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REPORT

On the results of identification
of ways of improving the post-secondary
vocational education programmes *81110 Agronomy*
and *72150 Plant products technology* by matching
skills to the needs of the soybean production
and processing sector in the Republic of Moldova

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List of Abbreviations

ANSA – National Food Safety Agency
FAO – Food and Agriculture Organization
USA – United States of America
EU – European Union

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Introduction

The concern of the Republic of Moldova for sustainable development implies the need to mobilize a wide range of tools and factors, so as to ensure a synergy of efforts in order to best achieve the set objectives. Among them, vocational education is a factor with a special significance in ensuring the labour market with adequately skilled human resources.

Today, the soybean production and processing sector is a field of major interest, due to its many economic, environmental and social benefits and, thus, its potential role in achieving the sustainable development goals. The prosperity of the sector implies the identification and capitalization of all factors with direct and indirect, short-term and long-term impact. Based on the latest reasoning, the identification of ways for the improvement of the specialists' vocational training for this sector is a required and particularly relevant action.

The survey was carried out under the project "Development of rural areas in the Republic of Moldova", Part I "Increasing the competitiveness of the agri-food sector through integration to domestic and global value chains, in particular in the soya sector", funded by EU and implemented by the Austrian Development Agency in partnership with the Educational Centre PRO DIDACTICA and the Donau Soja International Association (Austria).

The main purpose of the study was to identify the needs of the soybean production and processing sector in terms of professional skills and develop recommendations for the post-secondary vocational education programmes *81110 Agronomy* and *72150 Plant products technology* in line with them.

The specific objectives of the study were:

- analysis of the current state of affairs and trends of the soybean production and processing sector at international and national level;
- evaluation of the existing regulatory framework in the Republic of Moldova related to the promotion of soybean cultivation;
- evaluation of the post-secondary vocational education programmes *81110 Agronomy* and *72150 Plant products technology* in terms of the compliance of their current content with the requirements of the sector under review;
- survey of opinions of soybean producers and processors on the skills to be further included in the respective programmes;
- formulation of recommendations on improving the post-secondary vocational education programmes *81110 Agronomy* and *72150 Plant products technology*, to ensure an optimal contribution to the performance of the soybean production and processing sector in the Republic of Moldova.

1. Description of the applied methodology

The study was carried out in the following stages:

I. Analysis of the soybean production and processing sector worldwide and in the Republic of Moldova;
II. Evaluation of the post-secondary vocational education programmes *81110 Agronomy* and *72150 Plant products technology* in terms of the extent to which their current content corresponds to the requirements of the sector under review;
III. Survey of the soybean producers and processors' opinion on the skills to be further envisaged in the respective programmes;
IV. Formulation of recommendations on improving the post-secondary vocational education programmes *81110 Agronomy* and *72150 Plant products technology*.

The process of analysing the soybean production and processing sector involved:

a) collecting, systematizing and analysing the quantitative and qualitative indicators regarding the evolution of the sector by accessing the national and international statistical databases;
b) study of some scientific and analytical publications related to the addressed field;
c) research of the strategic documents of the Republic of Moldova concerning, directly or indirectly, aspects related to the evolution of the soybean production and processing sector;
d) formulation of conclusions regarding the trends in the evolution of the analysed sector as benchmarks for performing interventions in the addressed vocational education programmes.

The evaluation of the post-secondary vocational education programmes *81110 Agronomy* and *72150 Plant products technology* took place through the following processes:

a) identification of the providing institutions;
b) study of the curriculum, identifying relevant course units to address various aspects of soybean production and processing;
c) detailed analysis of the curriculum of the selected course units, communication with the course holders and highlighting some preliminary directions of intervention in order to connect the skills to the needs of the sector.

The survey of the soybean producers and processors' opinion regarding the skills to be further introduced in the respective programmes was carried out based of an opinion poll conducted with 59 producers and 12 processors, involving several processes:

a) development of the survey form for the opinion poll conducted with soybean producers and of the structured thematic interview form for the opinion poll conducted with soybean processors;
b) conducting a telephone survey of soybean producers;
c) conducting telephone interviews of soybean processors;
d) processing of the opinion poll results.

The formulation of recommendations for the improvement of the post-secondary vocational education programmes *81110 Agronomy* and *72150 Plant products technology* was carried out by integrating the findings made as a result of the sector analysis and the results of the opinion poll.

Executive summary

The study of the soybean production and processing sector resulted in the following ***findings***:

I. There is a steady increase in overall soybean production worldwide, the largest producers being the USA, Brazil and Argentina. However, the expansion of soybean production had its own problems:

- loss of considerable resources of forest, savannah and pastures; the destruction of communities, biodiversity and ecosystems, especially in Brazil, Argentina and Paraguay, by having a detrimental effect on climate change;
- affecting the quality of soil and surface and groundwater due to the fact that genetically modified soy requires large amounts of herbicides;
- detection of numerous cases of human rights violations through the forced takeover of land and even the murder of a large number of small farmers, especially in South American countries.

II. The European Union is one of the largest importers of soy, providing for 40% of the vegetable protein used in animal feed. The EU's target of producing around 47.5 million tonnes of meat per year by 2030 also means increasing the amount of soy needed for animal feed. Under these circumstances, the concern to stimulate the production of vegetable protein is natural, being determined both by the growing demand for the product and by certain circumstances, such as the poor quality of imported soybeans (mostly produced from genetically modified seeds), the adverse impact on the environment caused by the largest producers. An important step in solving this problem was the signing of the European Soya Declaration by 14 countries in December 2017. The objective of increasing the legume crop production for food and feed is examined in the context of the concern for sustainable agriculture, thus contributing to the achievement of two objectives of the 2030 Agenda: Objective 2. "Ending hunger, ensuring food security, improving nutrition and promoting sustainable agriculture" and Objective 15. "Protecting, restoring and promoting the sustainable use of terrestrial ecosystems, sustainable management of forests, combating desertification, halting and repairing soil degradation and halting biodiversity loss".

III. The Republic of Moldova is one of the states that joined the 2030 Agenda, undertaking to fulfil the sustainable development goals. However, the data on the total soybean planted areas in the years 2008-2018 shows no constant trends in the development thereof, as well as the significant decrease in 2018 compared to 2015, when the largest areas cultivated with soybeans were recorded. While the soybean planted areas decreased during the analysed period, the yields recorded less alarming trends. Even if it varied significantly from one year to another, the level reached by the indicator in 2018, of 21 q/ha, is the highest recorded in the reference period (2008-2018), and a practically similar level was reached in 2014.

