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INNOVATION MANAGEMENT AS A TOOL FOR ENHANCING THE PERFORMANCE OF AGRI-FOOD ENTERPRISES

521.03 – ECONOMY 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 addressed topic. Under the current conditions, when society is profoundly affected by a wide range of external factors, such as unfavorable natural phenomena, geopolitical events, financial instability, etc., the concern for continuous economic growth, food security, and the well-being of the population increasingly highlights the significance of the agri-food sector. On the other hand, the analysis of the economic performance of the agri-food sector of the Republic of Moldova has made it possible to ascertain the existence of a wide range of problems, namely: the absence of stable growth trends in the value of the obtained production; the existence of a significant number of inefficient entities; the slow growth of the value of exported agri-food production and the significant reduction in its share in total exports. Thus, we deduce the necessity of an optimal mobilization of the factors that enhance the performance of the agri-food sector, one of the most relevant being innovation activity. The general recognition of the role of innovations in improving performance in all fields already represents an argument for placing them in the attention of decision-makers in the agri-food sector.

Based on the aspects presented above, the importance of investments in innovations can be highlighted, as well as the fact that the economic justification of decisions to invest in one type of innovation or another must be carried out through the use of appropriate tools and based on detailed studies of the factors that may disrupt the proper course of the innovation implementation process. The identification and detailed analysis of the vulnerability of different types of innovations to various factors that hinder them, the knowledge of the consistency and the impact with which one factor or another may impose itself, represent important steps to be followed in the complex and responsible approach of investing in innovation activities. On the other hand, the managerial efforts made are justified by the results obtained by the entities, expressed in the increase of their competitiveness and, in this way, in the growth of the sector's contribution to ensuring the economic and social prosperity of the state.

The aim of the work consists in elucidating and evaluating the impact of innovation management on the performance of agri-food enterprises.

The research objectives assumed and achieved for the purpose of attaining the predetermined aim consist in: the synthesis of theoretical approaches regarding innovation management and its role in enhancing the performance of enterprises; the evaluation of the current level of application of innovation management in agri-food enterprises in the Republic of Moldova; the identification and analysis of barriers to innovation in the agri-food sector of the Republic of Moldova; the quantification of the impact of investments in innovations on the

economic performance of agri-food enterprises and, in this way, the justification of the role of innovation management in ensuring the prosperity of the sector; the quantification of the impact of innovation barriers on the potential reduction of profit; the elucidation of opportunities for intensifying the application of innovation management in agri-food enterprises in the Republic of Moldova.

The research hypothesis consists in the assumption that innovation management has a significant impact on the economic performance of enterprises in the agri-food sector, the investments carried out in innovations contributing substantially to the increase of their profitability.

The degree of study of the problem. Innovation management represents a subject widely addressed by researchers and experts at the current stage, with their agreement being noted on the fact that innovations exert an influence on the performance of enterprises. At the same time, the methodology for measuring the impact imposes itself as a subject of scientific discussions, by virtue of the fact that the success or failure of activities depends on a wide range of factors, endogenous and exogenous, quantifiable and non-quantifiable. Likewise, divergences are noted in the presentation and systematization of the factors that hinder innovation and, implicitly, in the elucidation of the directions of action aimed at reducing their harmful influence.

The bibliographic and historiographic study carried out made it possible to identify a series of researchers who have made essential contributions to the creation of the theoretical foundations of innovation management, among whom we can mention: Schumpeter, Drucker, Kimberly, Van de Ven, Evan, Daft, Damanpour, Walker, Hamel, Mol, Devece, Vaccaro, Hervas-Oliver. We also note the local researchers, such as: Bugaian, Jalenco, Graur, Doga-Mîrzac, Prisăcaru, Dobrovolschi, Litvin, Ciloci, Șavga, Cimpoieș.

Synthesis of the research methodology and justification of the chosen research methods. The research objectives were achieved through the application of a wide range of research methods, as follows: the synthesis of theoretical approaches regarding the investigated subject involved a detailed bibliographic and historiographic study, carried out through the methods of analysis, synthesis, abstraction, induction, and deduction, which represent adequate tools for theoretical studies; the assessment of the current level of application of innovation management in the agri-food enterprises of the Republic of Moldova and of the barriers to innovation involved the methods mentioned above, as well as the use of tabular and graphical representation methods at the stage of primary data processing and results presentation, as well as the grouping method, economic-statistical analysis, and the technique of semi-structured thematic interviews; the quantification of the impact of investments in innovations on the economic

performance of agri-food enterprises was carried out predominantly through the method of stochastic factorial analysis – Huber robust linear regression, in combination with the general research methods highlighted above: synthesis, abstraction, induction, and deduction; the quantification of the impact of innovation barriers on potential profit reductions was carried out using the Ridge regression method; the formulation of directions for the rationalization and efficiency improvement of innovation management involved the use of synthesis, induction, deduction, and generalization.

The relevance of the selected methods is justified by the effects obtained, namely, the achievement of the assumed research objectives.

As an informational basis for the research, a wide range of scientific and analytical publications related to the topic, the available data of the National Bureau of Statistics of the Republic of Moldova, data from the official European Union page (Eurostat), and the results of the semi-structured thematic interview, among others, were used.

The object of the research is the totality of new (innovative) processes and practices of the agri-food enterprises in the Republic of Moldova.

The novelty and originality of the paper can be justified by the following arguments: a diagnostic of the innovation activity of agri-food enterprises was carried out, given that the national statistical research 1-Inov does not include agricultural enterprises, and the statistical data concerning food and beverage manufacturing enterprises are incomplete; the vulnerability of each type of innovation to the factors that hinder innovation, as well as the intensity of the influence of each factor, was determined based on the provisions of the third edition of the Oslo Manual for collecting and interpreting innovation data, developed by the Organisation for Economic Co-operation and Development (OECD) and Eurostat; the impact of investments in innovation on economic performance was assessed and demonstrated separately for agricultural enterprises and for those in the food industry, as well as in aggregate for agri-food enterprises, using the robust Huber linear regression method; the impact of various innovation barriers on the potential decreases in the profit of enterprises in the agri-food sector was quantified by applying several analytical instruments, such as grouping methods, economic-statistical analysis, and Ridge regression.

The theoretical significance of the thesis. The results obtained in the paper can be utilized as support in the conceptualization of innovation and innovation management, in reflecting their connection with performance, in quantifying the impact of innovations on the economic performance of enterprises, as well as the impact of innovation barriers on potential profit reductions.

The practical value of the thesis can be argued as follows:

1. At the theoretical-methodological level – the results can be adopted and applied within initial and continuous professional training, through their inclusion in the teaching process by vocational and higher education institutions within courses related to innovation management, as well as in training programs for managers and specialists of agri-food enterprises. The results can also be utilized by researchers interested in the field of innovations across various domains to deepen their investigations;

2. At the macroeconomic level – the research results, particularly those concerning the impact of innovations and the associated barriers, will be useful to sectoral management representatives: the Ministry of Agriculture and Food Industry, the Ministry of Economic Development and Digitalization, as well as professional associations, for improving sectoral policies by facilitating innovation activities;

3. At the microeconomic level – the tools used in the study can be adopted and applied by managers of agri-food enterprises in the economic justification of decisions regarding the implementation of innovations.

CONTENT OF THE THESIS

In Chapter 1 of the thesis, *Theoretical Approaches to Innovation Management and Its Impact on Enterprise Performance*, a historiographic overview is conducted on the conceptualization of innovation, innovation management, and performance.

The term "innovation" was first defined in the 1880s with the meaning of "unusual", and one of the authors who made a substantial contribution to the deepening of the concept is Schumpeter, who perceives innovation as "the implementation of new combinations that result in development" (Schumpeter, 1934, p. 66). In the 2018 edition of the OSLO Manual, the term innovation is examined as "a new or improved product or process (or a combination thereof) that differs significantly from the unit's previous products or processes and has been made available to potential users (product) or used by the unit (process)" (OECD, 2018, p. 20).

Continuing the research, we will refer to the term innovation management, which, through a review of relevant publications, allows us to observe that both in everyday economic language and in scientific usage, it is examined mainly from the perspective of the applied aspect of innovations in enterprise activity, while initially researchers' attention was focused more on technological innovation.

The first to distinguish between technological innovation and managerial innovation (which he calls administrative) is Evan (1966, p. 51).

Subsequently, numerous publications can be identified in which attempts are made to conceptualize managerial innovation, using various terms with the same meaning, such as administrative innovation or organizational innovation (Giuliani, Le Roy, and Robert, 2018, p. 47).

Hamel and Breen (2007, p. 32) position managerial innovation as significantly more important than product-focused innovation. The authors note that "innovation comes in many forms: operational innovation, product innovation, strategic innovation, and, of course, management innovation." By studying the importance and impact of each type of innovation and acknowledging that each plays a significant role in the existence of an efficient enterprise, they emphasize that managerial innovation should be ranked first, and understanding this fact is "an important step in strengthening innovative practices in managerial activity."

Even though the significance of managerial innovation was increasingly emphasized in scientific approaches, the role of technological innovation, expressed through new or improved products and processes, is also highlighted as an indispensable factor for performance. Thus, Van de Ven, for example, promotes the reasoning that in the absence of product or process innovations, an enterprise ceases to develop and becomes non-competitive. In other words, "without new ideas

and ways to improve capabilities and develop new products or processes, organizations become stagnant" (Van de Ven, 1986, p. 596).

