The development of innovative technologies in the vitivinicultural sector

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Abstract: *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. Globalization, transformation of consumer behavior, mobility, availability of information are the trends of our time. Digital technologies are reshaping the global economic system, enabling the formation of an efficient digital economy, which will lead to the development of increased investment flows, accumulation of human and financial resources. And the implementation of modern technologies in the vitivinicultural sector will support farmers in managing their business, through various methods, but the end result is maximizing profits with minimal environmental impact. Viticulture is a strategic pillar for the national economy of the Republic of Moldova, being the calling card of Moldova, which traces and highlights the social-cultural values, the economic potential held, the cross-sectoral implications, especially that related to wine tourism. At the same time, the vitivinicultural sector represents an important source of income for a large part of the country's population, especially the rural population. The aim of this research is to study the role and importance of modern technologies in the vitivinicultural sector, the effects produced by innovations and modern technologies in the vitivinicultural sector will be investigated by analyzing EU best practices. The information base of the study consists of statistical databases, reports of organizations in the field, the National Office of Viticulture and Wine, the Ministry of Agriculture and Food Industry, articles of experts in the field, best practices of EU countries. And the methodology applied includes methods of systemic analysis, quantitative and qualitative methods, economic and financial analysis specific to the activity. The research results will demonstrate the importance of implementing modern/innovative technologies leading to the development and modernization of the vitivinicultural sector.*

Keywords: *development; innovative technologies; vitivinicultural sector; modernization.*
JEL classification: *O33; Q1; Q55.*

1. Introduction

Agriculture is one of the last sectors, which went towards modernization through digitization, and the impact of environmental economic conjecture factors have emphasized the need for the integration of modern technologies in the vitivinicultural sector. The vitivinicultural sector needs modern solutions for the specific problems against which classical methods do not have the expected effect. The modernization of the vitivinicultural sector implies the integration of modern technologies in all vitivinicultural sub-branches.

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For the national economy, vitiviniculture sector is an important and vital one, with growth potential. The vineyards are the most valuable part of the wine heritage in the Republic of Moldova. The vitiviniculture sector contributes to the development of regions and is a stable source of income for the rural population, through its economic value, the wine sector attracts investments in this sector by offering young people and more to develop or start their own businesses in the sector or in other sectors related. Also, other branches of the national economy depend on the development and evolution of this sector, such as transport, manufacturing, packaging, exports, domestic trade, service provision and others. The reserve wine of the Republic of Moldova is the visiting card of the Republic of Moldova as a tourist destination, this being one of the main reasons why tourists visit our country. Thus, realizing the value and notoriety of the wine sector for the national economy but also for the image of the Republic of Moldova, the development of the sector is paramount.

The development of the vitivinicultural sector, from a strategic perspective, depends on modernization, innovation and the competitiveness of the products, the need to increase their quality and compliance with the demands of the foreign market in relation to the price and the durability conditions imposed. Thus, in order to ensure these desired goals, a complex process of reforming and modernizing the vitivinicultural sector was launched.

Starting from 2010, in the Republic of Moldova, the first steps in the emergence of a strategic vision for the modernization of the vitivinicultural sector took place, when several changes were introduced in the strategic plan, including steps towards the modernization of the Wine and Vine Law no. 57/2006 and the creation of the National Office of Vineyards and Wine, the creation of the Vitivinicultural Registry, the aim being to obtain accurate information about the vineyard areas in the country. The most important role in the modernization of the vitivinicultural sector is played by the authorities, which ensure financing and the selection of priorities in the sphere of innovation, strategic planning, determining the list of goods and services, which can become a state objective, creating self-organization mechanisms in the sphere of innovation, promoting capital for participation in innovative projects, examination and analysis of innovative projects.

