement (%)
Cooperation between neighbouring agricultural producers should be rewarded	86	14	0
Adopting Practices by Neighbors Reduces My Costs	67	19	14
Interest in collective agroecological schemes	70	18	12
The environmental impact depends on the decisions of the neighbors	80	10	10

Source: elaborated by the author based on survey data.

A particularly relevant result is the fact that 80% of producers acknowledge the existence of negative neighborhood externalities, stating that the environmental impact generated by the adoption of ecological practices can be diminished or even canceled by the uncoordinated decisions of neighboring agricultural producers. This perception confirms the systemic nature of organic farming and the limits of individual approaches in the absence of territorial coordination.

Chapter 3 of the thesis, entitled **"Public policies and support mechanisms for increasing the efficiency of organic agriculture in the Republic of Moldova",** analyzes the role of public interventions in the development of organic farming, evaluating the existing policies, the support instruments applied and their impact on the economic efficiency of agricultural holdings.

The effectiveness of public policies supporting organic farming depends not only on the volume of financial resources allocated, but also on the existence of a clear regulatory framework defining the economic unit to which these interventions apply. Currently, the Republic of Moldova does not have an explicit legal definition of "organic farming", the legislation in force focusing mainly on the final product and the certification process, without recognizing the organic farm as an integrated economic unit, with its own status and functions. This regulatory gap generates difficulties in the coherent application of public policies, affecting the process of subsidizing, monitoring and evaluating the performance of the ecological sector.

In the practice of the European Union, although the legislation does not provide a definition of organic farming, organic production is regulated as a regime applicable to the unitary managed farm, as a coherent set of land, animals and activities carried out entirely according to the rules of organic farming. This approach allows for a clear assessment of the conformity and traceability of production

and forms the basis of direct payment systems, eco-schemes and rural development interventions, which aim at the structural and economic adaptation of farms, not the carrying out of isolated activities. In this respect, the lack of similar terminology in the Republic of Moldova reduces the degree of alignment with the acquis communautaire, limits statistical comparability with EU Member States and creates legal uncertainties for operators managing mixed farms or in the process of fully converting to organic farming [2].

The analysis of the regulatory framework and subsidy practices in the Republic of Moldova highlights the fact that public support is mainly oriented towards activities, investments or certified organic products, without delimiting the organic farm as a distinct beneficiary of public interventions [13]. This approach limits the ability of public policies to influence the economic efficiency of farms, as organic farming operates as a complex system, in which decisions on resource use, production organisation, risk management and exploitation of results are interdependent.

The problem is amplified by the agricultural structure specific to the Republic of Moldova, characterized by the fragmentation of farms and the high share of small and medium-sized units. In the absence of an explicit delimitation of the organic farm as an economic unit eligible for public support, it becomes difficult to establish the eligibility criteria and assess the impact of subsidies on economic efficiency. Especially in the case of mixed holdings, support granted without clear structural criteria risks being dispersed and not generating significant effects on economic performance.

In this context, in order to substantiate the priority directions of public support and to increase the economic efficiency of organic farming, it is necessary to operationally define the organic farm as an integrated economic unit. Within the present research, the organic farm is defined as a technical-economic unit operated under a single management, in which at least 50% of the agricultural area used and/or at least 50% of the annual agricultural income comes from certified organic production activities or in the process of conversion, carried out in accordance with the applicable regulatory framework. This delimitation allows the identification of farms for which organic farming is the predominant economic activity and justifies the priority targeting of public support to these units, with a view to increasing economic efficiency and long-term viability.

This conceptual delimitation creates the necessary framework for orienting the priority directions of public support not only towards conversion and ecological compliance, but also towards strengthening economic competitiveness and integrating farms with organic production into value chains.

Treating cooperation between organic agricultural producers as a basic direction of public support requires not only recognising its economic role, but also operationalising it through clear

quantitative criteria. In the conditions of the fragmented agricultural structure of the Republic of Moldova, the differentiation of public support according to the level of cooperation allows the orientation of budgetary resources towards the forms of organization that generate the greatest effects of economic efficiency. From this perspective, public support can be structured gradually, depending on the degree of association of organic farms, without excluding individual farms, but explicitly stimulating the transition to functional associative forms.

From the perspective of economic efficiency, three operational levels of cooperation relevant to organic farming can be delineated. The first level is individual organic farms or farms in informal forms of collaboration, which do not benefit from common infrastructure and do not make purchases or collective recovery. The second level is represented by farms that are members of producer groups or functional cooperatives, which carry out joint input acquisition, logistics or certification activities, covering at least 30–50% of the volume of economic activities. The third level includes advanced cooperatives or integrated associative forms, in which at least 50–70% of organic production is sold collectively, and investments in storage, processing or marketing are made jointly. This classification allows public support to be linked to the real economic impact of cooperation.

In order to stimulate cooperation, public support can be differentiated by applying indicative increase coefficients, correlated with the level of association of organic farms. Thus, for individual holdings, the basic support is applied without additional increases, having a predominantly compensatory role. For farms that are members of cooperatives or functional producer groups, public support may be increased by a coefficient of between +15% and +25%, depending on the type of cooperation and the activities carried out jointly. In the case of advanced cooperatives, which demonstrate significant collective capitalization and joint investments, the increase coefficient can reach an indicative level of +30–40%, reflecting economies of scale and superior structural effects on economic efficiency.