Based on the reflections above, we deduce that the concept of innovation management involves both focusing on the design and implementation of technological innovations and the execution of managerial tasks at a qualitatively new level, in an innovative manner. Therefore, we support a comprehensive approach to innovation management, encompassing both technological and managerial elements, and in this context, we consider it relevant to define it as the totality of new processes and practices, implemented through the synergy of technological and managerial dimensions, aimed at modifying the way an enterprise operates by introducing new techniques and strategies, with the expected result being the enhancement of the enterprise's performance (Străinu, 2020).

In order to assess the role of innovation management in enhancing enterprise performance, it is necessary to undertake a conceptual exploration of performance, which is carried out in subchapter 1.2, *The Essence and Content of Performance*. The increasingly active presence of the term "performance," not only in scientific debates but also in analytical endeavors and the vocabulary of businesspeople, is driven by managers' major concern for the success of companies and the sustainability of businesses in an extremely flexible and turbulent environment.

Implicitly, we also note the absence of a common opinion among researchers regarding the systematization of conceptual approaches to performance. At the same time, we observe that most studies embed performance approaches within a temporal framework. And even though there are differences in the content and duration of the stages from case to case, a synthesis study allowed us to deduce that the majority of opinions converge around four basic stages, as presented in Figure 1.

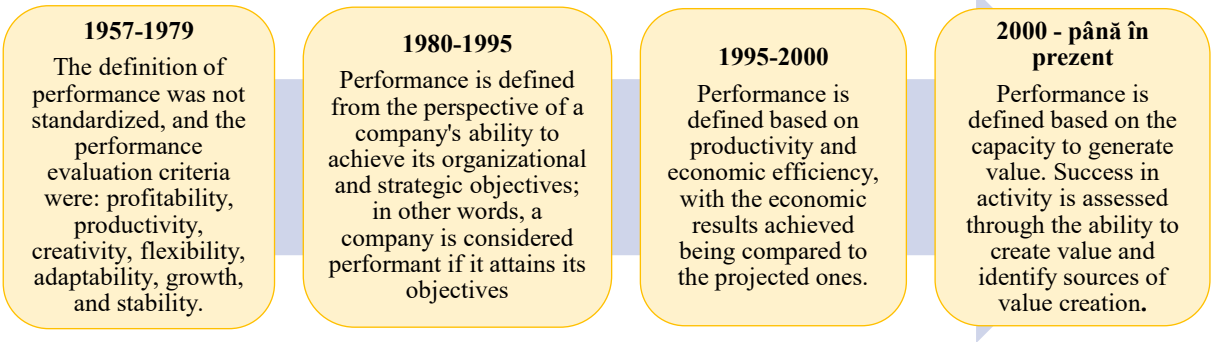

Fig. 1. Stages in the Conceptualization of Performance

Source: synthesized by the author based on (Pintea & Nistor, 2011; Burescu, 2024; Pintea & Achim, 2010; Avram (Boitoș) & Rus, 2013)

Also, starting from the 2000s, alongside economic concerns, environmental protection considerations have been emphasized in the system of performance evaluation criteria, contributing to the shaping of the concept of overall performance. The latter, although also associated with creating value for each of the stakeholders with whom the economic entity interacts, includes not only the firm's capacity to obtain profit and, consequently, financial efficiency, but also extra-economic dimensions.

According to Chiriac's opinion, "a performing entity is that enterprise which creates value for its shareholders, satisfies its customers, considers the opinion of its employees, all while also taking care to respect the natural environment" (Chiriac, 2014, p. 80).

By generalizing the above, we can assert with certainty that the global approach to performance is characterized by complexity and depth. At the same time, we notice the expansion of performance evaluation criteria in the case of overall performance, through the incorporation of those referring to environmental impact, social equity, and ethical governance. Consequently, the need to evaluate performance not only through economic efficiency indicators (productivity, profit, profitability, etc.), but also through broader analyses, encompassing the full range of sustainable development indicators that address, alongside the economic dimension, the environmental and social dimensions, becomes increasingly prominent.

In this context, we consider that an organization's performance can be defined as a strategic endeavor aimed at achieving the organization's objectives, based on the most efficient management of available resources to continuously enhance competitiveness and ensure sustainable activity (Străinu and Prisăcaru, 2020).

Subchapter 1.3, *The Place and Role of Innovation Management as a Factor in Enhancing Enterprise Performance,* synthesizes researchers' opinions regarding the impact of innovation management on enterprise performance and presents models of the influence of innovations on enterprise performance.

The current conditions, extremely flexible, in which companies operate across all sectors, increasingly confirm the significance of innovation management, aimed at ensuring the improvement of organizational performance, enhancing the company's competitive advantage, as well as creating the image of an innovative company (Simciuc, Cimpoieș, 2017). In this context, the role of innovation management is undoubtedly essential, as it combines managerial innovation and technological innovation.

Even though a number of researchers have highlighted the distinct impact of the managerial dimension of innovation management, namely managerial innovation, on enterprise performance and have noted that it helps organizations in various ways and has a positive effect on multiple

aspects of them (Mol and Birkinshaw, 2009, p. 1269), as well as that "over the last century, managerial innovations have helped enterprises achieve new performance thresholds to a greater extent than any other type of innovation" (Hamel, 2006, p. 72), the contribution of technological innovation to enterprise performance is also considered significant in the specialized literature.

Among those who advocate for the significant role of technological innovation on enterprise performance are Kline and Rosenberg (1986), Stratan (2010), and Bugaian, Mamăligă, and Ciobanu (2015). Thus, Kline and Rosenberg (1986) specify that "technological innovation is absolutely essential for economic growth." Particularly for the prosperity of the Republic of Moldova, the necessity of "overcoming the barriers that create impediments to the implementation of innovative technologies" and the "indispensability of attracting the technical progress achieved by developed countries into the economies in transition, as is the case of the Republic of Moldova's economy" is emphasized (Stratan, 2010, p. 62; Bugaian, Mamăligă, and Ciobanu, 2015, pp. 103–104).

Despite many researchers highlighting the role of managerial innovation in enhancing enterprise performance, hypotheses also emerge suggesting that optimal effects are achieved through the "tandem" of both dimensions of innovation management, namely managerial and technological innovation. Zhang et al. (2019, p. 17), to determine how managerial and technological innovation influence enterprise performance, used data from a survey conducted on a sample of 304 enterprises. At the conclusion of the study, it was confirmed that both managerial and technological innovation contribute significantly and positively to organizational sustainability and performance.

Noting, however, the lack of concrete opinions on how innovation management impacts enterprise performance, we propose a model of the influence of innovation management on enterprise performance, developed based on the models proposed by Walker, Damanpour, and Devece (2011, p. 378), by complementing their fully intermediate model of the managerial innovation influence mechanism with the constituent elements of innovation management, namely: managerial innovation and technological innovation (Figure 2).

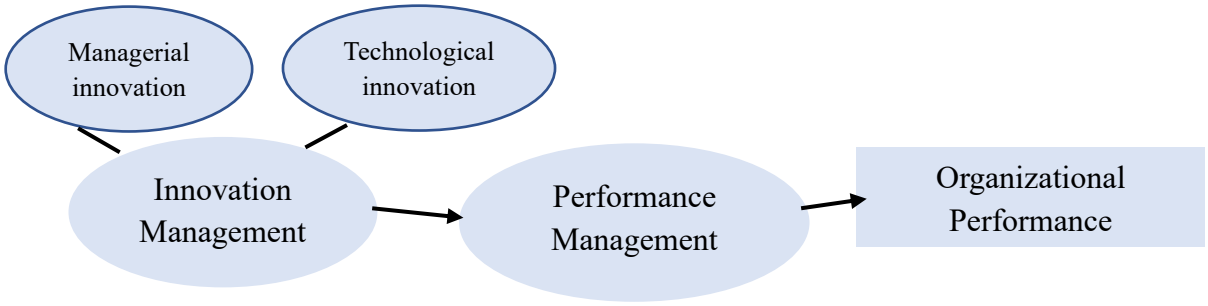

Fig. 2. The Influence of Innovation Management on Enterprise Performance

Source: completed by the author based on (Walker, Damanpour, and Devece, 2011, p. 378)

Thus, we can propose the following hypothesis: from the necessity to innovate, new practices and ideas are proposed, which are later developed into innovation management strategies that, once implemented, enhance the enterprise's performance through the implementation of technological and managerial innovations (Străinu, 2021).

In Chapter 2 of the thesis, *Evaluation of the Innovative Activity of the Agri-Food Sector of the Republic of Moldova*, Subchapter 2.1, *Characteristics of the Agri-Food Sector of the Republic of Moldova from the Perspective of Enterprise Economic Performance Indicators*, begins with the identification of the specific branches of the agri-food sector, thus establishing the categories of enterprises to be investigated in the study, namely: agricultural enterprises and food and beverage manufacturing enterprises.

In this context, we support the vision regarding the agri-food sector presented by Simion and Iancu, who state that it can be examined from the perspective of two "aggregates": agriculture and the food industry, each consisting of sub-branches (Simion and Iancu, 2001, pp. 11–12), and we consider it relevant to approach the composition of the agri-food sector based on the standard classification of economic activities presented in the Classifier of Activities in the Economy of Moldova (CAEM-2; Prisăcaru, 2021, p. 18).