The growth in crop productivity allowed for an increase in the total soybean production over the last 3 years of the analysed period (2016-2018). The indicator achieved in 2018, of 58 thousand tons, is much lower than the one recorded in 2010, when the Republic of Moldova had a total production of 111 thousand tons.

Soybean export data also show unstable trends. In the last decade, the largest detected exported quantity was in 2015, 69 thousand tons. Subsequently, a continuous decline in soybean exports is observed: in 2018− 12.8 thousand tons, amounting to $ 5.2 million, that being 56.2 thousand tons less than in 2015.

Soybean processing in the Republic of Moldova is carried out by producing vegetable oil and meal. Due to a whole series of technological and financial difficulties, the chemical method of processing soybeans is not currently used in the Republic of Moldova, advocating the mechanical method, based on the partial pressing of the oil through the screw press.

With reference to the evolution of meal production, we find the existence of some fluctuating trends. At the same time, we appreciate the level reached in 2018, of 24928 tons, an indicator superior to those of the previous years included in the analysis.

Among the most significant disruptive factors of the evolution of the soybean production and processing sector, we mention: the large share of imported means of production and their constantly rising price; insufficiency of storage spaces; limited access to elevators; insufficiency of certified organic transport; reducing the number of operators of soybean meal production and others.

IV. The analysis of the regulatory framework of the Republic of Moldova revealed the existence of a series of documents that support the interest in the crop concerned and contain specific measures in order to expand the production of non-genetically modified soybeans, as follows:

- National Development Strategy "Moldova 2030" (draft): *Specific objective 1. "Increasing revenues from sustainable sources and mitigating economic inequalities"; Specific objective 10. "Ensuring the fundamental right to a healthy and safe environment"*;
- National Strategy for Agricultural and Rural Development for the years 2014-2020: *Specific objective 2.1. "Supporting agricultural land and water management practices"; Specific objective 2.2. "Supporting environmentally friendly production technologies, ecological products, including biodiversity"; Specific objective 6.3. "100% improvement of soil quality and environment-friendly rehabilitation of degraded lands affected by landslides, and of agricultural land shelterbelts, as well as sustainable management and protection of useful mineral resources"*;
- Environmental Strategy for 2014-2023: *Specific objective 2. "Mainstreaming the principles of environmental protection, sustainable development and green economic development, adaptation to climate change in all sectors of the national economy"; Specific objective 4. "Reducing the negative impact of economic activity on the environment and improving measures to prevent environmental pollution"; Specific objective 5. "Creating the integrated environmental quality monitoring and control system"*;
- National Public Health Strategy for 2014-2020: *Specific objective 3. "Ensuring health protection by streamlining the control of behavioural and environmental risk factors"*;
- Soil Fertility Conservation and Enhancement Programme for the years 2011-2020: Major Objective 3. "Stopping the active forms of soil cover degradation on an area of 877 thousand ha of arable land by the end of 2020".

V. Evaluation of the post-secondary vocational education programmes 81110 Agronomy and 72150 Plant products technology in terms of compliance with the current content to the requirements of the sector under review revealed the following:

- As a result of the analysis of the post-secondary vocational education programme *81110 Agronomy*, a single course unit ("Botany and plant physiology") was identified in which students acquire distinct skills with reference to soybean cultivation. The other course units in the specialty curriculum with relevance to the research topic either address insufficiently or do not refer at all to soya.
- The analysis of the post-secondary vocational education programme *72150 Plant products technology* revealed that certain topics related to soybean processing are addressed in the course units "Storage of plant protection products", "Fundamentals of raw material production" and "Quality control of products of phytotechnical origin". At the same time, these issues are analysed insufficiently in the course units "Processes and devices in the food industry" and "Processing of plant protection products".

Recommendations

I. By generalizing the trends in the evolution of the sector, we find that ***more active and effective measures are needed to promote soybean cultivation among producers in the Republic of Moldova***, by virtue of the following circumstances:

- existence of favourable natural conditions for cultivation;
- the growing need for quality soybeans, especially for human and animal nutrition;
- recognition of the value of the crop as a remedy in improving environmental problems;
- efficiency of soybeans in economic activity.

II. As a result of the analysis of the regulatory framework of the Republic of Moldova related to the promotion of soybean, given the existence of adequate strategic visions, **we can identify a series of actions that would facilitate their attainment**:

- ✓ connecting the existing regulatory framework to the needs of the sector by creating favourable conditions for the production, processing, export of the related products;
- ✓ more active promotion of soybean cultivation among agricultural producers, placing special emphasis on its multiple benefits, as well as on its ability to ensure efficient economic activity. Implicitly, it is necessary to identify more effective tools of communication with producers, for a wider information of them, along with consultation on various issues related to soybean cultivation technology;
- ✓ more active highlighting of soybean in the context of measures on education for the sustainable development of different categories of audiences: pupils, students, participants of the continuous training activities, etc.;
- ✓ ***ensuring an adequate curricular framework*** in the initial professional training of future specialists for the agricultural sector, as well as the inclusion of soybean cultivation topics in continuing vocational training programmes, so as to facilitate the development of professional skills that would allow their owners to contribute to the development of the soybean production and processing sector in the Republic of Moldova.

III. The synthesis of trends in the evolution of the sector, the recommendations of specialists in the field and the results of the opinion poll conducted with soybean producers and processors allowed the formulation of the following recommendations:

a) inclusion in the curriculum of the study programme *81110 Agronomy* of a course unit / an additional module in order to develop advanced skills on soybean cultivation in future specialists;

b) curricular design of the proposed course unit / module so as to ensure the development of the following skills in future specialists:

- environmental and economic justification for including soybean in the crop rotation system; establishing the share of the area occupied by soybean and its place in the crop rotation system;
- performing soil tillage operations, establishing their sequence;
- applying modern, intensive, but also conservation technologies in soybean growing;
- justifying the fertilization needs, quantifying (determining) the necessary amount of fertilizers;
- fertilization (by applying appropriate methods and dosing);
- determining the needs for seeding material, fuel, lubricants, plant protection products and other materials;
- determining the needs for mechanized works and labour;

- identifying sources of supply of raw materials and materials for crop establishment and maintenance;
- selecting soybean varieties for seeding;
- determining the sowing density, preparing the seeds before sowing;
- seed inoculation;
- sowing;
- determining the degree and type of weeding;
- diagnosing diseases and pests;
- applying weed control methods;
- applying methods of treatment against diseases and pests;
- organising crop irrigation;
- applying harvesting methods (direct or divided);
- determining and interpreting the harvesting quality indices;
- storage of soybean seeds;
- assessing the economic efficiency of soybean production;
- soybean production marketing and promotion;
- business plan development.

c) the inclusion in the curriculum of the course unit "Processes and devices in the food industry" of the study programme 72150 Plant products technology of the following competences:
   - modern soybean processing machinery and equipment (including mechanical and electrical aspects in the operation of the soybean processing devices);
   - software and programmes used in soybean processing;
   - dryers;
   - processes and devices for obtaining milk, mayonnaise and soy cheese;
   - soybean oil production processes and devices;
   - soybean feed production processes and devices.

d) the inclusion in the curriculum of the course unit "Processing of phytotechnical products" of the study programme 72150 Plant products technology of the following competences:
   - soybean extrusion processes and technologies;
   - performing tests until processing;
   - primary soybean processing;
   - soy processing for milk, mayonnaise and cheese;
   - soybean oil processing;
   - soybean processing for forage.