Differentiation by cooperation can also be applied to investment support, by adjusting the amount and maximum eligible ceilings. While individual organic farms can benefit from ordinary financial support (e.g. 50% of the eligible investment value), associative forms can access increased amounts between 60% and 70%, in particular for joint investments in storage, processing, logistics and market infrastructure. Also, the maximum ceiling per project can be increased by 30–50% for cooperatives, reflecting the larger economic size and collective impact of the investments made.

These thresholds and indicative coefficients provide the necessary analytical framework for the design of differentiated public support schemes, based on the level of cooperation and the demonstrated economic impact of associative forms in organic farming.

As financial support mechanisms are increasingly diversified and differentiated according to the degree of green commitment and cooperation, increasing the efficiency of the use of public funds cannot be achieved without improving the institutional framework for monitoring and assessing the impact of subsidisation on the economic performance of organic farms.

In the absence of a coherent system for collecting and analysing post-acquittal economic data, public support mechanisms risk remaining predominantly geared towards formal compliance and budget absorption, without allowing the assessment of the real effects on the efficiency of organic farms. From this perspective, the role of the existing structures within AIPA and MAIA, in particular the AIPA Post-Payment Monitoring Directorate, the Economic Analysis, Agricultural Statistics and Promotion Directorate of MAIA, the Organic Agriculture Directorate of MAIA as well as the Directorate for the Safety of Food Products of Non-Animal Origin (ANSA) becomes essential in ensuring feedback between the allocation of public support and the economic results obtained.

The systematic collection of relevant indicators on the structure of the holding, the degree of greening (share of ecological areas and incomes), the level of cooperation, the investments made and the evolution of economic performance would allow the application of econometric methods for assessing the impact of subsidisation and the continuous adjustment of public policy instruments. In this way, public support for organic farming can be progressively oriented from a static logic of compensation to a dynamic one, based on efficiency, results and long-term economic consolidation.

In this context, increasing the economic efficiency of organic farms cannot be achieved solely by increasing the volume of financial support, but depends crucially on the quality of the economic decisions taken at farm level. The ability of managers to analyse the cost structure, plan investments, assess risks and use modern economic instruments is becoming a determining factor in the transformation of subsidies from mere compensatory mechanisms into determinants of economic efficiency.

From this perspective, the development of the managerial and economic capital of organic farms is emerging as a basic transversal direction of public support, complementary to existing financial and institutional interventions. The integration of economic training and advisory programmes into the Agricultural Knowledge and Innovation System (AKIS), with a focus on cost management, economic efficiency assessment, the use of performance indicators and the substantiation of investment decisions, can help to increase the capacity of farms to make effective use of public support and strengthen their long-term viability.

In this respect, a strategic orientation of public policies could aim at partially correlating access to certain forms of financial support with the level of professional and managerial training of farm managers, without introducing restrictive barriers, but through incentive mechanisms. Having

specialized studies in the field of agribusiness, agricultural economics or regular participation in lifelong training programmes (e.g. once every 5–10 years) could be criteria for prioritising or increasing the amount of financial support, in particular for investment-oriented and structural development-oriented grants.

Table 7. Priority directorates of public support and its effects on the economic efficiency of organic farms

Priority direction	Relevant tools and/or actors	Effect on efficiency (economic mechanism)	Indicators
Conversion and maintenance of organic farming	AIPA; National Fund for the Development of Agriculture and Rural Environment; Compensatory payments	Reduces risk and income losses during the transition period; stabilise financial flows; allows the technological and organisational adjustment of the holding	revenue/ha, cost/ha, profit/ha, level of profitability, technical efficiency (TE), share of organic area in the utilised agricultural area (%), share of income from the sale of organic production (%)
Productive investments and greening of SMEs	ODA (non-reimbursable grants up to 200 thousand lei; minimum co-financing 30%)	Technological modernization; increasing energy efficiency and water use; Reduction of unit production costs	Operating costs, energy/water consumption, productivity, capital
Access to markets and exports	Investment Agency; participation in international fairs (e.g., Biofach); Commercial partnerships	The average price obtained increases; reduces market access costs; ensures stable contracts and revenue predictability	average selling price, number of export contracts, added value
Certification and control	Institutional strengthening; regulatory harmonization; CZDA / USAID projects	Reduces transaction costs; increases the credibility of products; reduces the risk of non-compliance and associated losses	certification cost, compliance time, number of non-conformities/refusals
Human Capital, Managerial Capabilities and Extension (AKIS)	AKIS system; USAID Farmer-to-Farmer; AED; MOVCA; EcoVisio	Improves economic management; optimizes the cost structure; reduces technological errors; increases factor productivity	labor productivity, costs/unit product, technical efficiency (TE), rate of adoption of managerial tools
Cooperation and association between organic producers	MOVCA; EcoLocal; cooperatives and producer groups	Economies of scale; increased bargaining power; more efficient logistics and marketing; Reduced transaction costs	logistic cost/unit, collective sales volume, sales revenue, degree of cooperation (%)

Source: prepared by the author.

Such an approach does not aim to formally condition access to support, but to stimulate the professionalization of the management of organic farms, recognizing that economic efficiency is the

result of the interaction between financial resources, managerial skills and the ability to adapt to the requirements of the market and the institutional environment.