A significant aspect in the functioning of agri-food enterprises is represented by the obtained economic and financial indicators, which reflect the performance achieved and its evolution over time. The analysis of the indicators reflecting the economic performance of the agri-food sector during the period 2017–2023 highlighted the absence of stable growth trends in the value of total agricultural production as well as in the food industry sector, with the exception of beverage production, as shown in Figures 3, 4, and 5.

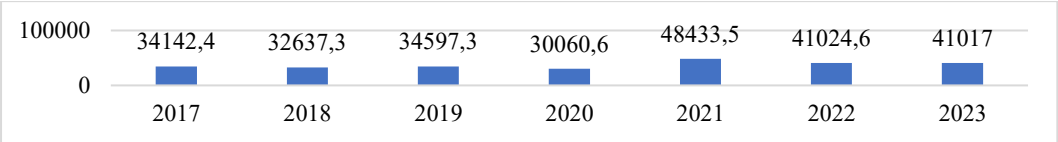

Fig. 3. Evolution of total agricultural production obtained in the period 2017–2023, million MDL, current prices

Source: developed by the author based on (National Bureau of Statistics of the Republic of Moldova. Economic Statistics. Agriculture)

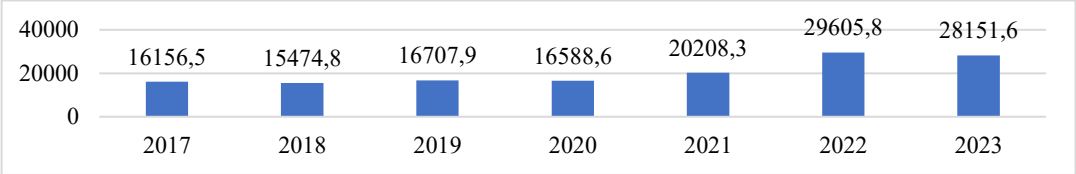

Fig. 4. Evolution of production obtained by food industry enterprises in the period 2017–2023, million MDL, current prices

Source: developed by the author based on (National Bureau of Statistics of the Republic of Moldova. Economic Statistics. Industry)

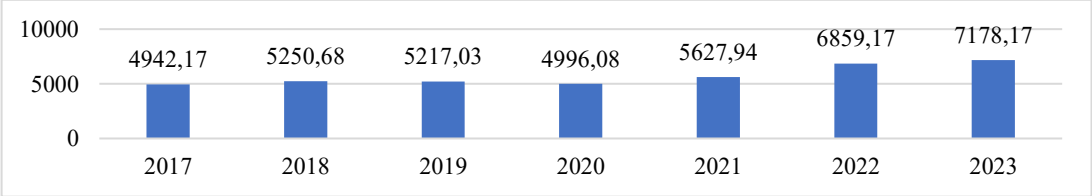

Fig. 5. Evolution of beverage production in the period 2017–2023, million MDL, current prices

Source: developed by the author based on (National Bureau of Statistics of the Republic of Moldova. Economic Statistics. Industry)

Similarly, a decrease in the share of agri-food production in total sales revenue at the national level was observed in 2023 (Figure 6), as well as the existence of a significant number of inefficient entities (Table 1).

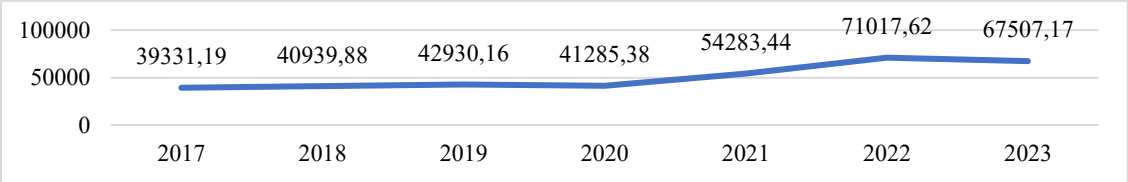

Fig. 6. Evolution of revenue from the sale of agri-food production in the period 2017-2023, million MDL, current prices

Source: developed by the author based on (National Bureau of Statistics of the Republic of Moldova. Entrepreneurship)

Table 1. Evolution of the number of enterprises in the agri-food sector of the Republic of Moldova that incurred losses in the period 2017–2023, units

Branch Name	Years						
	2017	2018	2019	2020	2021	2022	2023
Agriculture, Hunting, and Related Services	1163	1431	1499	2315	1214	1852	2375
Fishing and Aquaculture	52	53	54	66	49	45	51
Food Industry	490	454	411	474	382	381	376
Beverage Manufacturing	120	115	105	120	86	103	105
Total	1825	2053	2069	2975	1731	2381	2907

Source: developed by the author based on (National Bureau of Statistics of the Republic of Moldova. Economic Statistics. Entrepreneurship)

Another important outcome aspect of the agri-food sector is its contribution to the country's exports. The comparative evolution of exports of agricultural products, food industry products, and beverages from the Republic of Moldova during 2017–2023 (Figure 7) indicates, however, that despite a general upward trend, the growth rate of agricultural product exports is higher, whereas the export of food industry products and beverages shows only modest growth trends.

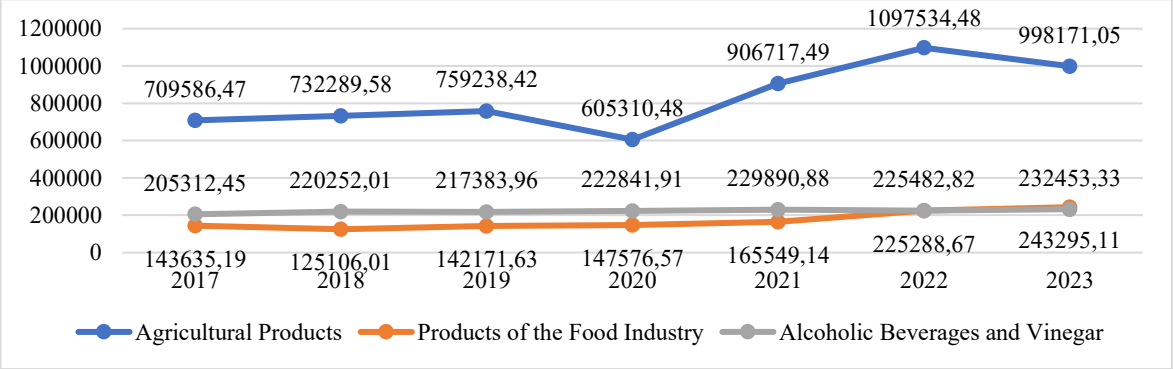

Fig. 7. Comparative evolution of exports of agricultural products, food industry products, and beverages from the Republic of Moldova in the period 2017–2023, thousand USD, current prices

Source: developed by the author based on (National Bureau of Statistics of the Republic of Moldova. Economic Statistics. Foreign Trade)

By generalizing the above, we note that the agri-food sector of the Republic of Moldova, despite being represented by an increasing number of enterprises, does not exhibit pronounced trends of economic performance growth. A fluctuating evolution of the value of production obtained is observed, along with the inefficient activity of a significant number of entities (42.72% of the total number of enterprises in 2023) and the slow growth of agri-food exports. In the context

of these highlighted problems, we deduce the existence of ineffective and inefficient management of the performance-generating factors.

The significance of the agri-food sector for the economic and social prosperity of the Republic of Moldova is indisputable, stemming primarily from its role in ensuring the country's food security. An important argument in this regard is that, even though it is declining, agriculture's contribution to the gross domestic product remains at a representative level, accounting for 7.1% in 2023 (National Bureau of Statistics of the Republic of Moldova. Economic Statistics. Entrepreneurship).

Even though there are no separate statistical data on the contribution of the food and beverage manufacturing industries to the gross domestic product, we will refer to the contribution of the processing industry, within which the production obtained by the food and beverage industries accounts for over 43% (food industry – 35% and beverage manufacturing – 8%), these being among the main sub-sectors supporting the sector according to government acts (National Industrial Development Program for 2024-2028). Thus, according to official statistical data, the contribution of the processing industry to the gross domestic product in 2023 was approximately 8.4% (National Bureau of Statistics of the Republic of Moldova. Economic Statistics. National Accounts).

Enterprises in the agri-food sector also hold a significant share of total sales revenue, which in 2023 amounted to 10.61% (National Bureau of Statistics of the Republic of Moldova. Economic Statistics. National Accounts).

Based on the above, we deduce the necessity of optimally mobilizing the factors that enhance the performance of the agri-food sector, one of the most significant being innovative activity.

In subchapter 2.2, *Implementation of Innovation Management in Enterprises of the Agri-Food Sector*, an introspection was conducted into the innovative activity of agri-food enterprises. For this purpose, the results of an opinion survey carried out between July 2023 and April 2024 were used, employing the semi-structured thematic interview method, with questionnaires completed by phone. The survey involved 107 agricultural enterprises, food industry, and beverage manufacturing enterprises with more than 9 employees.

During communication with the respondents, a series of significant aspects were addressed, of which three will be detailed below:

1. Evaluation of the situation regarding the implementation (or non-implementation) of investments in innovations during the period 2021–2022;
2. Identification of the type(s) of innovation implemented in each enterprise;

3. Comparative evaluation of the volume of resources invested in different types of innovations.

The representativeness coefficient of the samples is presented in Table 2.