The modernization of the vitivinicultural sector is imperative for achieving the objectives of the "Wine of Moldova 2030" Strategy; "National Strategy for Agricultural and Rural Development 2023 - 2030", National Development Strategy "Moldova 2030"; "The development program of the vitivinicultural sector of the Republic of Moldova 2030"; however, the materialization of these objectives requires substantial investments and the collaboration of interested parties. The value and notoriety of the wine sector in the national economy, the appropriate pedo-climatic conditions, as well as the need to increase the competitiveness of wine products and the requirements of the foreign market, it is necessary to implement a strategy for the development/modernization of the sector. A number of innovative projects were supported by foreign donors, including the creation of a register of vineyards, modernization of facilities and equipment in laboratories and nurseries, and support for small producers. These initiatives have provided a strong platform for the vitivinicultural sector to develop/modernize and adapt to climate conditions.

The Ministry of Agriculture and Food Industry adopted the general objective, which aims at *"modernizing the vitivinicultural sector, solving structural problems in the wine industry and contributing to the creation of favorable conditions for the production of quality wines (with protected geographical indication (PGI) and protected designation of origin (PDO)"*, thus contributing to the increase of competitiveness on the domestic and foreign markets. At the same time, the need to modernize the sector is also expressly outlined in the *National Agricultural and Rural Development Strategy 2023-2030* through the specific objective 1.1. *"Actions to stimulate investments in the primary infrastructure of agricultural holdings for a viable and competitive growth"*, which aims to stimulate investments for "modernizing the infrastructure and the production sector.

Government Decision no. 1313 of 07.10.2002, "The program for the recovery and development of the wine sector in the period 2002-2020" had a positive impact on the sector. The

purpose of this decision was to stop the regression in the wine sector, at the same time to restore this sector and create a branch of quality wine and wine products, competitive on the market and with increased economic efficiency. The state policy developed and promoted by the Ministry of Agriculture and Food Industry, as well as the legislative framework: the Law on Viticulture and Wine No. 57 of 10.03.2006; Government Decision No. 418 of 09.09.2009 on the approval of the Technical Regulation "Production, certification, control and marketing of vine propagation material"; Moldovan Standards (MS), etc. aims to regulate and organize the production activity in the vitivinicultural sector.

The research carried out demonstrates that the modernization of the vitivinicultural sector is still at an early stage of maturity, but the trends recorded and its development potential are increasing. The modernization of the vitivinicultural sector will strengthen and increase the recorded trends, will allow the timely capitalization of the existing potential, will bring benefits to the businesses already launched, ensuring the resilience of the value chain through the improved yields of the vineyards; increased productivity by exploiting digital data; the use of technologies such as: artificial intelligence and reducing supply costs through the implementation of smart storage (SMART).

The implementation of modern technologies in the vitivinicultural sector is possible with the support of the authorities, financial institutions, and entrepreneurs in the field. First of all, entrepreneurs must perceive the importance and necessity of implementing modern technologies, which will lead to increased activity efficiency, increased production and cost control, maximization of profits and environmental protection.

2. Literature review

The theoretical-scientific support of the work is based on a variety of important scientific works and publications by renowned researchers, both from the country and abroad.

In the works of Vasiliev and Briuhanov (2006), Boincean (2014) we meet the process of development and modernization of the sector by applying the principles of the "Green Economy", using innovative technologies non-invasive to the environment. According to these authors, the importance of the accessibility of technologies and the modernization of the agricultural sector is highlighted, 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.

This approach is also found in the works of Lebedeva and Gafiatov (2015), who mention that the implementation of modern technologies should not affect the environment and the quality of products for consumers. An important issue 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. According to the opinion of Dumitrescu et al. (2015), digitization is a way to face the increased challenges in the markets.

In the wine sector in recent years several reforms and modernization and development projects are undertaken to achieve efficiency, effectiveness, economy and quality. These technological developments have driven all sectors to rapid change. As in other sectors, agriculture was affected by these technological developments that entered a process of change and development (Dumitrescu et al., 2015). 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 the research of these notions and terms, different concepts of the modernization of agriculture were determined as "Digital Agriculture", "Precision Agriculture", "Smart Agriculture". As Ghelbet (2016) and Manyka et al. (2017) mention, the digital agriculture revolution will have far-reaching consequences for 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-paying jobs that require secondary education and reduce the demand for jobs that perform routine tasks.