A distinct focus is placed on the analysis of financial support mechanisms for organic agricultural producers. Existing forms of support are examined, including subsidies provided through national funds, support for conversion to organic farming, as well as facilities offered during the period of maintenance of organic practices. The analysis highlights that public support plays a key role in compensating for the additional costs and risks assumed by agricultural producers in the conversion process, but its level and structure do not always ensure increased economic efficiency in the medium and long term (Table 7).

An important role is played by the mechanisms for certification, control and monitoring of production costs and market access for agricultural producers. Administrative procedures and certification costs are a significant constraint for small and medium-sized farms, negatively influencing economic efficiency and limiting the expansion of the organic sector.

The presence of effective promotional tools, well-developed marketing channels and economic cooperation between producers increases the capacity of organic farms to reap the benefits of organic products on the internal market. Thus, the strengthening of value chains and forms of economic association plays an important role as tools to increase efficiency and competitiveness (Figure 2).

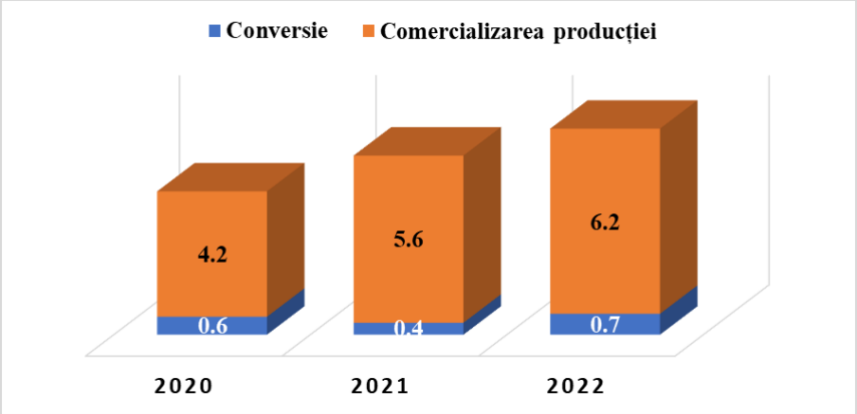

Figure 2. Subsidies accessed for maintaining organic farming (conversion versus marketing of organic production) in 2020-2022

Source: developed by the author based on the data from the questionnaire and the database of the Agency for Intervention and Payments for Agriculture.

However, subsidies allocated to support organic farming can reduce the negative impact of production costs. To test this argument, the model applied was extended by including an interaction term between ln (subsidy) and ln (costs), in order to assess the effects of production costs on efficiency, which may fluctuate depending on the amount of subsidy paid. The interaction term allows estimating the relationship between policy subsidisation and production costs in relation to technical efficiency (Table 8).

Table 8. Logit regression results (extended interaction term model)

Variable	Coefficient	Standard deviation	Value - p
Constanta	1,0125	0,665	0,128
ln(Amount of grants accessed)	-0,1364	0,076	0,072
ln(Cost of production)	-1,0862	0,228	0,000
ln(Profit)	0,6704	0,161	0,000
ln(Revenue from sales, obtained from organic farming)	0,3007	0,057	0,000
Area of organic farmland tilled by farms	0,0028	0,001	0,040
Number of employees	-0,0184	0,006	0,002
Grant accessed - Dummy	1,2199	0,339	0,000
Interaction term	0,0274	0,015	0,060

Source: author's calculations based on analyzed data, made in Python.

According to the results, the interaction term between ln (subsidy) and ln (costs) is positive (0.0274) and marginally significant, so that the allocation of subsidies can partially offset the negative impact of high production costs (Table 8). This is particularly characteristic for organic farms that benefit from high subsidies and have lower efficiency losses due to high production costs. These findings confirm that the allocation of subsidies is not limited to direct transfers, but has a key role to play in reducing the financial constraints faced by many organic farmers.

The coefficient of production costs remains negative by a greater magnitude, reconfirming that higher costs cause inefficiencies, while the positive interaction term suggests that the slope of the cost-efficiency relationship becomes less negative as the value of subsidies increases.

The subsidy for land conversion is positive and significant, supporting the argument that subsidies allocated for land conversion to organic farming contribute to efficiency gains (Table 8). Profits and revenues also remain positive and significant, confirming that organic farms with higher revenues and profits are experiencing higher technical efficiency.

In the extended model, the area of the holding becomes positive and statistically significant, indicating that larger holdings benefit from economies of scale, when the mechanism of subsidies and costs is explicitly modelled.

Based on the analysis, the main dysfunctions of current public policies are identified, which limit their impact on the efficiency of organic farming. These include the predominantly compensatory nature of financial support, the insufficient focus on boosting economic performance, the lack of correlation between public support and the economic results achieved, as well as the low level of institutional coordination.

Table 9. Integrated framework of public support to increase the economic efficiency of organic farming

Program Component	Proposed support instruments	Beneficiaries	Expected economic and environmental results
Conversion and eco-friendly maintenance	Differentiated direct payments by crop type and livestock systems	Farms in conversion and organic certificates	Expansion of ecological areas; income stability; Reducing economic risk
Productive and non-productive investments	Grants for equipment, irrigation, soil management, storage and processing	Individual agricultural producers, cooperatives, producer groups	Increased productivity; reduction of unit costs; Increasing added value
Human and institutional capital	Subsidizing certification; vouchers for consultancy and training; Regional Support Centers	Organic farms, organic operators during the conversion period	Improving skills; reduction of technical errors; Increase compliance
Market integration and value chain	Grants for processing, branding, marketing; interest subsidies; State guarantees	Cooperatives, processors, exporters	Increased market access; more stable prices; Resilience to external shocks

Source: elaborated by author

In order to demonstrate the implementability of the Integrated National Programme for Increasing the Economic Efficiency of Organic Farming, the proposal is transposed in the form of a public policy matrix. It links the strategic objectives with the intervention instruments, efficiency indicators, time horizon and responsible institutions, thus facilitating the monitoring and evaluation of the impact of the programme (Table 10).