Table 2. Representativeness coefficient of the samples targeted in the opinion survey

Type of enterprises by sectoral affiliation	Number of enterprises evaluated	Total number of enterprises in 2022	Sample representativeness coefficient
Agricultural enterprises	66	5315	0,01
Food and beverage manufacturing enterprises	41	1156	0,035
Total	107	6471	0,017

Source: developed by the author based on (National Bureau of Statistics of the Republic of Moldova. Economic Statistics. Entrepreneurship)

In order to obtain the most accurate responses during the interview, it was necessary to explain to the respondents the essence of innovative activity and the types of innovation, based on the typology proposed by the Organisation for Economic Co-operation and Development, which identifies four types of innovation: product innovation, process innovation, organizational innovation, and marketing innovation. It should be noted that this typology is also used as a basis in Statistical Survey No. 1 – INOV conducted by the National Bureau of Statistics of the Republic of Moldova (National Bureau of Statistics of the Republic of Moldova. For respondents. Statistical forms, 2023), applied only in the industry and services sectors. Consequently, as a result of communication with the respondents, it was found that, in most cases, they do not correctly perceive the notion of innovation and, therefore, do not consider that the enterprise they represent is innovative, which also explains the extremely low number of innovative enterprises, according to the data provided by the National Bureau of Statistics of the Republic of Moldova (National Bureau of Statistics of the Republic of Moldova. Economic statistics. Entrepreneurship).

Indeed, within the opinion survey, out of the 107 respondents, 98 stated that the enterprises they represent invested in innovations during the period 2021–2022, including 61 agricultural enterprises and 37 enterprises from the food and beverage industry. At the same time, as observed in Figure 8, 30 agricultural enterprises (49%) implemented a single type of innovation, the majority (44%) opting for process innovations. Thirty-one enterprises applied two or more types of innovations. Of these, 18 (30%) combined process and product innovations, 2 (3%) – organizational and marketing innovations, while 11 (18%) integrated multiple types of innovations.

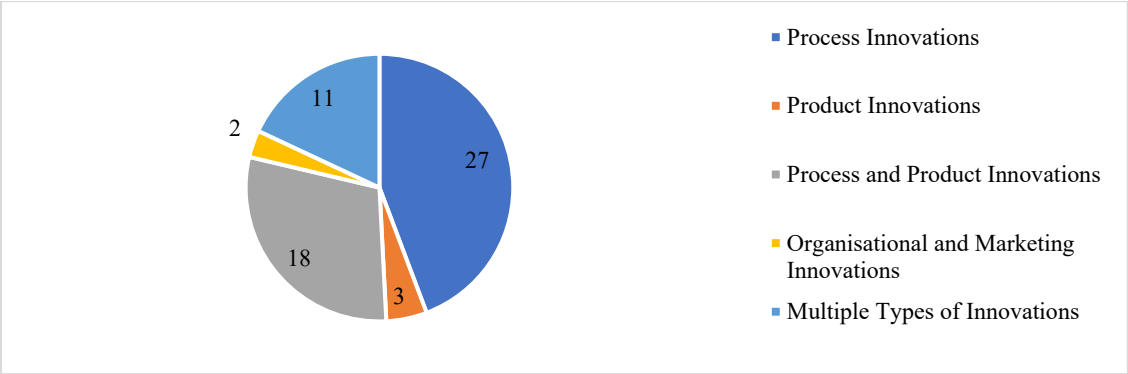

Fig. 8. Number of agricultural enterprises by types of innovations applied during the period 2021–2022, units

Source: developed by the author based on the results of the opinion survey

Of the 37 food industry and beverage manufacturing enterprises that implemented innovations during 2021–2022, 22 (59%) invested in a single type of innovation, including 16 (43%) in process innovations, 4 (11%) in product innovations, and 2 enterprises (5%) in organizational and marketing innovations. Fifteen enterprises (40%) combined two or more types of innovations, of which 14 (37%) combined process and product innovations, and one implemented multiple types of innovations (Figure 9).

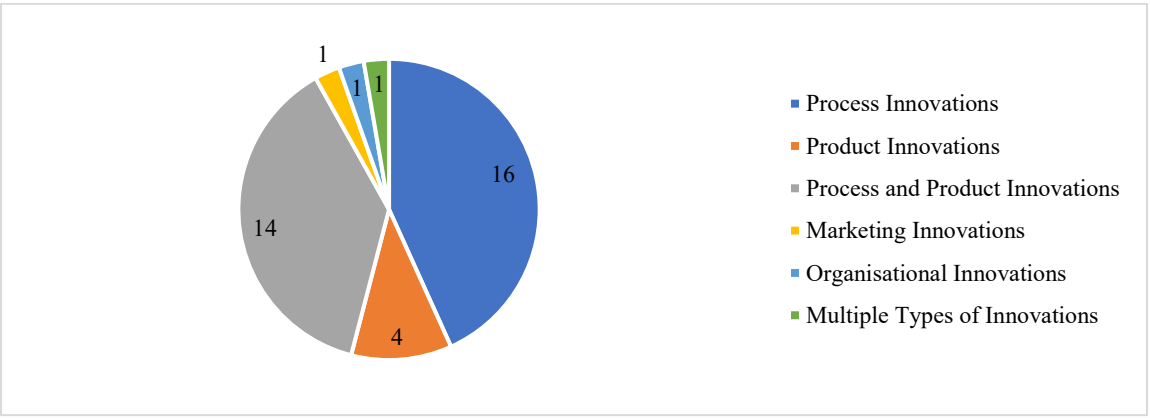

Fig. 9. Number of food and beverage enterprises by types of innovations applied in the period 2021–2022, units

Source: developed by the author based on the results of the opinion survey

Another important aspect in managing the innovation activities of enterprises is the volume of resources invested. The data regarding the level of resources allocated for different types of innovations are presented in Tables 3 and 4.

Table 3. Volume of resources allocated to various types of innovations during 2021–2022 by agricultural enterprises

Type of innovations	Volume of resources invested, thousand MDL, including:			
	Up to 100	101-500	501-1000	Over 1,000
Process innovations	2	3	2	20
Product innovations	-	-	-	3
Product and process innovations	3	1	3	11
Organizational and marketing innovations	1	1	-	-
Multiple types of innovation	1	4	3	3
Total	7	9	8	37

Source: developed by the author based on the results of the opinion survey

Table 4. Volume of resources allocated for various types of innovation during 2021–2022 by enterprises in the food and beverage industry

Type of innovations	Volume of resources invested, thousand MDL, including:			
	Up to 100	101-500	501-1000	Over 1,000
Process innovations	2	4	3	7
Product innovations	2	2		
Product and process innovations	2	3		9
Marketing innovations		1		
Organizational innovations				1
Multiple types of innovation		1		
Total	6	11	3	17

Source: developed by the author based on the results of the opinion survey

Analyzing the data presented in Tables 3 and 4, we observe that the largest amounts were invested in process innovations and in combined innovations, which target both processes and products. Thus, 20 agricultural enterprises among those investigated, representing approximately 33% of the total, allocated sums exceeding one million lei for process innovations, while another 11 enterprises (18% of the total) made significant investments in combined innovations focused on both process and product. With regard to the enterprises in the food and beverage industry, 7 enterprises (19% of their total) invested over one million lei in process innovations, while 9 enterprises (24%) invested in combined product and process innovations.

In subchapter 2.3, *The Essence, Content, and Impact of Barriers to Innovation on the Performance of Enterprises in the Agri-Food Sector*, at the initial stage, by referring to the Global Innovation Index and examining its evolution in the Republic of Moldova during 2017–2024, a visible regression was observed from 36.8 points to 28.7 points, with the exception of 2018, when an increase was recorded (Dutta, Lanvin, and Wunsch-Vincent, 2017; Dutta, Lanvin, and Wunsch-Vincent, 2018; Dutta, Lanvin, and Wunsch-Vincent, 2019; Dutta, Lanvin, and Wunsch-Vincent, 2020; Dutta et al., 2021; Dutta et al., 2022; Dutta et al., 2023; Dutta et al., 2024).

In the context of these findings, a comprehensive study of innovation barriers was conducted. In this regard, based on the third edition of the Oslo Manual (OECD, 2005), five basic factors that hinder innovation were identified: cost-related factors, knowledge-related factors, market factors, institutional factors, and other factors.

To analyze the perception of managers and specialists of the investigated enterprises regarding the extent to which certain barriers hinder innovation in agri-food enterprises in the Republic of Moldova, the aforementioned survey included two questions: the first aimed to identify the specific factors that hinder innovation in each enterprise, allowing multiple responses, and the second to estimate the extent to which each of these factors generates potential profit reduction, with the total reduction of profit equated to 100%. Responses were obtained from all 66 representatives of agricultural enterprises and 40 of the 41 representatives of food and beverage industry enterprises.

By processing the survey results, it was possible to evaluate and measure the extent to which, in the respondents' perception, each of the highlighted factors contributes to profit loss. This was determined as a simple arithmetic mean by summing the contributions indicated by respondents for each general factor and dividing the total sum obtained by the total number of selections for that factor. The obtained data are presented in Figures 10 and 11.