According to Rose et al. (2021), the introduction of innovative technologies in the wine sector brings a major change. And in the coming years this sector will become a sector with a major impact on socio-economic development.

Karly Burch from the University of Otago (National Office of Vineyards and Wine, 2021), notes that the introduction of innovative technologies in the vitivinicultural sector will help to carry out labor-intensive tasks that include decision-making, namely pruning the vines for wine grapes. Also, Stratan et al. (2020) emphasize the direct link between economic efficiency in agriculture and technical-scientific innovations, as well as the need to modernize and automate production processes and operations in the agricultural sector.

As it results from the analysis of the specialized literature, the innovative solutions and actions implemented in the wine sector will transform this sector in the long term into a sustainable sector, i.e. caring towards nature, man and society. The scientific literature in the field of agrarian economy, digitalization, and innovations served as the foundation of the research. National and international databases formed the empirical information base. In addition, legislative acts and policy documents in the field were consulted, along with reports and publications of the National Bureau of Statistics, the Ministry of Agriculture and Food Industry, the National Office of Vineyards and Wine, as well as methodological studies developed by the World Bank, the Commission European, Food and Agriculture Organization.

3. Methodology and data

The methodologies applied in this study include the following steps. Firstly, the scientific literature has been consulted to highlight the current development and modernization trends of the wine sector. This highlighted the international practices that could be implemented in the Republic of Moldova to enable the modernization of the country's wine sector. Secondly, the state of the wine sector has been analyzed by monitoring a set of indices for the period 2010-2022, such as the area of vineyards, also vineyards classified per type of grapes, table grapes and wine grapes, the global grape harvest, the median harvest per hectare, the evolution of wine production and its growth rate, as well as the export of viticulture products and its financial value. The indices were obtained from the National Bureau of Statistics, the National Office of Vineyards and Wine, APIPA, the reports of the Ministry of Agriculture and Food Industry, and the export data. The data highlights the role of the wine sector in the national economy and the importance of its continuous development. Thirdly, graph-based dynamic analysis was used. Lastly, conclusions were drawn based on the analyzed data.

The data used in this scientific paper has been obtained from the National Bureau of Statistics, the reports of the Ministry of Agriculture and Food Industry, the National Office of Vineyards and Wine, studies of the World Bank, the European Commission, and the Food and Agriculture Organization.

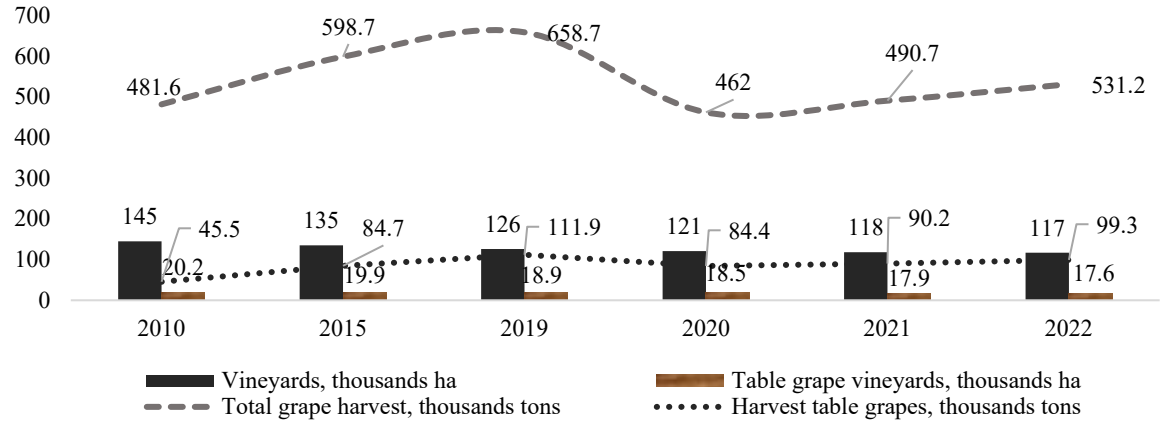
4. Results and discussions

The vitivinicultural sector constitutes the most important part of the agricultural and food sector, creating 16% of the total value produced in agriculture. Moldovan wine exports bring in around 3 billion lei, representing 12% of the external trade balance and 3% of GDP. Wine is also important, being the Ambassador of our country, the visiting card of the Republic of Moldova, it promotes the country internationally and globally, thus gaining popularity and at the same time attracting tourists from everywhere. Wine plantations represent 7% of Moldova's total agricultural land and 3.8% of the country's total land area, demonstrating the highest vineyard density in the world. According to National Office of Vineyards and Wine data, the vitivinicultural sector

