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THE FOUNDATION OF THE MODERNIZATION CONCEPT OF THE WINE SECTOR

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Abstract: *Agriculture, today, faces a series of challenges, both from climatic conditions and vice versa. To overcome these challenges and increase the efficiency of operations, maximize crop productivity and reduce the negative impact of agriculture on the environment, modernization of agriculture is necessary. The modernization of agriculture will open the formation of an effective digital economy, significant opportunities will be created for the creation and development of business, they will help increase investment flows, the accumulation of human and financial resources of the world.*

The aim of the work is the complex and deep study of the concept of modernization of the agricultural sector; the research of the development of modern technologies, by sharing the international experience that leads to the modernization of the wine sector. To achieve this goal, scientific research methods and tools were used, such as: the documentary method, which was based on the research and study of specialized materials; the synthesis method, applied to establish the connection between the researched aspects; the systemic analysis method; the graphical and tabular method of presenting data. As theoretical-scientific support, several works and scientific publications of renowned scholars, both from the country and abroad, served. The results of the research allowed the substantiation of the concept of modernization of the wine sector and the classification of the modernization process, developed and substantiated.

Keywords: agriculture; modernization, wine sector.

Classification JEL: Q1; Q10; O14

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INTRODUCTION

Viticulture is a strategic pillar for the economy of the Republic of Moldova, contributing to the formation of the main indicators of the national economy, as well as to the development of regions by attracting investments and maintaining jobs. The sector has connections and collateral relationships with other sectors of the economy through the value chain, and the traditions and regional and international recognition of wines and grapes are undeniable arguments that highlight the major importance of this sector. Similarly, the added value of viticultural products is one of the benchmarks that attract investors to this important sector.

For the population in rural areas, viticulture represents a stable source of income, serving as a reason for their retention in rural environments, providing stimulation for their professional training, oriented towards initiating and developing businesses in the field of viticulture or other related branches. This sector contributes to the socio-economic profile of the country, being attractive from multiple perspectives.

The level of approach to the subject in the scientific literature

The theoretical and scientific support of the work was provided by important scientific works and publications of renowned researchers, both from the country and abroad. The research on the role and importance of the concept of modernization and development of the wine sector is based on

scholars such as Vasiliev A., Briuhanov A. Boincean B. R. Perciun, N. Amarfi-Railean, M. Oleiniuc, T. Bajura, V. Doga, O. Lebedeva, etc.

At the same time, legislative acts and policy documents in the field, reports of the Ministry of Agriculture and Food Industry, the National Office of Vine and Wine, as well as methodological studies, reports developed by the World Bank, the European Commission were studied.

RESEARCH METHODOLOGY

To substantiate the concept of modernization of the wine sector, the works of scholars from both the country and abroad served as the theoretical, methodological, scientific and informational support. The work is a continuation of previously developed research, and the novelty is the substantiation of the concept of modernization of the wine sector as a tool for attracting investments, resulting in the generation of added value, thus ensuring its development.

RESULTS AND DISCUSSION

Today, economic growth is impossible without the use of information and communication technologies, as they cover increasingly diverse spheres of economic activities and create new opportunities for socio-economic development. The notion of modernize (fr. moderniser) meaning improvement was used as early as 1585, and "modernity" means the quality of being modern. In the mid-20th century, the concept of modernity appeared, which means a process of transition, evolution of the social system towards contemporaneity (Iacob G, 1995).

Today, the concept of modernization of the agricultural sector is increasingly found in the works of domestic scholars. Thus, the authors Vasiliev A., Briuhanov A. (2016), Boincean B. (2012), approach the concept of modernization of agriculture through the application of ecological technologies, the creation of enterprises on the principles of the "green economy". The works of these authors highlight the importance of the accessibility of technologies and the modernization of the agricultural sector, in the context of regional development, the need for economic, financial and human resources for the implementation of innovations, as well as the efficiency of their implementation in practice. Also, this approach is found in the works of Russian researchers, such as Lebedeva O., Gafiatov I. (2015), who mention that: the implementation of modern technologies should not affect the environment and the quality of products for consumers. An important problem in the implementation of innovations and digital technologies is the efficiency of management at the level of the region and of entities in the agricultural sector.