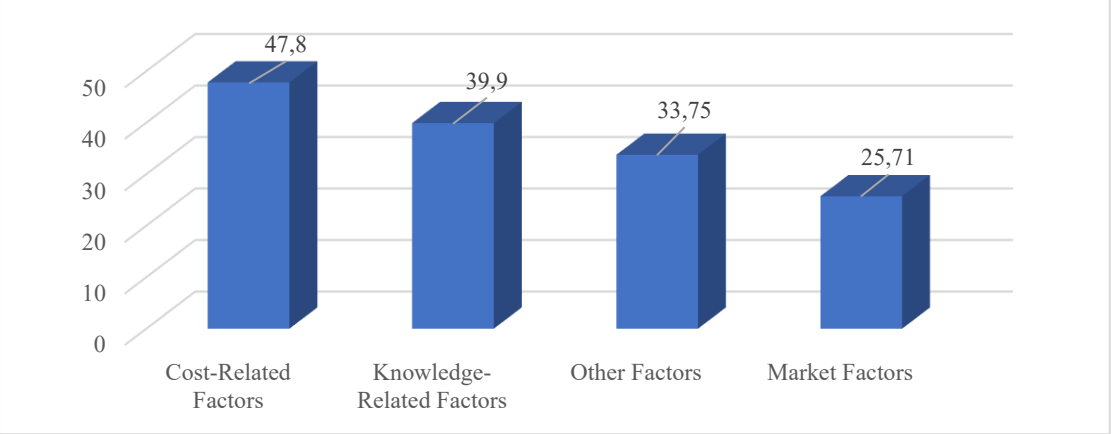

Fig. 10. Average contribution of general factors hindering innovation to potential profit reduction in agricultural enterprises, %

Source: developed by the author based on the results of the opinion survey

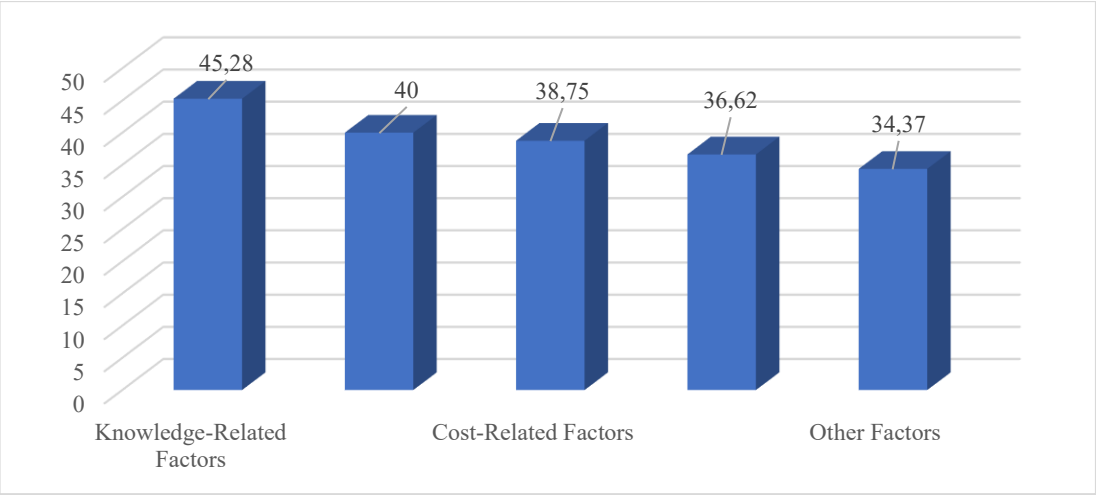

Fig. 11. Average contribution of general factors hindering innovation to potential profit reduction in food and beverage manufacturing enterprises, %

Source: developed by the author based on the results of the opinion survey

A comparative evaluation of the data presented in Figures 10 and 11 allows us to observe that, while the hierarchy of factors in agricultural enterprises remains the same in terms of frequency of occurrence and contribution to potential profit reduction, representatives of enterprises in the food and beverage industry indicated a greater contribution of knowledge-related and institutional factors, even though these factors were mentioned less frequently.

Chapter 3, *Assessing the Impact of Investments in Innovations and Their Associated Barriers on the Performance of Agro-Food Sector Enterprises in the Republic of Moldova*, begins with an initial overview of methodologies for evaluating the impact of innovations on enterprise performance. This is necessary both to present the tools used in various studies and to justify the relevance of the linear regression method, which was effectively employed to achieve the main objective of the research. In this regard, a synthesis study revealed that, despite the challenges associated with measuring the impact of innovations on enterprise performance, it remains a significant challenge for many researchers (Bernal-Torres et al., 2023; Afeltra, 2022; Ntiamoah, Li, and Sarpong, 2019). Among the methods applied to demonstrate the relationship between innovation and enterprise performance, we distinguish: EFA (Exploratory Factor Analysis), CFA (Confirmatory Factor Analysis), SEM (Structural Equation Modeling), linear regression, and PLS (Partial Least-Squares Regression). Implicitly, the importance of linear regression is noted, as it is the most classical method used to determine and model the relationship between variables.

In subchapter 3.2, *Quantifying the Impact of Investments in Innovations on the Performance of Agro-Food Enterprises in the Republic of Moldova*, based on the results of the opinion survey, the impact of investments in innovations was quantified separately for agricultural

enterprises and for enterprises in the food and beverage industry, as well as cumulatively for agro-food enterprises.

Following the descriptive analysis of the data regarding the amounts invested in innovations and the gross profit obtained by the enterprises included in the survey, the presence of outlier values, a positively skewed distribution to the right, and high value dispersion was observed. Given that economic indicators (costs, gross profit) are generally characterized by asymmetry, it is important to select appropriate analytical models to obtain the most accurate results. Specifically, outlier or extreme values represent very small or very large observations that can reduce and distort the information in a dataset (Wada, 2020). The most suitable method for analyzing such data is the use of a robust estimation method (Field, 2013), because removing or replacing outliers would result in the loss of essential data, and the values obtained in the opinion survey conducted in this study do not represent errors, but rather large sums of investments or profits achieved by real enterprises, which, if excluded, would alter the existing reality. On this basis, to determine the size of the coefficients that indicate the percentage increase in profit resulting from the implementation of innovations, the Huber robust linear regression method was selected. A significant advantage of this method is the model's ability to determine valid relationships between variables even in the presence of extreme values and heavy-tailed abnormal distributions, to which ordinary least squares (OLS) linear regression is sensitive (Feng and Wu, 2022).

An essential step of the research is the formulation of the hypotheses, namely:

H_0: $\beta = 0$ – there is no relationship between investments in innovations and the gross profit obtained by agri-food enterprises;

H_1: $\beta \neq 0$ – investments in innovations have a significant effect on the gross profit obtained by agri-food enterprises.

The results and coefficients obtained using the Huber robust linear regression are presented in the model equation:

$$Y_{profit}=1578{,}73+1{,}43\cdot x_{invest}. \quad \textbf{(1)}$$

The estimated regression coefficient for the variable "investments in innovations" is 1.43, which indicates an economic interpretation that for every one thousand lei invested in innovations, the profit will increase by 1,430 lei; in other words, each lei invested in innovations will generate an increase in profit of 1.43 lei. At the same time, the Z-statistic of 18.35 and its p-value < 0.001 demonstrate a strong relationship between investments and gross profit, allowing us to reject the null hypothesis H_0.

A similar Huber robust linear regression analysis was conducted separately for agricultural enterprises and for enterprises in the food and beverage industry, with the hypotheses formulated following the same approach as for the agro-food enterprises:

H_0 $\beta = 0$ – there is no relationship between investments in innovations and the gross profit obtained by agricultural enterprises;

H_1 $\beta \neq 0$ – investments in innovations have a significant effect on the gross profit obtained by agricultural enterprises, with the results presented in the model equation:

$$Y_{profit=1510,57+1,42 \cdot x_{invest}} \quad \textbf{(2)}$$

The estimated regression coefficient for the variable "investments in innovations," with a value of 1.42, allows us to state that for every one thousand lei invested in innovations, the gross profit of agricultural enterprises will increase by 1,420 lei, meaning that each lei invested in innovations generates a gross profit of 1.42 lei. The obtained Z-statistic of 14.89 and p-value < 0.001 demonstrate a strong relationship between investments and the gross profit obtained by agricultural enterprises, thus allowing us to reject the null hypothesis H_0 in favor of the alternative hypothesis H_1.

In the same manner, the research hypotheses were formulated for enterprises in the food and beverage manufacturing industry:

H_0 $\beta = 0$ – there is no relationship between investments in innovations and the gross profit obtained by food and beverage manufacturing enterprises;

H_1 $\beta \neq 0$ – investments in innovations have a significant effect on the gross profit obtained by food and beverage manufacturing enterprises, with the findings expressed in the model equation:

$$Y_{profit=1082,39+2,33 \cdot x_{invest}} \quad \textbf{(3)}$$

The robust estimate of the innovation variable coefficient, with a value of 2.32, allows us to state that for every thousand lei invested in innovations, the gross profit of food and beverage manufacturing enterprises will increase by 2,320 lei, meaning that each lei invested in innovations generates a profit of 2.32 lei. The obtained values for the Z-statistic – 16.98 and $p < 0.001$ – demonstrate a strong relationship between investments in innovations and the gross profit obtained by food and beverage manufacturing enterprises, allowing us to reject the null hypothesis H_0 in favor of the alternative hypothesis H_1.

In Subchapter 3.3, *Quantifying the Impact of Barriers to Innovation on the Performance of Agri-Food Enterprises*, the research proceeded with quantifying the impact of innovation barriers

on potential profit reductions, using the Ridge regression method. The general formula of Ridge regression is (Herawati et al., 2024):

$$\hat{B}_{ridge} = (X^T X + \lambda I)^{-1} X^T Y, \lambda \geq 0 \quad \textbf{(4)}$$

The results obtained for the $\hat{B}_{ridge}$ coefficients are presented in Table 5.