comprises: 50 thousand farmers and wine households, 250 agricultural enterprises, 181 wineries, 10 agricultural cooperatives. Together, these enterprises directly or indirectly employ more than 150 thousand people, which constitutes 10% of the active labor force of the country. For the Republic of Moldova, from the economic point of view, the wine-growing sector is an essential sector of great economic importance, harmoniously developed as a result of favorable natural conditions throughout the country, especially in the central and southern areas of the Republic of Moldova (Iațișin, 2014).

The area planted with vines, including the table varieties Vitis Labrusca, constitutes 117 thousand ha and is decreasing. In the year 2022, the areas planted with technical varieties in the farms of production-merchandise on fruit production reached 68200 ha, while native varieties occupy 1732 ha, Figure 1.

Figure 1. Evolution of areas and harvest of vineyards in the Republic of Moldova, 2010 - 2022, thousand ha



Source: own analysis, based on data from the National Bureau of Statistics

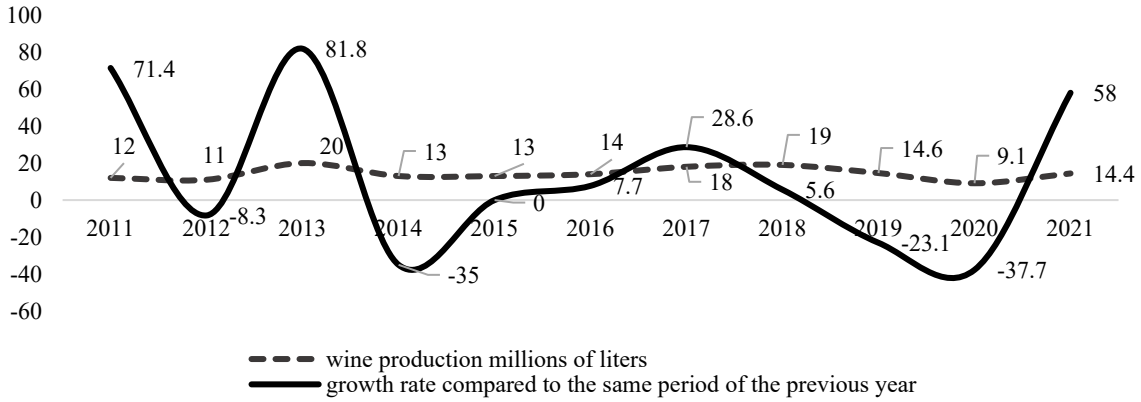
The grape harvest also varies, so in 2022 the grape harvest amounted to 531.2 thousand tons more by 8.2% compared to 2021. For the vitivinicultural sector the year 2021 was a complicated year, because due to weather conditions, many plantations were affected by diseases and pests. As we know, the development of the wine sector is influenced by several factors, and the pedoclimatic conditions have direct effects on the profitability as well as the quality of the grape harvest. The last 2-3 years weather conditions had a major impact on the grape harvest.

In 2022, about 280 thousand tons of grapes were processed and about 19 million decaliters of wine was produced, including the raw material wine for distillation. In vineyards with wine varieties, in 2022, the average grape harvest amounted to 5.5 tons per hectare, ranging from 4-14.5 tons per hectare Figure 2 (Timofti, Iaţişin, & Cereteu, 2019).

Exports also decreased by 14% compared to 2021 and is the lowest in the last ten years, decreases were also recorded in the value of exports by 9% compared to 2021. Thus, exports amounted to 10.4 million decaliters, which sums up all categories including spirits (National Bureau of Statistics of the Republic of Moldova, 2021).