3. Analysis of the soybean production and processing sector

3.1 History of the emergence and benefits of soy

Native to East Asia, soya beans have been cultivated for over 3,000 years. Currently, there are 3,500 different soya bean varieties that are grown worldwide.

Soybean was imported in Europe over 150 years ago. Professor Friedrich Haberlandt, director of the Vienna University of Natural Resources and Life Sciences during the Austro-Hungarian Empire, initiated the first extensive soya bean cultivation trials in Europe. At the 1873 Vienna World Fair, Haberlandt presented a variety of soybean suitable for cultivation in Central Europe. Starting with 1875, Haberlandt carried out experimental research on the soybean in parallel with the work on his famous book "Die Sojabohne – Ergebnisse der Studie und Versuche über die Anbauwürdigkeit dieser neu einzuführenden Culturpflanze" ("Soybean – the results of study and experiments to determine whether this new field crop is worth cultivating"), published in 1878. Although in Europe the interest in growing the soybean disappeared with Haberlandt`s death, in the United States the research initiated by him continued and led to an impressive expansion of soybean plantations [15].

The significance of the soybean, the need to pay particular attention to the respective crop is argued by its following benefits:

- ✓ soybean represents food and feed crop of undoubted value due to the high content of protein substances, this being 38.5%, while other similar crops such as peas and beans, respectively, have a protein content of 27.8 and 24.6% [20]. Soy proteins contain all the essential amino acids. In the composition of the seeds and the green soybean mass there are also carbohydrates, mineral salts, vitamins, ferments and other substances. Soybean hay and flour have a high nutritional value: one kg of soybean hay contains 1.51 g of nutrients, 96g of protein, 15.6g of calcium, 2.2g of phosphorus and over 50g of carotene. Soybean albumin is characterized by a high degree of dissolution in water, which simplifies its use in the food and technical industry [11];
- ✓ due to the successful combination of precious chemicals, soybean is widely used as a raw material in the cosmetics, chemical and pharmaceutical industries [15];
- ✓ soybean has an essential contribution to increasing soil fertility. Thus, as a result of the symbiotic activity, soil accumulates about 108-120 kg/ha of biological nitrogen, the contribution of the beans being 78-80 kg/ha and of the peas - 48-50 kg/ha [19].

The multiple benefits of the soybean along with other legumes determined the UN to declare 2016 the International Year of Pulses [22].

3.2 Evolution of soybean production worldwide

Today, soybean plantations occupy more than 50% of the areas cultivated with oilseeds worldwide, which is about 6% of agricultural land [15].

According to official data [17], in 2018, global soybean production worldwide accounted for over 360 million tonnes. Thus, in comparison with the year 1960 when about 17 million tonnes were obtained annually [15], we find that for 6 decades the volume of production increased 21 times. By 2030 it is expected to increase soybean production by a further 28% and reach a level of approximately 434 million tonnes, and by 2050, according to the FAO forecast, annual soybean production will amount to around 515 million tonnes [16].

Almost 80% of the total quantity of soybean produced worldwide is provided by 3 countries: the USA, Brazil and Argentina. The contribution of different countries to the production of the soybean is shown in Figure 1.

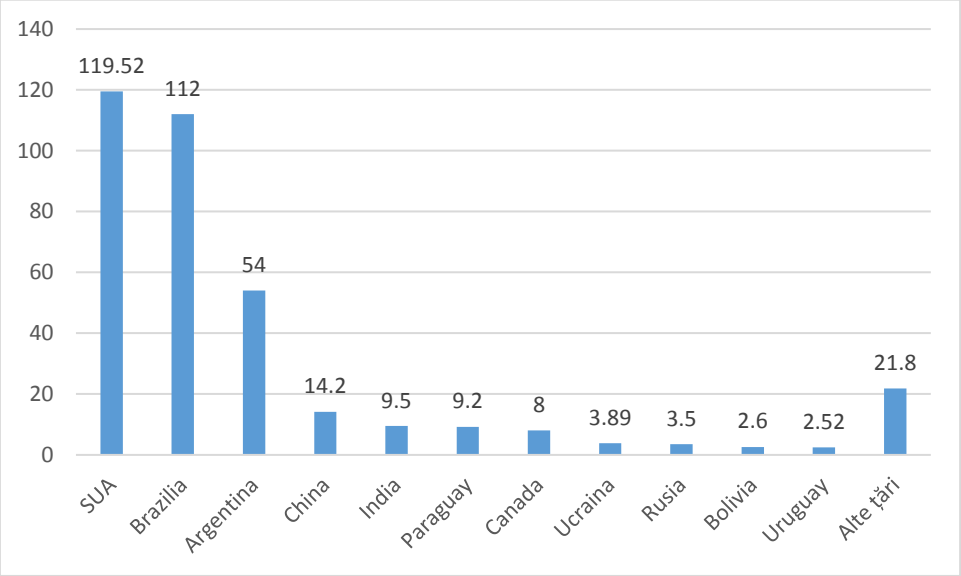

Figure 1. *The contribution of different countries in the production of the soybean in 2018, thousand tonnes*
Source: Developed by authors based on [17]

The largest soybean user in the world is China, followed by the US, while the EU ranks third. The data on the consumption of soybean by country are shown in Figure 2.