In recent times, a variety of reforms and projects have been developed regarding the modernization of the agricultural sector in order to achieve efficiency, effectiveness, economy and quality. Technological developments in recent years have led all sectors to rapid changes. As in other sectors, agriculture has been affected by these technological developments that have entered a process of change and development. Many institutions, organizations and universities in different countries of the world are conducting various studies under the name of smart agriculture by using emerging technologies. As a result of researching these notions and terms, various concepts of agricultural modernization have been determined such as "Digital Agriculture", "Precision Agriculture", "Smart Agriculture" (Amarfii-Railean, N., Perciun, R., Shveda, N., 2020). International institutions such as the World Bank, FAO and the Consultative Group on International Agricultural have suggested that in order to provide food to the population, agricultural modernization is needed. Also, this idea of sustainable development through the establishment of the "green economy" is also found in the works of national researchers.

According to the author Inozemtseva V. L. (2008), modernization is impossible without political reforms, it must be “post-industrial”, and its fate will be decided in the field of innovative technologies. Thus, one cannot talk about modernization if the development of science and education is not put in the foreground. The authors, Ghelbert A. (2016) and McKinsey (2017) mention that the digital agricultural revolution will have far-reaching consequences on the structure of agricultural labor around the world. However, the exact magnitude and direction of these consequences are not yet clear. Emerging evidence from other industries shows that the adoption of modern technologies in agriculture can increase the demand for higher-paid jobs that require secondary education and reduce the demand for jobs that perform routine tasks.

A study by McKinsey (2017) Center for Advanced Connectivity and Agriculture Practice mentions that agriculture has a high potential for automation compared to other sectors. John Sviokla, an American consultant, author known as a leader in innovation, said: “The Internet is one of the most complex things ever created. It requires human organization at another level. Thus, digital transformation will trigger a completely new revolution that will transform organizations and governments and lead to an extraordinary wealth of creation around the world”.

Following the research conducted on the concept of modernization, it was concluded that the most significant approach to the concept of modernization is reflected in Figure 1, where modernization is seen as a process and as an outcome.

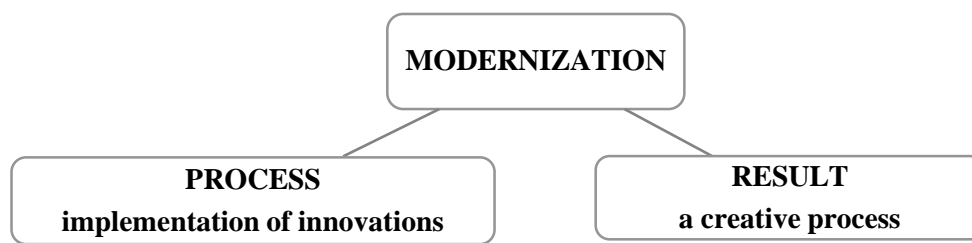


Figure 1. Approach to the concept of modernization

Source: Prepared by the author.

The debate over these approaches and the definition of which is more perfect has been suspended in connection with the development of an international standard for the concept and methodology of statistics and innovation as a well-defined tool. The formation of this international standard was largely facilitated by two works, known as the “Frascati Manual and the Oslo Manual”. As stated in the Oslo Manual, “modernization is the introduction of a new or significantly improved product or process (good or service), a new marketing method or a new organizational method into business practice, workplace organization or external relations” (Руководства Осл, 2010).

The modernization of the wine sector through digitalization is based on four categories of digital tools, based on evidence of their impact:

- precision agriculture (including sensor technology);
- digital financial services;
- data-driven agriculture;
- ICT extension.

The modernization of the wine sector expands the use of these tools through different methods of engagement, including: technical assistance, capacity building for teams and by strengthening the knowledge base on best practices. At the same time, the concept of smart vineyards refers to new measurement tools, based on data collection using wireless sensors (possibly combined with satellite or drone imagery and powered by the potential of Artificial Intelligence). As an example,

wireless sensors, which are important for future smart vineyards, are used to collect various measurements within a given area, to help improve productivity and oeno-climate forecasting (Modern Technologies in Agriculture, 2020).

Following research conducted on the literature in this field, it was determined that research can be divided into three dimensions (Stratan A., 2019, Amarfii-Railean, N., Perciun, R., Shveda, N., 2020).