Globalization and the evolution of modern technologies bring fundamental changes in all directions; thus, digital technologies lead to the creation and development of a faster, profitable and efficient business and at the same time stimulate investments. And, investments in the development and modernization of the wine sector are necessary to maintain the progress of Moldovan wine exporters and to facilitate access to new markets.

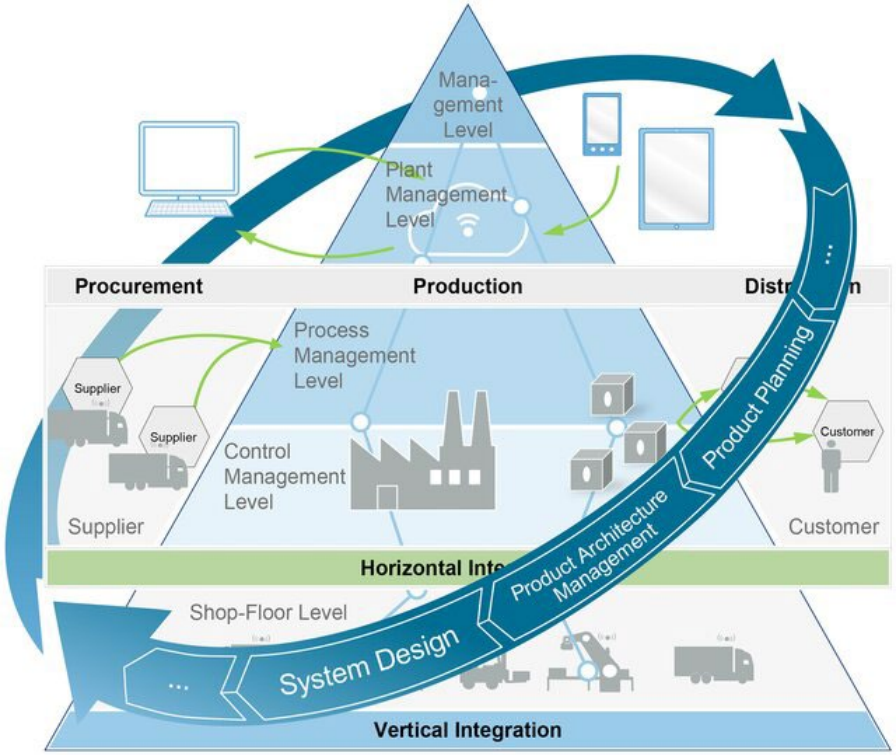
Figure 2. The evolution of wine production in the Republic of Moldova in the period 2010-2021



Source: own analysis based on data from the National Bureau of Statistics and National Office of Vineyards and Wine

The evolution of modern technologies brings major changes both in society and in agriculture, and the use of these technologies in the wine sector will lead to the sustainable development of the sector and the creation of new jobs (Amarfii-Railean, 2020). Lebedeva and Gafiatov (2015) also mention that the use of modern technologies will lead to sustainable development with competitive products. It is necessary to register success in the implementation and use of modern technologies and innovations in agriculture by effective management at all levels. According to Dumitrescu et al. (2015), digitization is a way to cope with increased challenges in the markets. The digitization of the wine sector is illustrated by the pyramid of automation, which includes the integration of aspects, both vertically and horizontally (Figure 3).