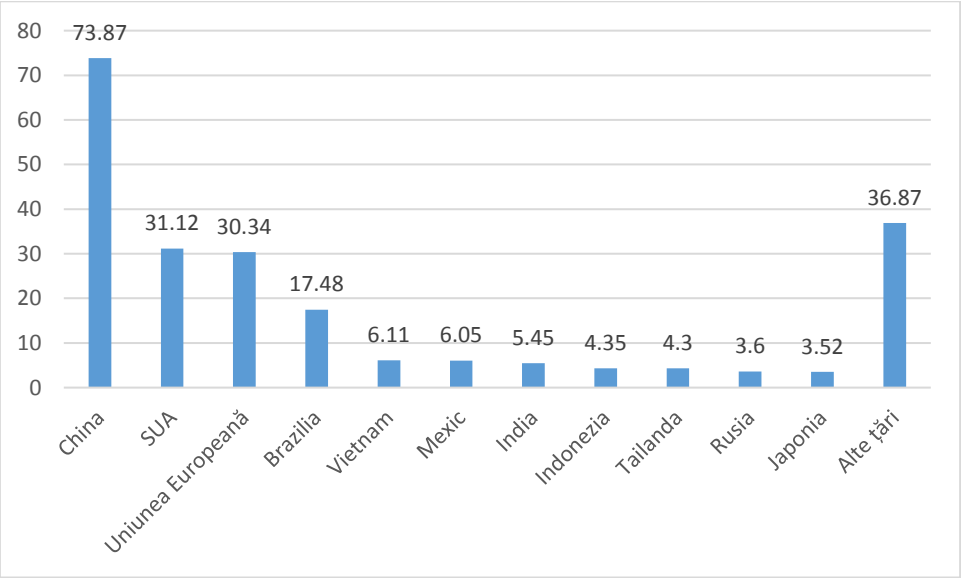

Figure 2. *Soybean consumption by countries in 2018, thousand tonnes*
Source: Developed by authors based on [17]

The expansion of soybean production has caused many problems. Thus, the extension of the areas cultivated with soybean to million hectares, especially in countries such as Brazil, Argentina and Paraguay, has led to the loss of considerable resources of forests, savannah and grasslands, to the destruction of communities, biodiversity and ecosystems, making a detrimental contribution on climate change. Today

soybean plantations continue to endanger the primary and tropical forests of Amazonia, the Atlantic Forest and the Dry Forest of Chiquitano, the tropical savannah of Cerrado, etc. [19].

Genetically modified soybean requires large quantities of herbicides, thus affecting the quality of soil, surface water and groundwater. Implicitly, human and animal health problems are generated.

The environmental problems were not the only ones that were caused by the extension of the cultivated areas with soybean. There were also major problems of human rights violations through forced land acquisition and even the murder of a large number of small farmers [8]. As a result, soybean production and trade, as well as related issues of the environment, indigenous peoples and rural workers have become an important element of political discourse in South America [14].

3.3 Current status and prospects for soybean cultivation in the European Union

In EU countries, soybean provides 40% of the plant protein used in animal feed. However, 95% of the required quantity of soy is imported by them. In 2013-2015 the EU imported on average 36.1 million tonnes per year: 12.7 million tonnes for the production of soybean oil and flour and 18.5 million tonnes of soybean meal (the equivalent of 23.4 million tonnes of grain soybean). About 95% of the soy import is intended for animal feed. On the other hand, the EU represents one of the largest consumers of meat, with an annual consumption per capita of 68.6 kg (according to data of 2017). By 2030, it is expected to produce 47.5 million tonnes of meat per year, which will also involve increasing the amount of the soy required for animal feed. Under these conditions, the European Union's concern for stimulating the production of plant proteins is natural, determined both by increasing demand for the product and by such important circumstances, as the poor quality of imported soybean (most of which is produced from genetically modified seeds) as well as the adverse impact on the environment [16]. An important step in solving this problem is the European Soya Declaration signing by 14 countries in December 2017 [9]. The objective of increasing the production of leguminous crops for food and feed is examined in the context of concern for sustainable agriculture. At the same time, it is mentioned that, by focusing attention on supporting the growth of soybeans and other legumes, it will contribute to the achievement of two out of 17 important objectives of the 2030 Agenda [18], Objective 2 "End hunger, achieve food security and improved nutrition and promote sustainable agriculture" and Objective 15 "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss".

The relevance of the concern for stimulating the production of soybean and other legumes is also argued for by contributing to the objective of the EU Sustainable Development Strategy adopted in 2001, which aims at increasing prosperity, improving the quality of life now and for future generations and capitalizing on the innovative potential of the economy in the environmental and social field.

The signatories of the declaration highlighted the following elements in supporting the stated objectives:

- developing sustainable production of soybean and other legumes in appropriate areas of Europe, taking into account the availability of resources;
- integrating the production of soybean and other legumes into well-planned crops rotations;
- ensuring the integrated protection of crops following the principle "as much as necessary and as little as possible", giving priority to the use of resistance of host plants and tolerant varieties;
- maintenance of traditional landscapes, landscape features and protection of biotopes with high natural value in agricultural landscapes;

- developing sustainable markets for soybean and other legumes in Europe that balance and respond to the needs of growers, processors, livestock breeders and consumers within the transparent value chains [9].

The actions taken by EU countries have led to the pattern of continuous growth trends in soybean production. Thus, according to the data of the European Commission [12], starting with 2012 the annual global production of soybean has been rising (Figure 3), noting a high growth rate especially in the period 2012-2014 (Figure 4). Even though the growth rate of annual global soybean production in the European Community slowed down after 2014, it is important that the volume of production continued to increase, which proves the effectiveness of the measures taken to support the production of soybean.

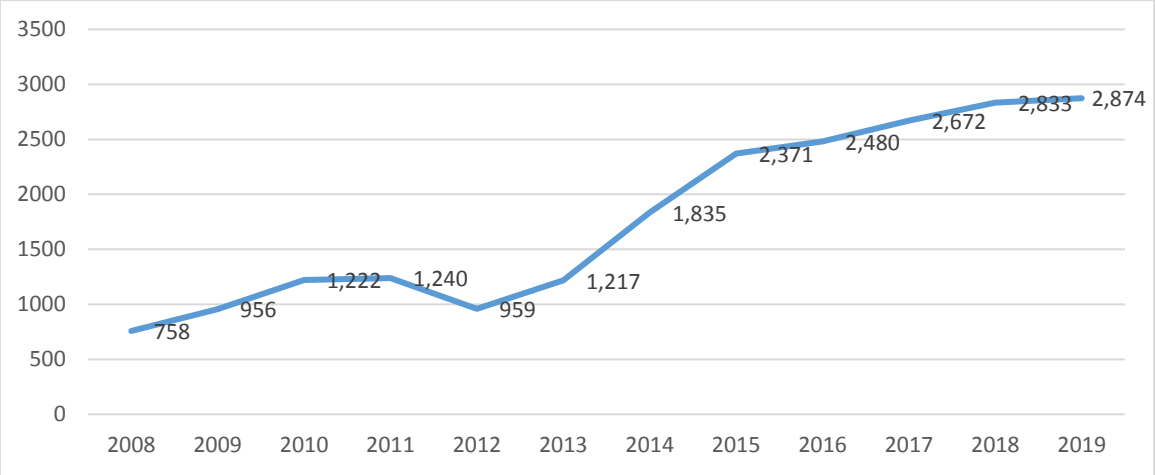

Figure 3. *Evolution of soybean production in the EU in 2008-2019, million tons*
Source: Developed by authors based on [12]