Table 10. Public Policy Matrix for the National Integrated Program for Increasing the Economic Efficiency of Organic Agriculture in the Republic of Moldova

Strategic objective	Public policy instrument	Key efficiency indicators	Period/ Deadline	Responsible institutions
Expansion of organic agricultural areas	Direct payments for organic conversion (differentiated by crop and livestock systems)	- ha in ecological conversion – no. of farms that have recently entered the system	1-3 years	MAIA, AIPA, certification bodies
Ensuring the financial stability of organic agricultural producers	Annual payments for maintaining organic farming	- ha certified organic – retention rate after conversion (%)	Permanent	MAIA, AIPA
Increasing the economic efficiency of farms	Grants for productive investments (equipment, irrigation, soil management)	- income/ha- profit/ha- unit costs	3–5 years	AIPA, MAIA
Reducing fragmentation and increasing economies of scale	Increased level of support for cooperatives and producer groups	- no. cooperatives with organic production – volume of collectively marketed production	3–5 years	MAIA, AIPA, local authorities
Increasing the added value of organic production	Support for storage, primary processing, sorting and packaging	- share of processed production (%) – value added/ha	3-7 years	AIPA, MAIA
Market integration and export access	Grants for branding, marketing and participation in international fairs	- average sale price – no. export contracts	3-7 years	Investment Agency, MAIA

Strategic objective	Public policy instrument	Key efficiency indicators	Period/ Deadline	Responsible institutions
Reducing knowledge and compliance barriers	Subsidization of eco-certification and vouchers for consultancy	- Certification/farm cost – compliance time	1-3 years	MAIA, ANSA, certification bodies
Strengthening rural human capital	Regional support centres ("Agropoints") and continuous training centres	- no. of trained agricultural producers – labour productivity	Permanent	MAIA, local authorities
Stimulating agro-ecological and environmental protection practices	Conditional payments for crop rotation, soil fertility, biodiversity	- soil quality indicators – area under agroecological measures	Permanent	MAIA, ANSA
Increasing resilience to economic and climate shocks	Interest subsidies on green loans and state guarantees	- Degree of indebtedness – private investments mobilised	3-7 years	Ministry of Finance, banks
Development of rural communities and local association	LEADER / CLLD programmes adapted to organic farming	- no. of local projects – jobs created	3-7 years	MAIA, LAGs
Ensuring institutional coherence and monitoring	Separate budget line for organic farming and dedicated calls	- Absorption rate of funds – budget execution (%)	Permanent	MAIA, AIPA, MF

Source: elaborated by the author.

The matrix also reflects a conceptual shift from the fragmented and isolated support of the individual farm to the development of value chains and local cooperation. This approach is supported by the results of the extended model, which indicate that the size of the holding becomes relevant for technical efficiency only in the presence of subsidy mechanisms that mitigate cost constraints. For cooperatives and functional producer groups, increase coefficients and prioritization criteria are applied, in line with their role in reducing production costs and increasing economic efficiency. Therefore, the promotion of cooperatives, producer groups and forms of vertical integration is a coherent solution for capitalizing on economies of scale in the organic agriculture sector in the Republic of Moldova.

General conclusions and recommendations

The research carried out, aimed at demonstrating the hypothesis that the economic efficiency of agricultural holdings with organic production in the Republic of Moldova is significantly influenced by a set of economic and institutional factors, including public support, implicitly towards achieving the goal of assessing the economic efficiency of organic farming and identifying the directions to increase it, led to the formulation of the following conclusions:

1. Research shows that organic farming must be analysed as a complex economic activity and not exclusively as a tool for protecting the environment or increasing the quality of agri-food products. Under market economy conditions, the sustainability of organic farming is conditional on achieving a satisfactory level of economic efficiency that allows organic farms to cover their costs,

generate stable incomes and ensure long-term business continuity. Economic efficiency is therefore a central element in assessing the resilience of the organic farming sector.

2. The theoretical analysis highlights that the economic efficiency in organic farming has a multidimensional character, being determined by the interaction between technical, economic and institutional factors. Specific features of organic farming, such as restrictions on the use of inputs, certification requirements, conversion period costs and increased vulnerability to climate and market risks, are generating additional pressures on the economic performance of farms. These aspects justify the need to apply appropriate efficiency assessment methods and differentiated public policies from conventional farming.

3. The analysis of the development of organic farming at national level confirms that the progress of this sector is closely correlated with the existence of coherent, predictable and well-institutionalized public policies. In the Republic of Moldova, although there are favorable pedoclimatic conditions and a growing interest in ecological practices, the sector faces economic and institutional limitations that slow down its expansion and consolidation. These constraints directly affect the economic efficiency and competitiveness of organic farms.

4. The assessment of the situation of organic farming in the Republic of Moldova highlights a pronounced particularity of agricultural holdings with organic production, manifested by significant differences in economic size, production structure, degree of capitalization and market access. This structural delineation limits the individual ability of producers to reap the benefits of economies of scale and to negotiate favourable conditions on the markets. In this context, the research highlights the importance of cooperation between producers (associations, cooperatives, producer groups) as an essential tool for strengthening environmental practices, reducing production costs and increasing economic efficiency.