- ❖ The first dimension focuses on the application of modern technologies for the modernization and development of the wine sector. Specific business factors, support from authorities and ensuring rapid growth rates are noted.

- ❖ The second dimension explores the role and importance of digital technologies in the development and modernization of the wine sector, in terms of job automation and increased labor productivity, marketing opportunities for new markets and optimization of resource potential.

- ❖ The third dimension focuses on identifying the possibilities for the use and implementation of modern technologies in small farms.

The recovery of the situation in the wine sector is possible by implementing modern technologies in production management, and the modernization of the wine sector will improve working conditions for farmers, reduce the negative impact of wine on the environment and ensure a much higher profitability of entities in the sector. Thus, in the author's opinion, the objective of modernization is to provide support to farmers in managing their business, through various methods, but the final result being the maximization of profits with minimal impact on the environment.

In the wine sector, as some researchers mention, major changes are expected as a result of the implementation of modern technologies. Thus, with the help of technological applications and solid management, the wine sector will be one of the sectors with the greatest impact in the coming years (Rose, D., Lyon, J., Boon, A. et al. 2021). Karly Burch from the University of Otago, leader of the Project on the Adoption of Modern Technologies, mentions that the implementation of modern technologies in the wine sector will help to perform labor-intensive tasks, which include decision-making, namely, pruning vines. These technologies include a virtual reality (VR) training headset (e.g., training workers in grapevine pruning), an augmented reality (AR) headset to assist the work (e.g., making pruning decisions on behalf of field workers, supporting their work in the field), and fully automated robotic technologies that can perform these tasks on their own (Modern Technologies in Agriculture, 2021). These smart technologies are designed to support growers with tasks of interest (disease identification, yield estimation) that have been identified in co-design workshops with producers and industry partners.

International experts from the International Organization of Vine and Wine (OIVV) have determined the trends for the modernization of the wine sector (Figure 2), which consist of sensing (IT), artificial intelligence (AI), robotics, satellite imagery/geographic information systems (GIS), LiDAR (laser remote sensing), blockchain, E-Label (electronic label), E-certificate (electronic certificate), smart storage (Digital Trends Applied in the Vine and Wine Sector, 2022).

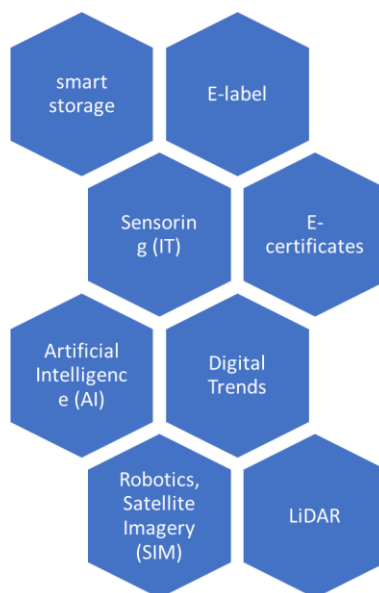


Figure 2. Trends in the modernization of the wine sector

Source: Prepared by the author, according to ONVV data

Also, researchers Bajura T., Doga V. Stratan A. et al. emphasize in their research the direct link between economic efficiency in agriculture and technical and scientific innovations, as well as the need to modernize and automate production processes and operations in the agricultural sector (Stratan, 2019).

By conducting a literature review, the author concluded that the process of wine sector modernization has been identified as one of the most important trends that will reshape society and the global economic system in the near and long term. Thus, in the author's opinion, the concept of wine sector modernization is a new concept and, at the same time, a key element of success. Wine sector modernization is the integration of modern technologies into all wine sub-branches, in order to add value, to change the way it operates and the way it provides value to its products, supply chain, processes, employees and customers.

The role of modernization in the modern economy has increased significantly. Modernization is a new way of meeting needs, providing an increase in the useful effect and, as a rule, based on the achievements of science and technology. Digital tools and data science lead to the most innovative development of society in our life and economy. Modern digital technologies are able to solve the assigned tasks, provide the most cost-effective production models, analyze and process large amounts of information, combine, various information resources on a single platform, which controls and reduces production risks and satisfies the information needs of a wide range of stakeholders. This is not a complete list of the possibilities of modern digital technologies that can be adapted to the needs of agricultural activities (Sinitsa, Y., Borodina, O. and others 2021).