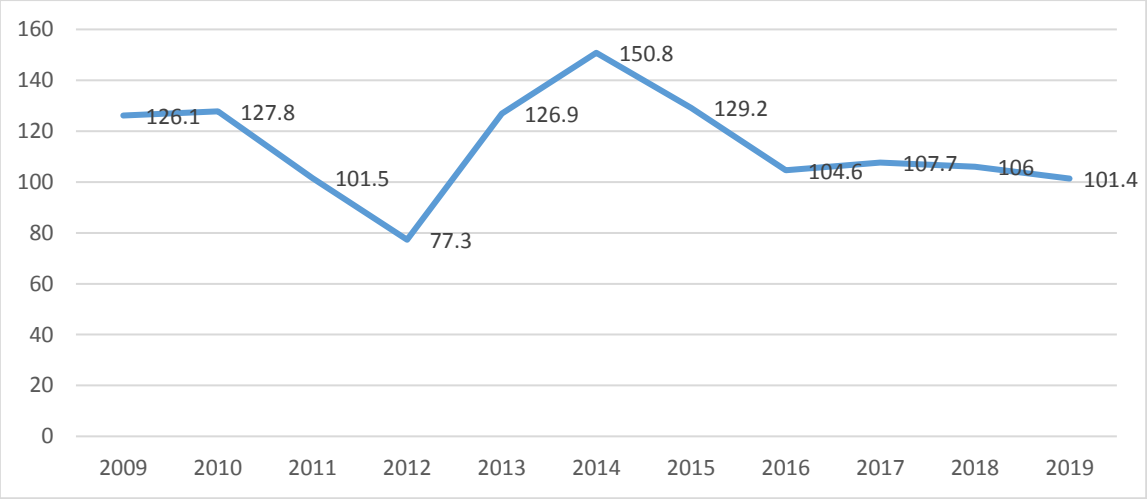

Figure 4. *The growth rate of soybean production in EU countries in 2009-2019, %*
Source: developed by authors based on [12]

At European level, the largest quantity of soy is produced in such countries as Ukraine, Russia, Italy and Serbia, followed by Romania, France, Hungary and Austria [15].

3.4 Soybean production and processing in the Republic of Moldova

The Republic of Moldova is one of the states that joined the 2030 Agenda, undertaking to fulfil the sustainable development goals [13]. However, the data on the total soybean planted areas in the years 2008-2018 shows no constant trends in the development thereof (Figure 5). The largest soybean planted area during the analysed period was recorded in 2015, but after that year, it has been continuously declining, to record only 28 thousand ha in 2018.

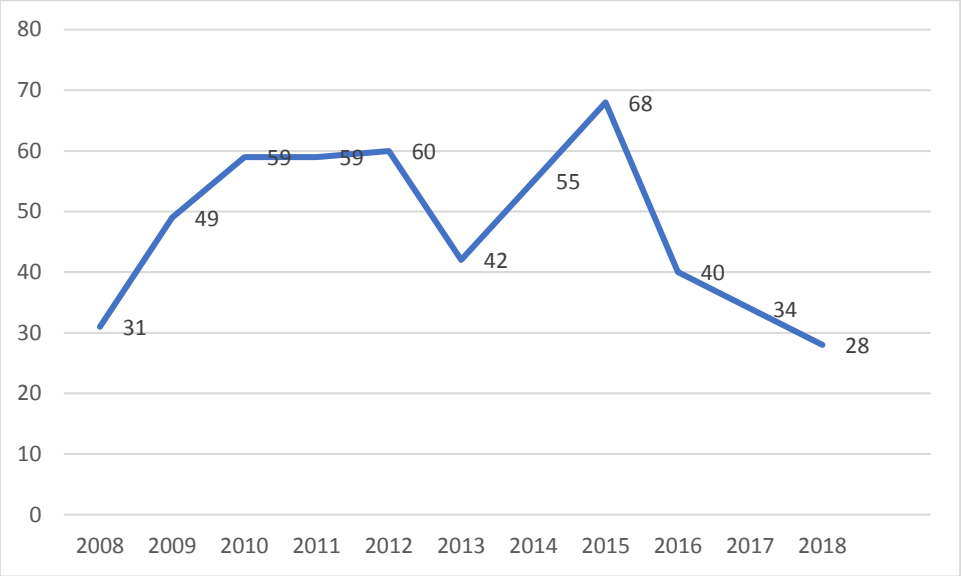

Figure 5. *Evolution of the total area cultivated with soybeans in the Republic of Moldova in 2008-2018, thousand ha*
Source: developed by the authors based on [23]

The analysis of developments in the soybean planted areas separately by agricultural companies and in the individual sector allows identifying rather similar trends for both categories of producers (Figure 6). The comparison of the 2018 level with that of 2015, when the largest areas were recorded, shows that the areas planted by companies decreased by 64%, and those in the individual sector–by 45%.