5. The results of the economic efficiency assessment indicate that there are considerable reserves for performance enhancement on organically produced farms, in particular by optimising the use of resources and improving economic management. The low levels of efficiency recorded by some farms do not reflect a limitation of the ecological model, but rather difficulties related to the organisation of production, access to inputs and markets, as well as the lack of cooperation mechanisms to allow the sharing of resources, knowledge and risks.

6. The research confirms that public support is a key factor in supporting the economic efficiency of organic farming, helping to reduce financial risks and mitigate the constraints specific to the conversion period and maintaining organic practices. At the same time, the results highlight that the impact of public support is not uniform and depends on the degree of correlation of the support instruments with the structural, economic and organizational characteristics of the farms.

The introduction of the operational concept of organic farming allows for a clearer delimitation of beneficiaries and a more efficient targeting of subsidy measures, according to the real level of commitment to organic agriculture, contributing to increasing the effectiveness and transparency of public policies.

7. The results of the research also highlight the role of forms of economic cooperation and training through the Agricultural Knowledge and Innovation System (AKIS) in amplifying the effect of public support on economic efficiency. Cooperation facilitates the collective use of resources, reduces transaction costs and access to subsidies and markets, and strengthening the managerial and technical skills of organic agricultural producers contributes to a more efficient use of resources and increased economic performance. In this context, the need to strengthen the mechanisms for institutional evaluation and monitoring of public support, carried out by the competent authorities (MAIA, AIPA and other relevant institutions), as a prerequisite for increasing the long-term economic efficiency of organic farming in the Republic of Moldova, is highlighted.

8. The application of the logit econometric regression model has shown that the probability of achieving a higher level of economic efficiency is influenced by subsidisation, cost structure and institutional factors at the same time. The results confirm the research hypothesis that public support is necessary but not sufficient to increase economic efficiency. The positive impact of subsidies is amplified when farms have adequate managerial capacity and are integrated into forms of economic cooperation, which facilitate access to inputs, information and markets.

9. In order to increase the economic efficiency of organic agriculture in the Republic of Moldova, an integrated approach is needed, combining efficient public policies, efficient economic management and strengthening cooperation between producers. Cooperation is emerging as an important factor for reaping the benefits of organic farming, allowing to overcome individual farm limitations, increase efficiency and transform organic practices into a sustainable pillar of national economic development.

Based on the research carried out, in order to increase the economic efficiency of organic agriculture in the Republic of Moldova, we propose the following:

1. The reconfiguration of the payment mechanism must be carried out by the MAIA, in collaboration with AIPA, so that it is oriented towards stimulating economic efficiency by correlating the subsidy with the results obtained and with the capacity of organic farms to efficiently use the available resources, including by introducing economic efficiency criteria in the assessment of eligibility for financial support.

2. The use of the operational definition of the proposed organic farm must be ensured by the MAIA, in collaboration with AIPA and ANSA, as a reference tool in substantiating, implementing

and evaluating public support measures, in order to delimit the beneficiaries more clearly and the differentiated orientation of the support, depending on the real level of ecological employment.

3. Increasing the predictability and stability of public support for organic farming must be ensured by the MAIA, in collaboration with AIPA, in particular during the conversion period, by maintaining the support amounts and eligibility rules for a multiannual period so that agricultural producers can plan investments and financial flows over three-five year horizons, reducing economic uncertainty and the risk of abandonment of the ecological system.

4. The stimulation and strengthening of cooperation between organic agricultural producers must be carried out by the MAIA, in collaboration with AIPA and ODA by differentiating public support, depending on the level of association, including by applying indicative increases of subsidies of +15–25% for members of producer groups or functional cooperatives and +30–40% for advanced cooperatives with demonstrated collective recovery, in order to reduce costs, facilitate certification and increase economic efficiency.

5. The support for the development of managerial and economic capacities of agricultural holdings with organic production must be carried out by MAIA, in collaboration with the institutions within the AKIS system, including CCAR and agricultural education and research institutions, through the development and implementation of training and counseling programs oriented towards cost management, economic efficiency assessment and the use of analytical tools in substantiating economic decisions.

6. The more active integration of organic farms into functional value chains must be carried out by MAIA, in collaboration with ODA and organizations in the agri-food sector (Moldova-Fruct and MOVCA), including by promoting marketing channels dedicated to organic products, stimulating cooperation with processors and facilitating access to domestic and foreign markets that can adequately remunerate organic quality.

7. The improvement of the institutional framework for monitoring and evaluating the impact of public support on economic efficiency must be carried out by the MAIA, in collaboration with AIPA and ANSA, through the systematic collection of relevant data by the Post-Payment Monitoring Directorate of AIPA, the Directorate for Economic Analysis, Agricultural Statistics and Promotion and the Organic Agriculture Directorate of the MAIA, as well as the Directorate for the Safety of Food Products of Non-Animal Origin within the ANSA, and by using econometric methods of analysis, in order to continuously adjust public policies.