Many countries have adopted a systemic approach to the development of digital agriculture, including the Republic of Moldova. Today, the Republic of Moldova is actively developing digital technologies and implementing information and communication technologies in the agricultural sector. Interest in the issues of introducing and assessing the effectiveness of innovative technologies in agriculture and the agro-industrial complex is associated with increasing trade and production results, with new opportunities for implementing accelerated import substitution models. At the same time, in our view, current trends in modernization are undergoing major changes, which can range from finding new business models, opportunities and making existing processes more efficient or more accessible, to pursuing opportunities to improve the state of an organization through current operations.

In other words, the modernization of the wine sector is not only about digitizing existing processes, but also about rethinking current operations in the light of new perspectives produced by modern technology. This will allow the modification and improvement of the wine sector, both at the operational and managerial levels, acting directly and indirectly for the benefit of winegrowers and the business environment in the sector (İaşıin T., 2019).

Agriculture is a link that creates conditions for the development of the most related sectors. Therefore, the modernization of the wine sector is important for increasing the efficiency of production and processed goods. Today's agriculture is continuously growing due to standardization through the use of modern technologies that include satellite imagery, GPS technology, robots and temperature, humidity sensors and others. All these advances help agriculture to be more efficient, safer and more environmentally friendly. In a context of increasing competition in global markets, achieving higher quality standards in the vineyard becomes extremely important. This has led to a radical renewal of viticulture and a review of agricultural techniques, with the aim of maximizing quality and sustainability by reducing and more efficiently using production inputs, such as energy, fertilizers and chemicals, and minimizing input costs, while ensuring environmental conservation.

Modernizing the wine sector through digitalization is becoming a goal, whether we are ready or not. The main effects of modernizing the wine sector through digitalization are efficiency, productivity, transparency, new business models/value propositions and sustainability (figure 3) (Amarfii-Railean, N., Perciun, R., Shveda, N.,2020).