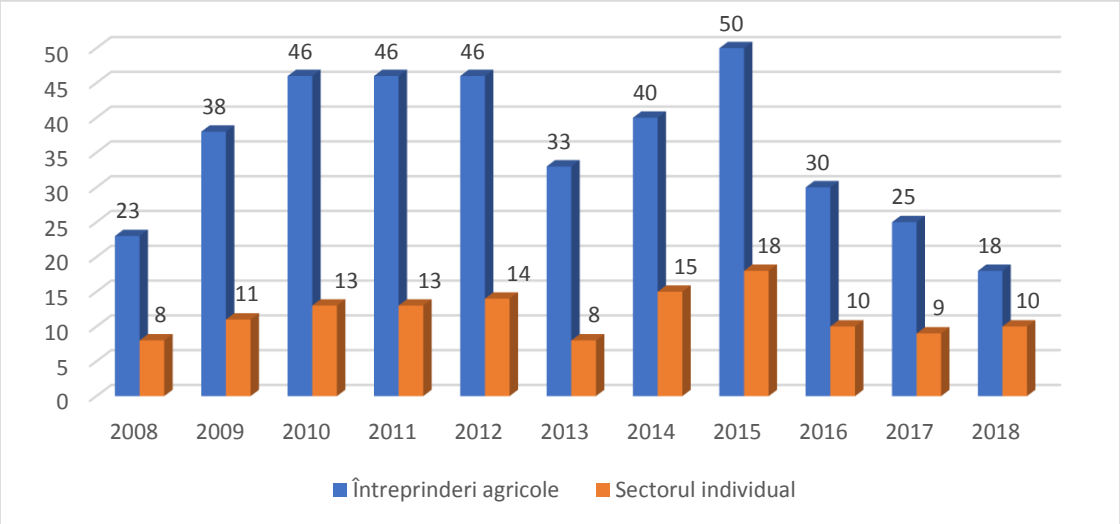

Figure 6. *Evolution of areas cultivated with soybeans in the Republic of Moldova in 2008-2018, broken down by agricultural companies and the individual sector, thousand ha*
Source: developed by the authors based on [23]

The analysis of soybean production in terms of regional differences shows that most planted areas are located in the northern part of the country, in particular the districts of Briceni, Edinet and Drochia. According to the data for 2017, 97% of soybean plantations were concentrated in that region [10].

While the soybean planted areas decreased during the analysed period, the yields recorded less alarming trends. Even if it varied significantly from one year to another, the level reached by the indicator in 2018, of 21 q/ha, is the highest recorded in the reference period (2008-2018), and a practically similar level was reached in 2014 (Figure 7).

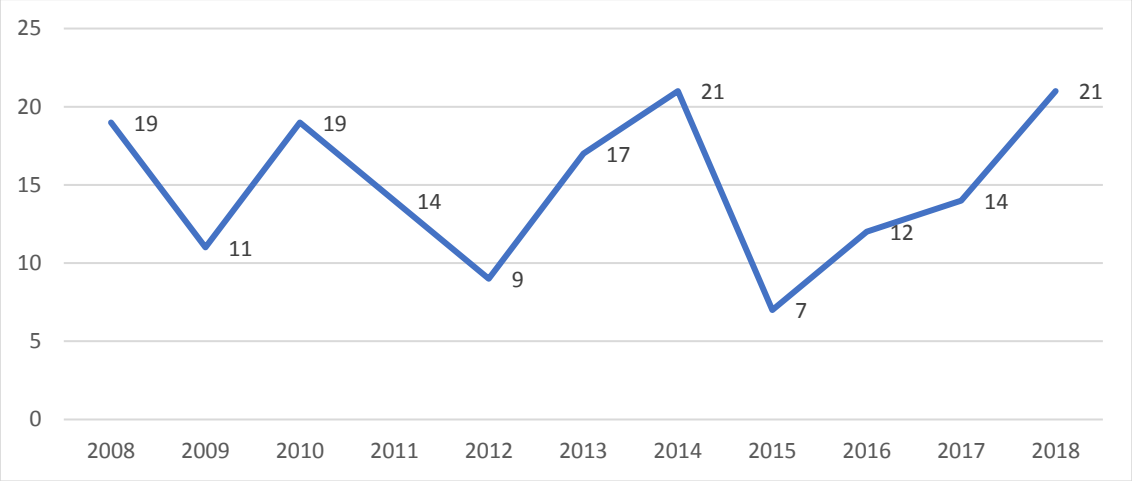

Figure 7. *Evolution of the average soybean yield in the Republic of Moldova in 2008-2018, q/ha*
Source: developed by the authors based on [23]

According to available data, since 2013, agricultural companies have managed to achieve higher soybean yields compared to the individual sector, except in 2015, when both categories of producers recorded the same result (Figure 8).

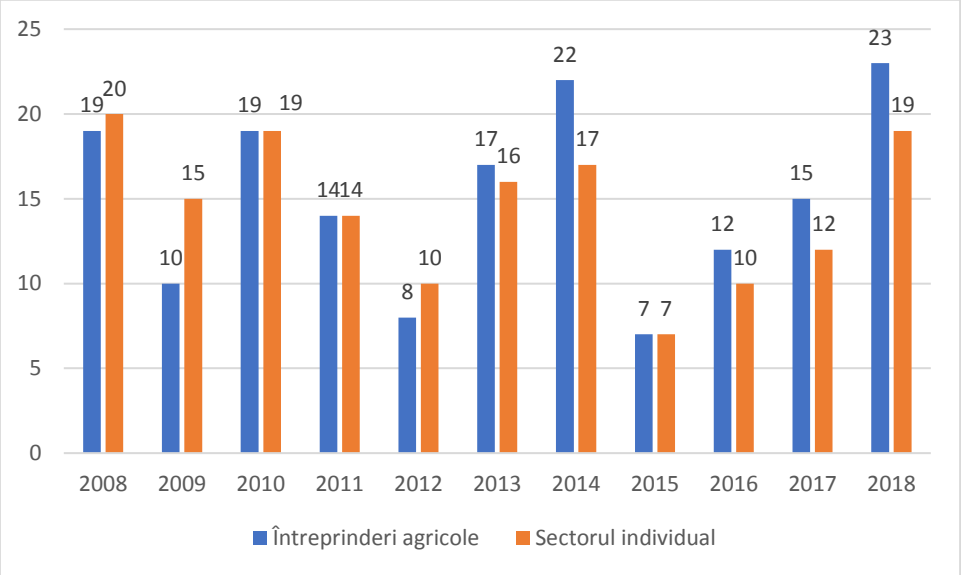

Figure 8. *Evolution of the average soybean yield in the Republic of Moldova in 2008-2018, broken down by agricultural companies and the individual sector, thousand ha*
Source: developed by the authors based on [23]

Despite the decrease in soybean areas, the growth in crop productivity has allowed achieving an increase in the total soybean production over the last 3 years of the analysed period (2016-2018). However, the indicator

achieved in 2018, of 58 thousand tons, is much lower than the one recorded in 2010, when the Republic of Moldova had a total production of 111 thousand tons. An almost similar result was recorded in 2014, with a yield of 109 thousand tons of soybeans. Thus, the volume of soybean production obtained in 2018 is 1.91 times lower than in 2010 and 1.87 times lower than in 2014.