8. Initiation by MAIA and phased implementation by ANSA of the process of institutionalization of an integrated information system in the field of organic agriculture. It will be intended to ensure a uniform record-keeping, continuous monitoring and efficient management of

data on environmental operators, certification bodies, control results and certification status. The system is to be designed based on the principles of interoperability with other relevant information systems at national level, in order to facilitate the efficient exchange of data between the institutions involved, thus contributing to increasing transparency, streamlining administrative processes and strengthening the capacity to substantiate decisions, in accordance with the requirements of the national and European regulatory framework.

9. The organization of a collaboration mechanism between AIPA, MOVCA and INCE of ASEM should be carried out under the coordination of the MAIA in order to expand the empirical research on the economic efficiency of organic farming through the use of larger samples and complementary econometric models, in order to deepen the understanding of the relationship between public support, producer cooperation and economic efficiency.

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List of the author's publications on the topic of the thesis

List of scientific publications on the topic of the doctoral thesis
by Mrs. COȘALÎC Diana
521.03 Economics and management in the field of activity
Academy of Economic Studies of Moldova

SCIENTIFIC PAPERS

2. Articles in scientific journals

2.1. in journals indexed in Web of Science and SCOPUS databases

1. Cimpoieș Liliana, **Coșalîc Diana**. **Inefficiency amid sustainability? Evaluating technical efficiency in Moldova's organic farming sector.** In: *Journal Scientific papers series "Management, economic engineering in agriculture and rural development",* Bucharest, 2025, Vol. 25(3), pp. 235-242, 0.5 c.a. ISSN 2284-7995
2. Cimpoieș Liliana, **Coșalîc Diana**. **Towards sustainable agriculture: assessing the economic impact of organic farms in Moldova's agricultural sector.** In: *Journal Scientific papers series "Management, economic engineering in agriculture and rural development"*,, Bucharest, 2024, Vol. 24(2), pp. 319-328, 0.7 c.a., ISSN 2284-7995
3. Cimpoieș Liliana, **Coșalîc Diana**. **Organic farming support policy in Moldova** In: *Journal Scientific papers series "Management, economic engineering in agriculture and rural development"*,, Bucharest, 2023, Vol. 23 (2), p. 159-164, 0.5 c.a. ISSN 2284-7995

4. Cimpoieș Liliana, **Coșalîc Diana. <u>Development of organic farming in Moldova: tendencies and challenges.</u>** In: *Journal Scientific papers series "Management, economic engineering in agriculture and rural development"*,, Bucharest, 2022, Vol. 22 (3), p. 131-136, 0.5 c.a. ISSN 2284-7995

2.3. in journals of the National Registry of Profile Journals (with indication of the category)

1. **Coșalîc Diana,** Organic Agriculture in the Republic of Moldova: Access to the EU Market between Harmonization and Obstacles. In: Vector European, Chisinau 2026, Vol 1, p. 160-166, 0.35 c.a. ISSN 2345-1106 (Category B)

3. Articles in conference proceedings and other scientific events

3.2.in the works of scientific events included in other databases accepted by ANACEC

1. **Coșalîc Diana.** Ecologic agriculture in the Republic of Moldova: access to the EU market between harmonization and barriers. In: Conference proceedings of the international scientificat-practical conference "Economic Growth in the Face of Global Challenges", Strategies for Sustainable Growth, Economic resilience and social equity, XIXth edition, October 9-10, 2025, INCE ASEM, volume II, p. 79-82, ISBN 978-9975-168-65-6
2. **Coșalîc Diana**, Development of the digital National Register of Farmers and implementation of the pilot phase as part of the vision of the Integrated Administration and Control System, ConsGeoCad, the first edition, 2024: Scientific symposium with national and international participation, 21 st -23rd November 2024, UTM 2025, p. 147-154, ISBN 978-9975-64-528-7
3. **Coșalîc Diana**. Agricultura ecologică cea mai strategică ramură pentru dezvoltarea durabilă a agriculturii Republicii Moldova. În: International Scientific-Practical Conference "Economic Growth in the Face of Global Challenges. Consolidation of National Economies and Reduction of Social Inequalities", October 10-11, 2024, 10-11 octombrie 2024, ediția XVIII, Chisinau 2024, Institutul Național de Cercetări în Economie, 0.5 c.a., ISBN 978-9975-3529-5-6.
4. **Coșalîc Diana.** Impedimentele cu care se confruntă fermierii din agricultura ecologică în accesarea subvențiilor. În: International Scientific-Practical Conference "Economic Growth in the Face of Global Challenges. Consolidation of National Economies and Reduction of Social Inequalities", October 10-11, 2024, 10-11 octombrie 2024, ediția XVIII, p. 290-301, Chisinau 2024, Institutul Național de Cercetări în Economie, 0.5 c.a., ISBN 978-9975-167-77-2
5. Cimpoieș Liliana, **Coșalîc Diana.** Agricultura ecologică cea mai strategică ramură pentru dezvoltarea durabilă a agriculturii Republicii Moldova. În: *Economic growth in conditions of globalization, International Scientifical – Practical Conference,* 12-13 octombrie 2023, ediția XVII, p.292-302, Chisinau 2023, Institutul Național de Cercetări în Economie, 0.5 c.a., ISBN 978-9975-3529-5-6
6. Cimpoieș Liliana, **Coșalîc Diana.** Dezvoltarea agriculturii ecologice: perspective pentru Republica Moldova. În: *Economic growth in conditions of globalization, International Scientifical – Practical Conference,* 12-13 octombrie 2022, ediția XVI, Chisinau 2022, vol I, Institutul Național de Cercetări în Economie, p. 355-363, 0.57 c.a.