Figure 3. Aims of digitization in the vitivinicultural sector

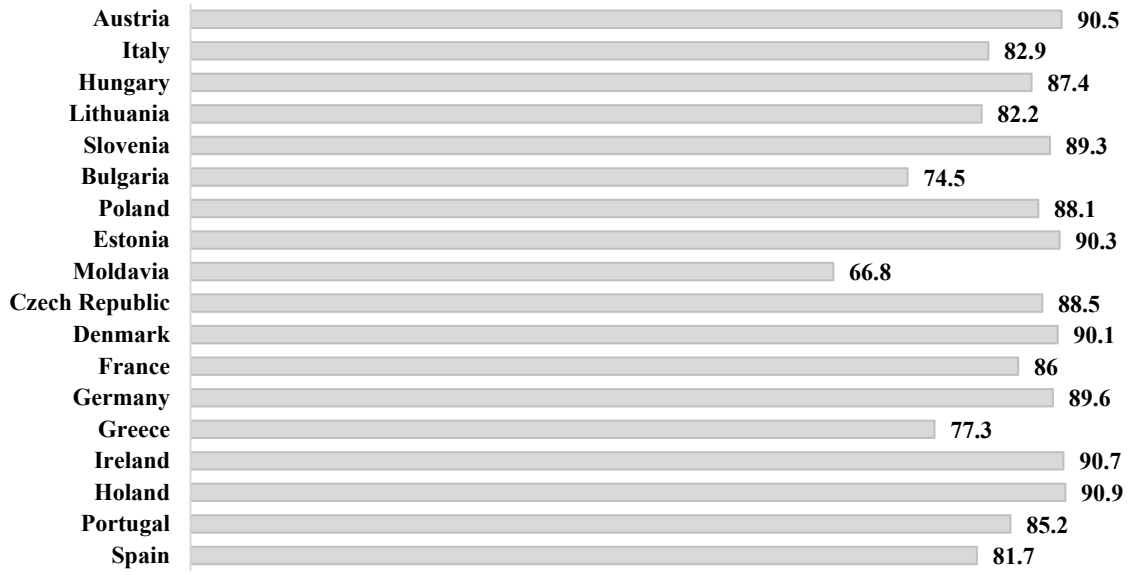


Source: Dumitrescu et al. (2015)

Vertical integration is united by a hierarchy that allows the entrepreneur to control operations at different stages, namely from the field level to the operational level of management, and horizontal integration can be achieved through concrete actions integrated between the interested parties (Dumitrescu et al., 2015; Gray and Rumpe, 2015).

Agriculture is one of the latest sectors which has moved towards modernization through digitalization, and the impact of some environmental economic conjectural factors have emphasized the need for integration of modern technologies in the vitivinicultural sector. A World Bank study on digitalization and innovation in agriculture shows that the digitalization index of agriculture in the Republic of Moldova is low compared to the EU countries, at 66.8 out of 100, and our country ranks last compared to the neighboring European countries (Figure 4).

Figure 4. Digitization index of Moldovan agriculture compared to EU countries, a. 2021



Source: Iațișin (2022).

The Republic of Moldova is in the process of recovering the existing gaps in terms of modernization of the agri-food sector in order to increase its efficiency, productivity and competitiveness on the local and international markets. The pillars of modernization are precision farming, field monitoring, precision spraying/irrigation/planting, data management, increasing climate resilience, reducing production risks, effective disease and pest control, and incorporating elements of the circular economy - reuse, recycling and pollution reduction.

Thus, the development of the vitivinicultural sector, from a strategic perspective, is related to the modernization, innovation and competitiveness of products, the need to increase their quality and to comply with the demands of the external market in relation to the price and sustainability conditions imposed. In order to achieve these goals, a complex process of reform and modernization of the vitivinicultural sector has been launched. The situation can be remedied through new investments, which contribute to the modernization of the sector and increase the competitiveness of products. The Ministry of Agriculture and Food Industry has adopted the general objective to "modernize the vitivinicultural sector, solve the structural problems in the wine industry and contribute to the creation of favorable conditions for the production of quality wines (with Protected Geographical Indication (PGI) and Protected Designation of Origin (PDO)", thus contributing to increased competitiveness on the domestic and foreign markets. At the same time, the need to modernize the sector is also expressly outlined in the National Strategy for Agricultural and Rural Development 2023-2030 through specific objective 1.1. "Actions to stimulate investment in the primary infrastructure of agricultural holdings for sustainable and competitive growth", which aims to stimulate investments for "modernization of infrastructure and the agricultural

production sector", "increasing agricultural competitiveness and productivity in a sustainable way". In this way, investments are encouraged in concrete directions: ensuring the quality and availability of inputs, modernization of production processes in line with EU standards. At the same time, we note that a problem underpinning the development of the vitivinicultural sector is the limited access to sources of financing, which would ensure modernization, and thus also the immobilization of investments for a medium or long period of time, as well as the financing costs for such investments.