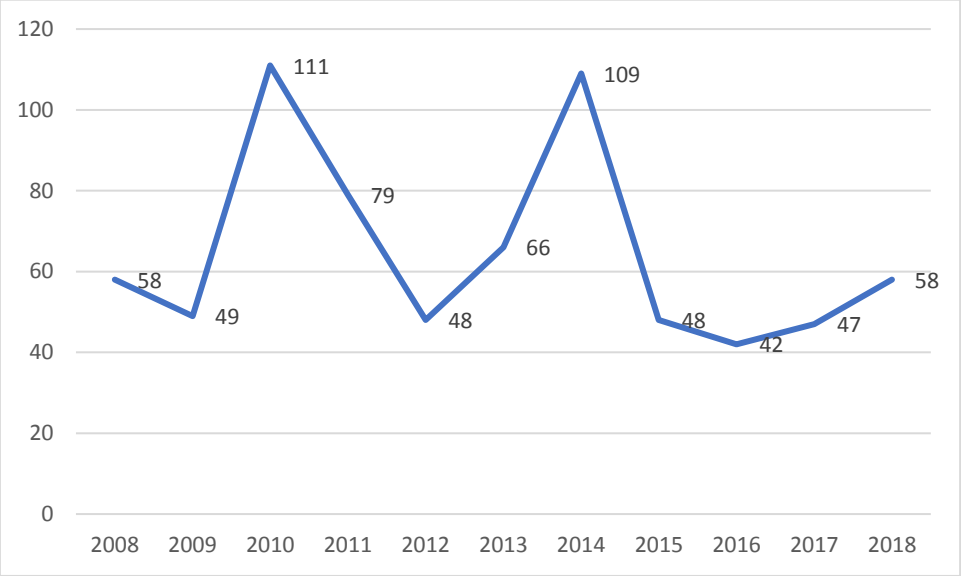

Figure 9. *Evolution of the total soybean yield in the Republic of Moldova in 2008-2018, thousand tons*
Source: developed by the authors based on [23]

Out of the 58 thousand tons of soybeans produced in 2018, 68% were obtained by enterprises and 32% in the individual sector (Figure 10).

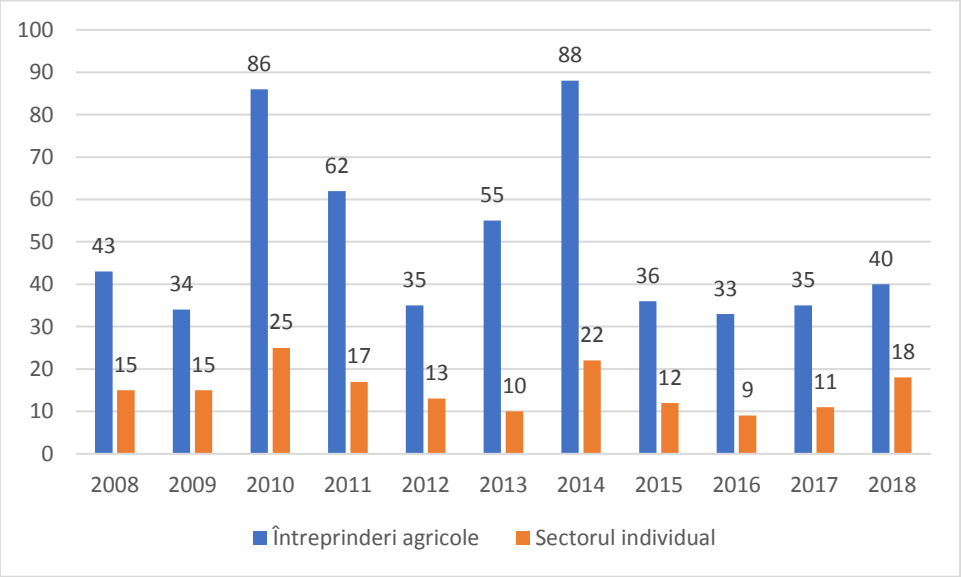

Figure 10. *Evolution of the total soybean yield in the Republic of Moldova in 2008-2018, broken down by agricultural companies and the individual sector, thousand tons*
Source: developed by the authors based on [23]

The data on soybean exports also shows some volatile trends. In the past decade, the largest amount of exported soybeans was recorded in 2015, when it amounted to 69 thousand tons. Subsequently, there has been a steady decline in soybean exports. In 2018, 12.8 thousand tons worth USD 5.2 million [10] were exported, i.e. 56.2 thousand tons less than in 2015.

The soybean processing in the Republic of Moldova consists of oil and soybean meal production. Because of the many technological and financial difficulties, no chemical processing of soybeans is applied in the Republic of Moldova, where the mechanical method of the partial oil pressing by means of the screw press machine is used instead [10] .

As for the developments in soybean meal production, the trends are also volatile (Figure 11). At the same time, we have noted some positive results achieved in 2018, of 24928 tons, above the indicators recorded in the prior years included in the analysis.

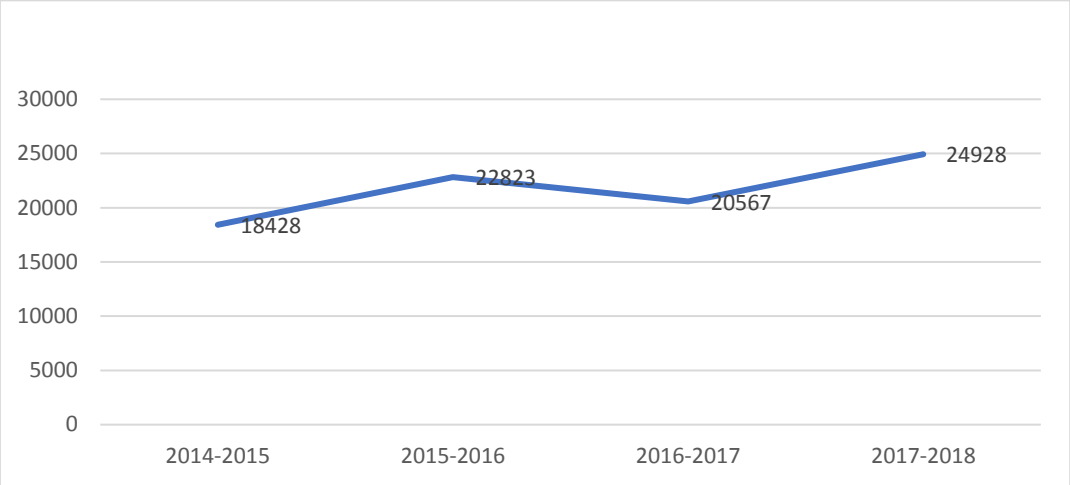

Figure 11. Evolution *of soybean meal production in the Republic of Moldova in 2014-2018, tons*
Developed by the authors based on [10]