ADNOTARE

Diana Coșalîc, „Sporirea eficienței economice a agriculturii ecologice în Republica Moldova”, teză de doctor în științe economice, Chișinău, 2026

Structura tezei: introducere, trei capitole, concluzii generale și recomandări, bibliografie din 230 de titluri, 22 de anexe, 150 de pagini de text de bază, 21 de figuri, 30 de tabele. Rezultatele obținute sunt publicate în 11 lucrări științifice.

Cuvinte-cheie: agricultura ecologică, sprijin public, certificare, eficiență economică, subvenționare.

Scopul lucrării: fundamentarea teoretică și metodologică a eficienței economice a exploatațiilor agricole cu producție ecologică și elaborarea unor direcții și instrumente de sprijin public orientate spre sporirea eficienței economice a agriculturii ecologice.

Obiectivele cercetării:

- Studierea reperelor/abordărilor conceptuale și a evoluției agriculturii ecologice și evidențierea implicațiilor acesteia asupra eficienței economice a exploatațiilor agricole;
- Sistematizarea și analiza abordărilor metodologice de evaluare a eficienței economice aplicabile producției agricole ecologice;
- Analiza cadrului conceptual și normativ al agriculturii ecologice în context european și național, și evaluarea nivelului de dezvoltare a agriculturii ecologice;
- Analiza nivelului de dezvoltare a agriculturii ecologice în Republica Moldova și determinarea nivelului de eficiență economică a exploatațiilor agricole cu producție ecologică, identificarea factorilor principali care influențează eficiența economică a acestora;
- Identificarea și argumentarea direcțiilor prioritare de sprijin public pentru creșterea eficienței exploatațiilor agricole cu producție ecologică;
- Evaluarea impactului subvenționării asupra eficienței economice a exploatațiilor agricole cu producție ecologică;
- Elaborarea unui cadru de sprijin public pentru promovarea domeniilor ecologice strategice în cadrul exploatațiilor agricole.

Noutatea și originalitatea științifică: realizarea, pentru prima dată la nivel național, a unei analize a eficienței economice a agriculturii ecologice, bazată pe date primare și modelare econometrică; propunerea și utilizarea unei definiții operaționale a exploatației agricole ecologice ca unitate economică predominant ecologică (≥50% din suprafețe și/sau venituri), care permite delimitarea clară a beneficiarilor sprijinului public; identificarea factorilor economici, structurali și instituționali cu impact asupra eficienței economice a exploatațiilor agricole ecologice și a mecanismelor prin care sprijinul public influențează performanța acestora; integrarea cooperării economice, capitalului uman și a capacității manageriale în analiza eficienței agriculturii ecologice, evidențiind rolul formelor asociative și al sistemului AKIS; Elaborarea direcțiilor strategice și a unui cadru de sprijin public orientat spre creșterea eficienței economice a agriculturii ecologice, adaptat condițiilor Republicii Moldova.

Rezultatele obținute care contribuie la soluționarea unei probleme științifice importante: clarificarea conceptuală a eficienței economice a agriculturii ecologice în contextul politicilor publice; integrarea dimensiunilor economice, instituționale și organizaționale în analiza eficienței exploatațiilor agricole ecologice; fundamentarea unui model de intervenție publică, orientat spre eficiență economică și sustenabilitate.

Semnificația teoretică: rezultatele cercetării contribuie la fundamentarea teoretică a conceptului de exploatație agricolă ecologică și la explicarea influenței factorilor economici și instituționali asupra performanței exploatațiilor agricole ecologice.

Valoarea aplicativă a lucrării: utilizarea instrumentelor de analiză economică și econometrică pentru evaluarea eficienței economice a exploatațiilor agricole ecologice și valorificarea rezultatelor în fundamentarea deciziilor economice și a politicilor publice de sprijin, contribuind la creșterea eficienței economice și orientarea agriculturii ecologice către un model de dezvoltare durabilă.

Implementarea rezultatelor științifice: rezultatele cercetării au fost implementate în activitatea autorităților publice și a organizațiilor de profil din domeniul agriculturii ecologice conform certificatelor anexate.

АННОТАЦИЯ

Диана Кошалык, «Повышение экономической эффективности органического сельского хозяйства в Республике Молдова», докторская диссертация по экономике, Кишинев, 2026

Структура диссертации: введение, три главы, общие выводы и рекомендации, библиография из 230 наименований, 22 приложений, 150 страниц основного текста, 21 рисунок, 30 таблиц. Результаты исследования опубликованы в 11 научных работах.

Ключевые слова: органическое сельское хозяйство, государственная поддержка, сертификация, экономическая эффективность, субсидирование.

Цель работы: теоретико-методологическое обоснование экономической эффективности сельскохозяйственных предприятий с органическим производством и разработка направлений и инструментов государственной поддержки, ориентированных на её повышение.

Задачи исследования:

- изучение концептуальных подходов и эволюции органического сельского хозяйства и оценка его влияния на экономическую эффективность сельскохозяйственных предприятий;
- систематизация и анализ методологических подходов к оценке экономической эффективности, применимых к органическому сельскохозяйственному производству;
- анализ концептуальной и нормативной базы органического сельского хозяйства в европейском и национальном контексте и оценка уровня его развития;
- анализ уровня развития органического сельского хозяйства в Республике Молдова, определение экономической эффективности предприятий с органическим производством и выявление ключевых факторов влияния;
- обоснование приоритетных направлений государственной поддержки для повышения эффективности сельскохозяйственных предприятий с органическим производством;
- оценка влияния субсидирования на экономическую эффективность сельскохозяйственных предприятий с органическим производством;
- разработка системы государственной поддержки для продвижения стратегических направлений органического производства в сельскохозяйственных предприятиях.