Many countries have adopted a systemic approach in the development of digital agriculture, among them being the Republic of Moldova Many countries have adopted a systemic approach to the sustainable development of agriculture through innovative technologies, including the Republic of Moldova. And, the implementation and use of advanced and innovative technologies in the agro-industrial complex allows a sustainable development of the sector with a minimal impact on the environment (Stratan et al., 2020). Modern technologies have completely redefined agriculture in recent years, encouraging the emergence of new forms and business models, providing more competitiveness to businesses, optimizing processes, reducing production cost, improving quality control and contributing to increased efficiency.

According to the ONVV, the concept of smart vineyards refers to modern and innovative technologies that offer the possibility of optimizing work in the plantations. The installation of modern technologies in vineyards will allow farmers to make correct decisions based on correct information, which will lead to increased production yields (National Office of Vineyards and Wine, 2021). The modernization of the vitivinicultural sector is expanding 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.

The recovery of the situation in the vitivinicultural sector is possible through the implementation of modern technologies in production management, and the modernization of the vitivinicultural sector will improve working conditions for farmers, reduce the negative impact of wine on the environment and ensure much higher profitability of the entities in the sector. According to international expert José Luis Flórez, we expect a major change in the vitivinicultural sector as a result of the implementation of modern technologies. The wine sector, with the help of modern technologies (field sensors, weather stations, drones) and sound management, will be one of the sectors with the greatest impact on sustainable development. (Rose et al., 2021).

Karly Burch from the University of Otago (National Office of Vineyards and Wine, 2021), notes that the implementation of innovative technologies in the vitivinicultural sector will help with labor-intensive tasks, which include decision making, namely, pruning vines to wine grapes. These technologies include Virtual Reality (VR) and Augmented Reality (AR) training tools to help winegrowers make the right decisions for vine pruning (Jones, 2014; Kallhoff, Di Paola, Schrgenhumer (eds.), 2018; Iațișin, 2021). These smart technologies will help and encourage manufacturers to meet the challenges. Also, by the international experts from the International Organization of Vine and Wine (OIV), they have determined the modernization trends of the vitivinicultural sector, which are made up of sensing (IT), artificial intelligence (AI), robotics, satellite imagery/geographic information systems (GIS), LiDAR (remote laser image detection), blockchain, E-Label (electronic label), E-certificate (electronic certificate), smart storage (National Office of Vineyards and Wine, 2021).

Therefore, the modernization of the vitivinicultural sector is important for increasing the efficiency of production and processed goods. Agriculture today is continuously growing due to standardization through the use of modern technologies that include satellite imagery, GPS technology, robots and sensors for temperature, humidity and others. All these technologies contribute to the sustainable development of the wine sector while aligning with international trends, ensuring competitive production. This has facilitated the recovery of the wine sector, the optimization of plantation management practices, and the production of high-quality, competitive products. Additionally, by promoting sustainable land management, these efforts have significantly

reduced the environmental impact, fostering a more harmonious relationship with nature (Iațișin, 2019; Iațișin, 2022; National Office of Vineyards and Wine, 2021).

Through a general synthesis of the literature in the given field, the author highlights the following classification of the modernization of the vitivinicultural sector (Table 1).

Table 1. Classification of the modernization of the wine sector

Classification indicator	Classification description
Revolutionary	managerial, organizational, social, industrial
Complex	aims at changes in all areas of human thought and behavior, among its components it includes: *industrialization, urbanization, social mobility, differentiation, secularization, expansion, mass media, dissemination of instruction, etc.)*
systemic, global	transcontinental, transnational, regional, organizational
lasting	fast, slow, increasing, uniform
degree of intensity	it is carried out in phases or stages
Reversible	that is, it can have the opposite character, it is not seen as a linear, continuous process.
Progressive	it is seen as inevitable, necessary, because it ensures general human, material and cultural welfare.
modernization efficiency	economic, social, environmental

Source: elaborated by the author.