Table 5. Ridge regression coefficients obtained based on the calculations

Ridge value with a penalty of 0.1	
Low market demand for innovative products	-0.331285
High innovation costs (it is expensive to introduce something new)	-0.856716
Deficiencies in attracting external resources (loans, grants, subsidies, etc.)	-0.524371
Difficulties in establishing partnerships for innovation activities (with other enterprises in the field, research institutions, etc.)	-0.419086
Insufficient information about various novelties in the field of activity.	-0.298338
Insufficient qualified personnel capable of developing and implementing innovations.	-0.617208
Insufficient own financial resources.	-0.738878
Others.	-0.476477
Insufficient motivation of enterprise staff for innovation activities.	-0.098001

Source: developed by the author based on the results of the opinion survey

By analyzing the obtained results, we can see that in the ranking of innovation barriers by the magnitude of their impact, high innovation costs occupy the first position, having an effect on potential reductions of gross profit of (-0.856). A strong impact is also exerted by the insufficiency of own financial resources (-0.738).

The following innovation barriers show a moderate impact: insufficient qualified personnel capable of developing and implementing innovations, equated with (-0.617); deficiencies in attracting external resources, such as credits, grants, subsidies, etc., (-0.524); “others,” which included export restrictions, prohibition of sales for the creation of state reserves, states of emergency, including in the context of the pandemic, also exerted a moderately negative influence on the gross profit of enterprises, equated with (-0.476); difficulties in establishing partnerships for innovation activities, (-0.419).

The following barriers in innovation activities are considered to have an insignificant impact, according to respondents: low market demand for innovative products (-0.331); insufficient information about various novelties in the field of activity (-0.298); insufficient motivation of enterprise personnel for innovation activities (-0.098).

GENERAL CONCLUSIONS AND RECOMMENDATIONS

The research carried out, aimed at demonstrating the hypothesis that innovation management has a significant impact on the economic performance of enterprises in the agri-food sector, with investments made in innovations contributing substantially to increasing their profitability and, implicitly, to achieving the objective of elucidating and evaluating the impact of innovation management on the performance of agri-food enterprises in the Republic of Moldova, has led to the formulation of the following conclusions:

1. In order to achieve the objective of synthesizing the theoretical approaches regarding innovation management and its role in enhancing enterprise performance, the bibliographic and historiographic study conducted by examining more than 100 sources has allowed us to state the following:

1.1. Among the multitude of approaches to innovation, we consider that those which examine it in direct connection with the business process are the most relevant. In this context, we support the definition of innovation presented in the OSLO Manual, namely: *"a new or improved product or business process (or a combination thereof) that differs significantly from the firm's previous products or business processes and that has been introduced on the market or put into operation by the firm."*

1.2. Given the evident existence of close links between innovation and creativity, we highlight the complementary relationship between creativity and innovation within innovation management. With reference to innovation management, we support its complex approach by encompassing both technological and managerial elements, and we propose defining it as *"the totality of new processes and practices implemented from the technological dimension to the managerial one, aimed at modifying the way the enterprise operates by introducing new techniques and strategies, the expected outcome being the enhancement of the enterprise's economic performance"* (Chapter 1, paragraph 1.1).

1.3. Taking into account the various approaches to performance across different periods and authors, we propose defining performance as *"a strategic endeavour aimed at achieving the organization's objectives, based on the most efficient management of available resources, in order to continuously increase its competitiveness and sustainability"* (Chapter 1, paragraph 1.2).

1.4. Implicitly, among the models illustrating the influence of innovation management on organizational performance, we highlight the full intermediary model, according to which the mechanism through which innovation management affects enterprise performance operates via performance management. At the same time, although several authors mention technological innovation as something distinct from or complementary to innovation management, we support

the hypothesis that innovation management, by its very essence, integrates both technological and managerial innovation (as reflected in the definition proposed above), with the effects on organizational performance representing a cumulative outcome of both components. Based on the above, we propose complementing the intermediary model of the mechanism through which innovation management influences enterprise performance by indicating the constitutive elements of innovation management, namely: managerial innovation and technological innovation (Chapter 1, paragraph 1.3).

2. The efforts directed toward achieving the objective of evaluating the current level of application of innovation management in agri-food enterprises in the Republic of Moldova resulted in the following general conclusions:

2.1. Given the identification of certain differences in the approach to the agri-food sector, we consider the position of the European Commission regarding this concept to be relevant, the agri-food sector being examined as a complex of activities related to agriculture, food processing, and beverage production. Accordingly, based on the Classification of Activities in the Economy of Moldova (CAEM-2), the corresponding sections were identified, namely: Section A: Agriculture, Forestry and Fishing, and Section C: Manufacturing. Within these, the activities falling under the sector were selected: 8 economic activities from Divisions 01 and 03 of Section A and 10 from Divisions 10 and 11 of Section C (Chapter II, paragraph 2.1). These actions allowed for the identification of the specific branches of the agri-food sector to be addressed in the subsequent analysis;

2.2. The analysis of indicators reflecting the economic performance of the agri-food sector during the period 2017–2023 highlighted a number of issues, namely: the absence of stable growth trends in production value and sales revenue obtained, with the exception of beverage production and sales; the reduction, in 2023, of the share of agri-food production in total national sales revenue; the existence of a significant number of inefficient entities; the absence of continuous trends of improvement in the financial situation of the enterprises analyzed; the slow growth of exported agri-food production value and the significant decrease in its share in total exports in 2023 compared with the previous year (Chapter II, paragraph 2.1). On the other hand, the agri-food sector stands out through a particular significance for the country's economic and social prosperity, this reasoning being supported by: its important role in ensuring national food security; the contribution of agriculture of about 7.1% to the gross domestic product; the essential share of agri-food products in total sales revenue and in the total value of exported goods; the representative number of employed population it comprises (Chapter II, paragraph 2.2). Based on the above, we

deduce the need for optimal mobilization of the factors that enhance the performance of the agri-food sector, one of the most significant being innovation activity;

2.3. The evaluation of the innovation activity of agri-food sector enterprises carried out during the period 2021–2022, conducted through a survey on a sample of 106 respondents (managers and specialists), allowed the following to be established: the majority of enterprises investigated (91.5%) conducted innovation activities during the analyzed period. Among investments in innovation, those directed toward processes and products predominated: approximately 79% of agricultural enterprises and 92% of enterprises from the food and beverage industry implemented process innovations, product innovations, or combined both types. These types of innovations also stand out through the highest amounts allocated by enterprises. At the same time, even though the share of innovative enterprises in the total number of enterprises investigated is high, the scale of innovations is low, a statement justified by the fact that the amounts invested in innovation over two years by about 40% of agricultural enterprises and 54% of enterprises in the food and beverage industry amounted to less than one million lei. Furthermore, a low interest of enterprises in organizational and marketing innovations is observed, which indicates an underestimation of the significance of these types of innovations in ensuring enterprise performance and, respectively, unexploited opportunities for economic growth (Chapter II, paragraph 2.2).

2.4. Despite the fact that recent analytical studies highlight an improvement in the business environment and in innovative entrepreneurship over the past two decades, as well as the existence of an adequate regulatory framework and various funding opportunities, at the national level there is a noticeable deficiency in the efforts of economic agents aimed at stimulating innovation. This statement is supported by the decrease of the Global Innovation Index of the Republic of Moldova during the period 2017–2024 by 8.1 percentage points, accompanied by a deterioration of the country's position in the overall ranking, with a slight improvement observed only in 2018 and 2022 (Chapter II, paragraph 2.3). As a result of the investigations aimed at achieving the objective of identifying and analyzing the barriers to innovation in the agri-food sector of the Republic of Moldova, the following conclusions were formulated (Chapter II, paragraph 2.3):

- Given the identification of numerous studies dedicated to reflecting on innovation barriers and their impact, we consider that the analysis included in the Oslo Manual (third edition) stands out through optimal consistency and relevance, where five general barriers/factors are highlighted: cost-related, knowledge-related, market factors, institutional factors, and other factors. Each general factor contains a series of detailed factors;
- Determining the level of vulnerability for each type of innovation, taking into account the impact of each factor, allowed us to conclude that organizational innovation stands out through a

low level of vulnerability, being influenced by only 10 detailed factors out of 24. Process innovation is influenced by 18 factors, which allows it to be classified as having a vulnerability level at the intersection of medium and high, while marketing innovation and product innovation have a high level of vulnerability. Estimating the intensity of influence of the general factors (the extent to which detailed factors manifest in each type of innovation) allowed us to determine that innovation costs represent the most significant factor affecting innovations, having a maximum intensity of 100%. Also showing a high intensity of impact are the so-called "other factors," which include the demotivation of subjects due to previous innovations or reduced demand, as well as knowledge-related factors and institutional factors. Only market factors have a medium intensity of 50%.

2.5. The evaluation of the specific factors that hinder innovation in the surveyed enterprises of the agri-food sector, based on respondents' perceptions, allowed the formulation of the following conclusions: most respondents in both samples indicated more than one factor, which demonstrates their awareness of the complexity of innovation processes and of the fact that these processes are influenced by driving forces of different natures; among the detailed factors that hinder innovation, representatives of agricultural enterprises most frequently mentioned the high costs of innovation, while those from the food and beverage manufacturing industry indicated the lack of qualified personnel. Thus, we deduce a correct awareness among managers and specialists of enterprises in the agri-food sector regarding the significance of factors that impede innovation, a statement supported by the fact that respondents' opinions largely correspond to the provisions of the Oslo Manual.