Научная новизна и оригинальность: Впервые на национальном уровне проведён анализ экономической эффективности органического сельского хозяйства на основе первичных данных и эконометрического моделирования. Предложено и апробировано общенациональное определение органического сельскохозяйственного предприятия как преимущественно органической экономической единицы (≥50 % площадей и/или доходов), обеспечивающее чёткое разграничение получателей государственной поддержки. Выявлены экономические, структурные и институциональные факторы, определяющие эффективность органических сельскохозяйственных предприятий, а также механизмы влияния государственной поддержки на их результаты. В анализ интегрированы аспекты экономического сотрудничества, человеческого капитала и управленческого потенциала с акцентом на роль кооперативных форм и системы AKIS. Разработаны стратегические направления и система государственной поддержки, ориентированные на повышение экономической эффективности органического сельского хозяйства и адаптированные к условиям Республики Молдова.

Решения важной научной задачи: Уточнено содержание экономической эффективности органического сельского хозяйства; интегрированы экономические, институциональные и организационные аспекты анализа; обоснована модель государственного вмешательства, ориентированная на устойчивый рост эффективности.

Террористическая значимость работы: Результаты исследования способствуют теоретическому обоснованию концепции органического земледелия и объяснению влияния экономических и институциональных факторов на результаты деятельности органических сельскохозяйственных предприятий.

Прикладная значимость работы: Заключается в использовании инструментов экономического и эконометрического анализа для оценки эффективности органических сельскохозяйственных предприятий и применении полученных результатов при разработке экономических решений и политики государственной поддержки, ориентированной на устойчивом развитии.

Внедрение научных результатов: Результаты исследования внедрены в деятельность органов публичной власти и профильных организаций в сфере органического сельского хозяйства, что подтверждается прилагаемыми сертификатами.

ANNOTATION

Diana Coșalîc, "Increasing the Economic Efficiency of Organic Agriculture in the Republic of Moldova", PhD thesis in Economic Sciences, Chisinau, 2026

Structure of the thesis: introduction, three chapters, general conclusions and recommendations, bibliography of 230 titles, 22 annexes, 150 pages of main text, 21 figures, 30 tables. The results obtained are published in 11 scientific papers.

Key words: organic farming, public support, certification, economic efficiency, subsidies.

Research goal: theoretical and methodological foundation of the economic efficiency of agricultural holdings with organic production and the development of directions and instruments of public support aimed at increasing the economic efficiency of organic farming.

Research objectives:

- Studying the benchmarks/conceptual approaches and the evolution of organic farming and highlighting its implications on the economic efficiency of farms;
- Systematization and analysis of methodological approaches for assessing the economic efficiency applicable to organic agricultural production;
- Analysis of the conceptual and normative framework of organic farming in European and national context and assessment of the level of development of organic farming;
- Analysis of the level of development of organic agriculture in the Republic of Moldova and determination of the level of economic efficiency of agricultural holdings with organic production, identification of the main factors influencing their economic efficiency;
- Identifying and arguing the priority directions of public support for increasing the efficiency of agricultural holdings with organic production;
- Assessment of the impact of subsidization on the economic efficiency of organic farms;
- Developing a public support framework for the promotion of strategic ecological areas within farms.

Scientific novelty and originality: Carrying out, for the first time at national level, an analysis of the economic efficiency of organic farming, based on primary data and econometric modelling; Proposing and using an operational definition of organic farming as a predominantly organic economic unit (≥50% of areas and/or income), which allows for a clear delineation of the beneficiaries of public support; Identification of economic, structural and institutional factors impacting on the economic efficiency of organic farms and the mechanisms through which public support influences their performance; Integration of economic cooperation, human capital and managerial capacity in the analysis of the efficiency of organic farming, highlighting the role of associative forms and the AKIS system; Elaboration of strategic directions and a public support framework aimed at increasing the economic efficiency of organic farming, adapted to the conditions of the Republic of Moldova.

The important scientific problem solved: conceptual clarification of the economic efficiency of organic farming in the context of public policies; integrating economic, institutional and organizational dimensions into the analysis of the efficiency of organic farms; substantiating a public intervention model oriented towards economic efficiency and sustainability.

Theoretical significance: The results obtained in this paper can be used as theoretical foundation of the concept of organic farming and to the explanation of the influence of economic and institutional factors on the performance of organic farms.

Applicative value of the thesis: consists of using economic and econometric analysis tools to assess the economic efficiency of organic farms and capitalizing on the results in substantiating economic decisions and supporting public policies, contributing to increasing economic efficiency and orienting organic farming towards a sustainable development model.

Implementation of scientific results: The results of the research were implemented in the activity of public authorities and organizations in the field of organic farming, according to the attached certificates.

DIANA COȘALÎC

INCREASING THE ECONOMIC EFFICIENCY OF ORGANIC AGRICULTURE IN THE REPUBLIC OF MOLDOVA

521.03 – ECONOMY AND MANAGEMENT IN THE FIELD OF ACTIVITY

Abstract of the Doctoral Thesis in Economic Sciences

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