Thus, based on the research findings, it can be stated that the implementation of modern technologies in the wine sector is both inevitable and essential for ensuring business competitiveness. This approach optimizes processes, reduces production costs, while also protecting the environment. To further enhance business value, increasing investments in technology and digitization is imperative. Thanks 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 the tracking of specific activities in the vineyard to obtaining and commercialization of the wine.

Therefore, as a result of the research, it was concluded that for the modernization of the vitivinicultural sector, one of the main conditions is to set goals and objectives, develop the means to achieve them and minimize the costs of their realization. Analyzing the meaning of the concept of "development, modernization of the vitivinicultural sector", it should be noted that it means renewal, access to a modern level of development comparable to that of advanced countries, namely:

- ❖ development of agricultural production at a modern technological level on a scale that will enable companies to occupy leading positions on domestic and world markets;
- ❖ modernization of production technologies, replacing obsolete 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 major innovations, including organizational and management innovations;
- ❖ re-skilling and re-educating people, over time, which will lead to changing living conditions;
- ❖ the implementation of structural changes, the formation of an industrial structure that meets the criteria of a developed industrial country. This requires an increase in the share of high value-added products in GDP and exports, including a move away from the one-sided orientation of raw material exports.

5. Conclusions and recommendations

This study aimed to analyze the necessity of the modernization of the national wine sector. The analysis was based on the effect of modern techniques applied in the wine sector in the European Union. This study has demonstrated that the digitalization and the technological development of the wine sector are pivotal in ensuring the growth of the quantity and quality of the

wine industry. Furthermore, it has been shown that the modernization of the viticulture sector will not only lead to a productivity, efficiency, and transparency growth, but will also lead to new business models and enhance the Republic of Moldova's competitiveness in the global marketplace.

The agricultural sector and its branches are among the last to undergo a modernization process. Therefore, there is a great need to implement the use of modern technologies and digitalization in branches such as viticulture. This is also shown by the low digitalization score of the agricultural sector of the Republic of Moldova, 66.8 out of 100, as reported by the World Bank.

This paper highlights that the implementation of digitalization must cover all areas of the viticultural branch to create value-added products, to improve production processes, the supply chain, and increase the proficiency of employees and entrepreneurs. The findings of this paper and the studies literature highlights the impact of modernization of the viticultural sector as one of the main factors to ensure the long-term development of the society and global economy.

The first part of this paper deals with the analysis of the viticultural sector and discusses its impact on the national economy. The analysis of the viticultural sector between 2010-2021 shows annual growth tendencies. The productivity of the vineyard per fruit grew annually by 2.1%. The harvest of table grapes showed a 2.6% annual increase. An annual increase of 7.1% was registered for the export of table grapes, whereas the volume of wine export grew by 6.3%. A much lower growth, 0.2%, was registered for the revenue resulting from the export of alcoholic beverages.

To ensure the further development and modernization of the viticultural sector, the author recommends the implementation of the best practices in the EU. For instance, the implementation of novel production management technologies in the viticultural sector of the Republic of Moldova will improve working conditions for farmers, it will ensure higher profitability for entities in the sector, boost production and control costs, thus, maximizing profits. Furthermore, the modernization of the viticultural sector will minimize the sector's negative impact on the environment. This is owed to the new-found ability to monitor entire processes, from vineyard-specific activities to wine making and its commercialization.

The main recommendation to ensure the modernization of the viticultural and wine sector, the sector must follow a market-led approach. Moreover, it is pivotal to ensure continuous investments and subsidies for new processing units, up to date instruments and machines, and a modern post-harvest infrastructure. This will not only improve the international reputation of Moldovan wine but will also streamline the relationship between private economic agents and the government.

In conclusion, to enable the modernization of the viticultural and vinicultural sectors, and the alignment with international practices, producers must opt for high-yield grape varieties, the increase in varieties characterized by high disease resistance, the increase in quality and competitiveness of viticultural and vinicultural products, the diversification of markets, and the increase in investments.

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