2.6. The evaluation of the extent to which each of the factors identified by respondents contributes to profit reduction from their point of view, based on summing the contributions indicated by respondents for each general factor and relating the total amount obtained to the total number of selections of the respective factor, allowed us to conclude that, while agricultural enterprises maintain the same hierarchy of factors both in terms of frequency of occurrence and in terms of contribution to potential profit reduction, the representatives of enterprises in the food and beverage manufacturing industry indicated a greater contribution of factors related to knowledge and institutional factors.

3. The objective of quantifying the impact of investments in innovation on the economic performance of agri-food enterprises and, consequently, of substantiating the role of innovation management in ensuring the prosperity of the sector required a detailed initial analysis of the methodologies applied for this purpose, which allowed us to justify the relevance of the selected method, namely the robust Huber linear regression method. This choice is also justified by the fact

that between investments in innovation and enterprise performance there is no fully functional, deterministic relationship, but a stochastic link (Chapter III, paragraph 3.1). The initial data for conducting the analysis were collected within the opinion survey mentioned above, carried out on a sample of 107 respondents (managers and specialists), including 66 representatives of agricultural enterprises and 41 representatives of enterprises in the food and beverage manufacturing industry. The results obtained allowed the formulation of the following conclusions:

3.1. There is a positive linear correlation between innovation costs and gross profit: as investments in innovation increase, the gross profit of agri-food enterprises increases accordingly (Chapter III, paragraph 3.2);

3.2. In both types of enterprises, innovation costs had a substantial impact on gross profit. Thus, in the agri-food enterprises analyzed as a whole, the profitability of innovations is 43%, in the agricultural enterprises analyzed – 42%, and in the food and beverage manufacturing enterprises – 132% (Chapter III, paragraph 3.2);

3.3. The value $p < 0.001$ associated with the estimated regression coefficient obtained for all three models demonstrates that the models are statistically significant at the 0.1% level (Chapter III, paragraph 3.2).

4. In order to achieve the objective of quantifying the impact of innovation barriers on the potential profit reductions incurred by the analyzed enterprises, the Ridge regression method was used, being applied to the entire sample of analyzed enterprises. The results obtained can be presented as follows (Chapter III, paragraph 3.3):

4.1. The most significant innovation barrier is represented by high costs, having an influence on potential gross profit reductions of (−0.856), followed by the insufficiency of own financial resources (−0.738). A moderate impact is exerted by the following barriers: the insufficiency of qualified personnel capable of developing and implementing innovations was estimated at (−0.617); deficiencies in attracting external resources such as loans, grants, subsidies, etc.: (−0.524); "others," identified as institutional factors: (−0.476); difficulties in creating partnerships for innovation activities: (−0.419). The following barriers exert a low impact: reduced market demand for innovative products: (−0.331); insufficient information about various developments in the field of activity: (−0.298); insufficient motivation of the enterprise's personnel for innovation-related activity – (−0.098001).

4.2. The comparative evaluation of the results obtained in the analysis of the impact of barriers through the Ridge regression method and the findings made by summing the contributions indicated by respondents for each general factor and relating the total obtained to the total number

of selections of the respective factor (mentioned earlier) allowed the identification of a similar result: the major significance of cost-related factors. At the same time, differences in the results obtained were also observed, the most important argument being the different nature of the estimation methods applied. In this context, we argue for a higher relevance of the Ridge regression method, as it ensures greater accuracy of results (Chapter III, paragraph 3.3).

On the basis of the above, recommendations were derived, intended to ensure the achievement of the proposed objective of identifying opportunities to intensify the application of innovation management in agro-food enterprises in the Republic of Moldova, namely:

I. Addressed to managers of agro-food enterprises in the Republic of Moldova:

1.1. Effective combination of different types of innovations, thereby creating the necessary premises for maximizing the performance of the managed entities and, in this way, increasing the competitiveness of the sector;

1.2. Application of tools for quantifying the impact of innovation costs on enterprise performance, as experimented in the study, for the economic justification of investment decisions;

1.3. Elimination or, at least, reduction of the impact of innovation barriers, expressed through profit reduction, by actions aligned with their nature. ***With regard to exogenous barriers, we recommend:*** continuous evaluation of existing external financing opportunities; utilization of information, consultancy, and training opportunities provided by external funding bodies, such as the Organization for Entrepreneurship Development, the Agency for Payments and Intervention in Agriculture, etc., as well as by the Ministry of Agriculture and Food Industry, producer associations, research and innovation organizations, and other public and private organizations; rationalization of the risk management system; more rigorous strategic planning; study and adoption of survival strategy applications by domestic and foreign enterprises; deeper investigation of the innovative products market, identification of uncovered niches in relation to technological development trends and potential consumer demands; identification of new segments for various innovative products; strengthening promotional efforts for new products to attract potential clients; more active collaboration with research and innovation organizations within the country and abroad; pooling efforts and resources with other sector enterprises for the design and implementation of innovations.

With regard to endogenous barriers, we recommend: analysis of innovation project alternatives based on the efficiency criterion; continuous evaluation of existing external financing opportunities; establishment of clear criteria regarding the innovation competencies of candidates at the recruitment and selection stage of enterprise personnel; support for the development of employees' innovation competencies through training, consulting, and guidance activities,

including by utilizing the opportunities offered by the external funding bodies mentioned above, as well as by the Ministry of Agriculture and Food Industry, producer associations, research and innovation organizations, and other public and private organizations; rationalization of the motivation system by including incentives for innovative approaches in work activities; improvement of the performance management system; incorporation of innovation into corporate culture, transforming it into an element of the enterprise's image.

II. Addressed to the Ministry of Agriculture and Food Industry, the Ministry of Economic Development and Digitalization, and relevant associations: improvement of sectoral policies by facilitating innovation activities, using instruments such as: active dissemination of information related to advanced technologies and their impact on enterprise performance; support for innovation and technology transfer activities carried out by enterprises in partnership with research and innovation organizations; facilitation of partnership relations between enterprises and foreign funders; in-depth study and adoption of best practices for implementing innovations in the agri-food sector promoted in countries such as Switzerland, the Netherlands, Singapore, Sweden, etc.

III. Addressed to institutions of initial and continuing professional education: adoption of research findings for inclusion in the training programs of future managers and specialists for the agri-food sector, as well as for the professional development of enterprise personnel.

IV. Addressed to researchers: adoption and deepening of research through diversification of methods for determining the impact of innovation on enterprise performance, as well as the expansion of the range of determining factors, such as: the level of managerial and operational staff competence, the adaptation of the chosen innovation type to market factors, climatic factors, etc.

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1. PRISĂCARU, V., STRAINU, O. Implementation of the innovative management in the food industry enterprises in the Republic of Moldova - current state, barriers, possible solutions. Scientific Papers, Series „Management, Economic Engineering in Agriculture and Rural Development", Vol. 23, Issue 1, 2023, p.659-668. ISSN 2284-7995. E-ISSN 2285-3952. https://managementjournal.usamv.ro/pdf/vol.23_1/Art69.pdf

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6. STRAINU, O. Managementul inovațional – factor al dezvoltării și competitivității întreprinderilor. *Paradigme moderne în dezvoltarea economiei naționale și mondiale. Conferință Științifică Internațională.* Chișinău, USM, 2020, p.438-442. ISBN 978-9975-152-69-3. https://ibn.idsi.md/sites/default/files/imag_file/2.%2BConferinta_Intern_Paradigme_moderne_2020.pdf

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ADNOTARE

Cauș Olga, „Managementul inovațional ca instrument de sporire a performanței întreprinderilor agroalimentare”, teză de doctor în științe economice, Chișinău, 2026

Structura tezei: introducere, trei capitole, concluzii generale și recomandări, bibliografie din 238 titluri, 9 anexe, 125 de pagini de text de bază, 55 figuri, 28 tabele. Rezultatele obținute sunt publicate în 7 lucrări științifice.

Cuvinte cheie: inovație, performanță, management inovațional, bariere în aplicarea inovațiilor, profit.

Scopul lucrării: elucidarea și evaluarea impactului managementului inovațional asupra performanței întreprinderilor agroalimentare.

Obiectivele cercetării:

1. Sinteza abordărilor teoretice cu privire la managementul inovațional și rolul acestuia în sporirea performanței întreprinderilor;
2. Evaluarea nivelului actual de aplicare a managementului inovațional în întreprinderile agroalimentare din Republica Moldova;
3. Identificarea și analiza barierelor în calea inovației în sectorul agroalimentar din Republica Moldova;
4. Cuantificarea impactului investițiilor în inovații asupra performanței economice a întreprinderilor agroalimentare și, pe această cale, argumentarea rolului managementului inovațional în asigurarea prosperității sectorului;
5. Cuantificarea impactului barierelor inovației asupra diminuărilor potențiale de profit;
6. Elucidarea oportunităților de intensificare a aplicării managementului inovațional în întreprinderile agroalimentare din Republica Moldova.