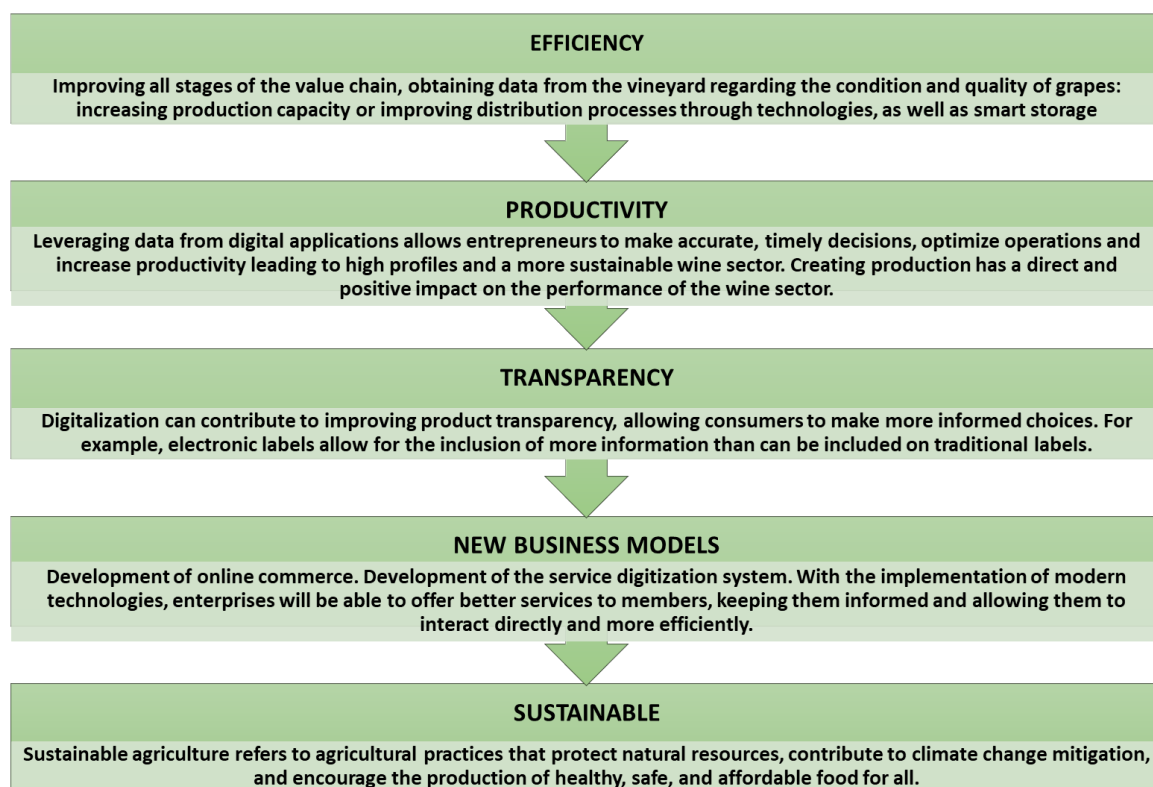


Figure 3. Effects of modernizing the wine sector through digitalization

Source: Prepared by the author (İAŞIŞIN, T., 2022;
Digital trends applied in the grapevine and wine sector, 2022)

Thus, the need to modernize the wine sector actually aims to increase the efficiency of the sector. It is known that only a small part of the pesticides applied reach the target plants, only a part of the applied nitrogen is used by the plants, only a part of the performance of agricultural machinery is used. Therefore, following the research carried out, we have come to the conclusion that for the

modernization of the wine sector, one of the main conditions is to establish goals and objectives, develop the means to achieve them and minimize the costs of implementation.

Analyzing the meaning of the concept of "modernization of the wine sector", it should be noted that it means renewal, access to a modern level of development comparable to that of advanced countries:

- ❖ development of agricultural production at a modern technological level on a scale that allows companies to occupy leading positions in domestic and world markets;
- ❖ modernization of production technologies, replacement of outdated equipment, machinery and technologies with modern, more productive ones;
- ❖ integration into the latest global innovation processes, in the world economy, the fastest use of all important innovations, including innovations in the field of organization and management;
- ❖ retraining and re-education of people, over time, which will lead to a change in living conditions;
- ❖ implementation of structural changes, the formation of an industrial structure that meets the criteria of a developed industrial country. This implies an increase in the share of products with high added value in GDP and exports, including moving away from the unilateral orientation of exports of raw materials.

Through a general synthesis of the literature in this field, the author highlights the following classification of the modernization of the wine sector (table 1).

Table 1. Classification of the wine sector modernization process

Modernization classification criteria	Classification description
Progressive	he process is approached as inevitable, necessary, because it ensures the growth and development of the sector, the material well-being of the regions and population involved, the promotion of wine culture;
Reversible	The process can have an inverse character, it is not viewed as a linear, continuous process.
Systemic	Process approached at the national, regional, organizational level
Complex	Aims at changes in all sub-branches: product; process; marketing; management.
Long-term	A process carried out quickly, slowly, growing, uniformly
Degree of intensity	Process that takes place in stages
Impact	Expected results at the economic, sectoral, social, environmental levels, etc.

Source: Prepared by the author.

From the perspective of the above, it follows that the modernization of the wine sector is a big step forward and necessary for increasing the efficiency of agricultural activities, for increasing production and controlling costs, maximizing profits and protecting the environment. Due to the evolution of technologies and IT solutions that have taken place in recent years, they are able to manage the complete flow, starting from tracking specific activities in the vineyard to obtaining and marketing wine. The development of the concept of modernization of the wine sector is influenced by some aspects of the political situation, as well as the challenges and problems registered in the sector, and the attractiveness of the wine sector and the investment opportunities are numerous.

The regulatory framework for the wine sector in the Republic of Moldova has been at the center of economic policy for several decades. Currently, the sustainable development objectives adopted by the Republic of Moldova involve the application of appropriate public policy and the creation of a favorable environment for sustainable and competitive development.

CONCLUSIONS

The experience and good practices of other countries support our belief that the modernization of the wine sector can only be achieved through investment strategies adapted to the modernization needs, this is the sure way to increase the economic performance of the local wine sector, to align with the European Union standards and to develop competitiveness overall.

The research allowed us to conclude that the implementation of modern technologies is new and relatively common for all related activities of the wine sector, and the integration and implementation of new practices requires a coordinated approach to reduce financial obstacles and increase knowledge and skills in the field.

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