Noutatea și originalitatea științifică: a fost efectuat un diagnostic al activității inovaționale a întreprinderilor agroalimentare, în condițiile în care cercetarea statistică 1-Inov realizată la nivel național nu are în aria de cuprindere întreprinderile agricole, iar datele statistice cu privire la întreprinderile industriei alimentare și de fabricare a băuturilor nu sunt complete; a fost determinată vulnerabilitatea fiecărui tip de inovație la factorii care împiedică inovația, precum și intensitatea influenței fiecărui factor, în baza prevederilor ediției a treia a Ghidului pentru colectarea și interpretarea datelor despre inovare (manualului Oslo) elaborat de Organizația pentru Cooperare și Dezvoltare Economică (OCDE) și Eurostat; a fost evaluat și demonstrat impactul investițiilor în inovații asupra performanței economice, distinct în întreprinderile agricole și ale industriei alimentare, precum și integral, pentru întreprinderile agroalimentare, prin metoda regresiei liniare robuste Huber; a fost cuantificat impactul diferitor bariere ale inovației asupra diminuărilor potențiale ale profitului întreprinderilor sectorului agroalimentar prin operarea cu diverse instrumente de analiză, ca: metoda grupărilor, analiza economico-statistică, regresia Ridge.

Rezultatele obținute care contribuie la soluționarea unei probleme științifice importante: cuantificarea impactului inovațiilor asupra performanței economice a întreprinderilor sectorului agroalimentar; cuantificarea barierelor inovației asupra diminuărilor de profit suportate de către întreprinderile sectorului agroalimentar.

Semnificația teoretică: Rezultatele obținute în lucrare pot fi valorificate ca un suport în conceptualizarea inovației și managementului inovațional, în reflectarea legăturii acestora cu performanța, în cuantificarea impactului inovațiilor asupra performanței economice a întreprinderilor, precum și al barierelor inovației asupra diminuărilor potențiale de profit.

Valoarea aplicativă a lucrării: La nivel teoretico-metodologic - rezultatele pot fi preluate și aplicate în cadrul formării profesionale inițiale și continue. La nivel macroeconomic - rezultatele cercetării, în special cele ce vizează impactul inovațiilor și barierele aferente, vor fi utile reprezentanților managementului sectorial: Ministerul Agriculturii și Industriei Alimentare, dar și ai Ministerului Dezvoltării Economice și Digitalizării, precum și ai asociațiilor de profil pentru perfecționarea politicilor sectoriale prin facilitarea activității inovaționale. La nivel microeconomic - instrumentele folosite în lucrare pot fi preluate și aplicate de către managerii întreprinderilor agroalimentare în procesul de argumentare economică a deciziilor cu privire la implementarea unor inovații.

Implementarea rezultatelor științifice: Rezultatele au fost preluate spre implementare de către 3 entități din sectorul agroalimentar.

АННОТАЦИЯ

Кауш Ольга, «Инновационный менеджмент как инструмент повышения эффективности деятельности агропродовольственных предприятий», докторская диссертация по экономике, Кишинев, 2026 г.

Структура диссертации: введение, три главы, общие выводы и рекомендации, библиография из 238 наименований, 9 приложений, 125 страницы основного текста, 55 рисунков, 28 таблиц. Результаты исследования опубликованы в 7 научных статьях.

Ключевые слова: инновации, эффективность, инновационный менеджмент, барьеры в применении инноваций, прибыль.

Цель работы: выявить и оценить влияние инновационного менеджмента на эффективность деятельности агропродовольственных предприятий.

Задачи исследования:

1. Анализ теоретических подходов к управлению инновациями и его роли в повышении эффективности деятельности предприятия;
2. Оценка текущего уровня применения инновационного менеджмента на агропродовольственных предприятиях в Республике Молдова;
3. Выявление и анализ барьеров на пути инноваций в агропродовольственном секторе Республики Молдова;
4. Количественная оценка влияния инвестиций в инновации на экономические показатели агропродовольственных предприятий и, таким образом, аргументирование роли инновационного менеджмента в обеспечении процветания сектора;
5. Количественная оценка влияния инновационных барьеров на потенциальное снижение прибыли;
6. Выявление возможностей для увеличения масштабов применения инновационного менеджмента на агропродовольственных предприятиях Республики Молдова.

Научная новизна и оригинальность: Был проведён диагностический анализ инновационной деятельности агропродовольственных предприятий, учитывая то, что национальное статистическое исследование 1-Inov не охватывает сельскохозяйственные предприятия, а статистические данные относительно предприятий пищевой промышленности и производства напитков являются неполными; была определена уязвимость каждого типа инноваций к факторам, препятствующим инновационной деятельности, а также интенсивность влияния каждого фактора на основе положений третьего издания Руководства по сбору и интерпретации данных об инновациях (Руководство Осло), разработанного Организацией экономического сотрудничества и развития (ОЭСР) и Евростатом; было оценено и продемонстрировано влияние инвестиций в инновации на экономическую эффективность — отдельно для сельскохозяйственных предприятий и предприятий пищевой промышленности, а также в совокупности для агропродовольственных предприятий — с использованием метода робастной линейной регрессии Хубера; было количественно оценено влияние различных барьеров инноваций на потенциальное снижение прибыли предприятий агропродовольственного сектора с применением различных аналитических инструментов, таких как метод группировок, экономико-статистический анализ и регрессия Риджа.

Решение важной научной проблемы: количественная оценка влияния инноваций на экономические показатели агропродовольственных предприятий; количественная оценка влияния инновационных барьеров на потери прибыли агропродовольственных предприятий.

Теоретическая значимость работы: Полученные в работе результаты могут быть использованы в качестве вспомогательного материала при концептуализации инноваций и инновационного менеджмента, отражении их связи с результативностью, количественной оценке влияния инноваций на экономические показатели деятельности предприятий, а также барьеров инноваций на потенциальные потери прибыли.

Практическая значимость работы: На теоретико-методологическом уровне - результаты могут быть взяты на вооружение и применены в начальном и непрерывном профессиональном образовании. На макроэкономическом уровне - результаты исследования, в частности, касающиеся влияния инноваций и связанных с ними барьеров, будут полезны представителям отраслевого управления: Министерству сельского хозяйства и пищевой промышленности, Министерству экономического развития и цифровизации, а также отраслевым ассоциациям для совершенствования отраслевой политики путем содействия инновационной деятельности. На микроэкономическом уровне - инструменты, использованные в работе, могут быть взяты на вооружение и применяться руководителями агропродовольственных предприятий в процессе экономической аргументации решений по внедрению инноваций.

Внедрение научных результатов: Результаты были приняты к внедрению тремя субъектами агропродовольственного сектора.

ANNOTATION

Cauș Olga, „Innovation management as a tool for enhancing the performance of agri-food enterprises", PhD in Economic Sciences thesis, Chișinău, 2026

Thesis structure: introduction, three chapters, general conclusions and recommendations, a bibliography of 238 titles, 9 appendices, 125 pages of main text, 55 figures, 28 tables. The results are published in 7 scientific papers.

Keywords: innovation, performance, innovation management, barriers in the application of innovations, profit.

The main goal of this research: to elucidate and evaluate the impact of innovation management on the performance of agribusinesses.

The objectives of the thesis are:

1. To synthesize theoretical approaches to innovation management and its role in enhancing enterprise performance;
2. To assess the current level of application of innovation management in agri-food enterprises in the Republic of Moldova;
3. To identify and analyze barriers to innovation in the agri-food sector of the Republic of Moldova;
4. To quantify the impact of investments in innovation on the economic performance of agri-food enterprises and thereby substantiate the role of innovation management in ensuring the prosperity of the sector;
5. To quantify the impact of innovation barriers on potential profit reductions;
6. To elucidate opportunities for intensifying the application of innovation management in agri-food enterprises in the Republic of Moldova.

The novelty and scientific originality: A diagnostic of the innovation activity of agri-food enterprises was carried out, given that the national statistical research 1-Inov does not include agricultural enterprises, and the statistical data concerning food and beverage manufacturing enterprises are incomplete; the vulnerability of each type of innovation to the factors that hinder innovation, as well as the intensity of the influence of each factor, was determined based on the provisions of the third edition of the Oslo Manual for collecting and interpreting innovation data, developed by the Organisation for Economic Co-operation and Development (OECD) and Eurostat; the impact of investments in innovation on economic performance was assessed and demonstrated separately for agricultural enterprises and for those in the food industry, as well as in aggregate for agri-food enterprises, using the robust Huber linear regression method; the impact of various innovation barriers on the potential decreases in the profit of enterprises in the agri-food sector was quantified by applying several analytical instruments, such as grouping methods, economic-statistical analysis, and Ridge regression.

The important scientific problem solved: the quantification of the impact of innovations on the economic performance of agri-food enterprises, as well as the quantification of the impact of innovation barriers on profit losses.

The theoretical significance: The results obtained can serve as a basis for conceptualizing innovation and innovation management, for reflecting their relationship with performance, and for quantifying both the impact of innovations on enterprise performance and the effect of barriers to innovation on potential profit losses.

The applicative value of the work: At the theoretical-methodological level - the results can be taken up and applied in initial and continuing vocational training. At the macroeconomic level - the results of the research, in particular those related to the impact of innovations and related barriers, will be useful to representatives of sectoral management: Ministry of Agriculture and Food Industry, but also to the Ministry of Economic Development and Digitalization, as well as to associations in the field for the improvement of sectoral policies by facilitating innovation activity. At the microeconomic level - the tools used in the paper can be adopted and applied by managers of agri-food enterprises in the process of economic argumentation of decisions on the implementation of innovations.

Implementation of scientific results: The results were taken over for implementation by 3 entities in the agri-food sector.

CAUȘ OLGA

INNOVATION MANAGEMENT AS A TOOL FOR ENHANCING THE PERFORMANCE OF AGRI-FOOD ENTERPRISES

AGROALIMENTARE

521.03 – ECONOMY AND MANAGEMENT IN THE FIELD OF ACTIVITY

Abstract of the Doctoral Thesis in Economic Sciences

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