By generalizing the data presented above, we conclude that there are no visible and steady positive trends in the development of soybean production and processing in the Republic of Moldova because of several disruptive factors:

- most inputs are imported, and the prices for such inputs are constantly rising. These trends affect the costs, with herbicides and seeds only accounting for more than 44% of the costs;
- most producers face the problem of lack of storage space and they have to sell their produce immediately after harvesting, at a price that does not allow them to generate the desired level of profit;
- the access of soybeans to elevators is limited, because the soybean batches brought to the elevators are too small and do not allow the optimal use of the processing capacity;
- there are problems with certified organic transport. As a result, cross-contamination of annual organic crops occurs during the transportation together with conventional products;
- the number of soybean meal producers has been declining under the pressure of increasing imports of genetically modified soymeal and of a reduction of VAT from 20% to 8% for cereal products (this reduction was not accompanied by a decrease in the soybean purchase price and, the profit generated by processors thus shrank) etc. [10]

Based on the above, we conclude that ***more active and more effective measures are required to promote soybean among producers in the Republic of Moldova and create an enabling environment for the entire value chain.*** In this context, there are several factors that have the potential to enhance the interest in soybean production:

- ✓ the existence of natural conditions favourable for cultivation;
- ✓ the growing need for high quality soy, especially for human and animal nutrition;

- ✓ recognition of soybean value as a remedy for mitigating environmental issues;
- ✓ the crop's capacity to ensure an efficient economic activity.

According to experts' estimates, the Republic of Moldova has good natural soil and climate conditions and heat and light regimes that are favourable for soybean production. Insufficient rainfalls are the only problem in this regard, especially in the central and southern areas.

On the other hand, the Republic of Moldova is currently facing a protein deficit of about 30-35%, which affects the health of the population, in particular children and the elderly. There is a growing need for soybean meal for the livestock sector, which cannot be covered by domestic resources. For example, the total domestic consumption of soybeans in 2017 was double compared to 2014, amounting to 81.4 thousand tons. As a result, while in 2013 the Republic of Moldova imported 10.5 thousand tons of soybean meal, in 2017 the imported amount was 39.5 thousand tons, and in 2018, 34.5 thousand tons were imported. The largest source of imports is Romania (62%), followed by Ukraine (29.5%) and Brazil (8.5%). According to importers' data, the soybean meal purchased from Romania is produced in Brazil or Argentina [10].

Finally yet importantly, the issue of importing genetically modified soybean meal for animal and poultry feed should also be mentioned. According to NFSA's data, about 61% of the total volume of imported soybean meal contains genetically modified organisms [10]. In the absence of accurate data on the import of other products obtained from genetically modified raw materials, it is difficult to assess the exact impact of the imports of "food waste" on human health [21].

In the context of the above, soy is considered by specialists an optimal and unique crop, in particular due to its ability to synthesize an increased amount of protein in just 3-4 months. Thus, with a yield of 2000 kg of soybeans per hectare, about 700 kg of crude protein and 400 kg of oil are obtained [11]. The orientation of production towards exports could ensure even better results, as export prices are much higher than the domestic ones.

As discussed above, soybean is beneficial in mitigation of environmental issues, in particular due to its role in enhancing soil fertility. The soils in the Republic of Moldova are affected by a continuous reduction of humus content. Thus, the annual uncompensated losses of humus from agricultural lands following mineralization exceed the level of 700 kg/ha, and the total deficit, taking into account the erosion losses, amounts to 1100 kg/year [6]. The lack of crop rotations designed to preserve soil fertility is the main factor leading to the negative balance of organic matter in the soil, along with erosion and shortage in local organic fertilizers. Under these circumstances, the specialists recommend the inclusion of leguminous and perennial crops in crop rotation, in order to preserve and improve the humus content in the soil [7].

Soybean is also an efficient crop for agricultural producers. Thus, according to estimates, soybean production starts to generate profit at a yield rate of 1 ton per ha [11]. Therefore, under effective management, it can guarantee a high economic performance for producers.

The need to pay more attention to supporting and fostering the production of non-genetically modified soybeans in the Republic of Moldova is supported by several strategic documents and, implicitly, strategic objectives, to which soybean could make an essential contribution (Table 1). .

Table 1. *Strategic objectives justifying effort in fostering the production of genetically non-modified soybeans in the Republic of Moldova*

Name of the Strategy Document	**Objectives the fulfilment of which may be facilitated by extending soybean production**

Moldova 2030 National Development Strategy (draft) [4]	Specific objective 1. "Increasing revenues from sustainable sources and mitigating economic inequalities"; Specific objective 10. "Ensuring the fundamental right to a healthy and safe environment".
National Strategy for Agricultural and Rural Development for the years 2014-2020 [1]	Specific objective 2.1. "Supporting agricultural land and water management practices"; Specific objective 2.2. "Supporting environmentally friendly production technologies, ecological products, including biodiversity"; Specific objective 6.3. "Improving soil quality and environment-friendly rehabilitation of degraded lands affected by landslides, and of agricultural land shelterbelts in proportion of 100%, as well as sustainable management and protection of useful mineral resources."
Environmental Strategy for the years 2014-2023 [2]	Specific objective 2. "Mainstreaming the principles of environmental protection, sustainable development and green economic development, adaptation to climate change in all sectors of the national economy"; Specific objective 4. "Reducing the negative impact of economic activity on the environment and improving measures to prevent environmental pollution"; Specific objective 5. "Creating the integrated environmental quality monitoring and control system".
National Public Health Strategy for the years 2014-2020 [3]	Specific objective 3. "Ensuring health protection by streamlining the control of behavioural and environmental risk factors".
Soil Fertility Conservation and Enhancement Program for 2011-2020 [5]	Major objective 3. "Stopping the active forms of soil cover degradation on an area of 877 thousand ha of arable land by the end of 2020".

Of course, the list of regulatory documents targeting the environment, public health, agricultural production efficiency, etc. to a greater or lesser extent (thus justifying the inclusion of soybeans in the area of interest of decision-makers of various levels) is not limited to those included in Table 1. We would like to draw particular attention to a rather new draft document, the National Development Strategy "Moldova 2030" [4], which is relevant in terms of aligning the interests and the priorities of the Republic of Moldova to international sustainable development concerns. Thus, the pillar "Sustainable and inclusive economy" refers to the objective "Increasing revenues from sustainable sources and mitigating economic inequalities". As shown earlier, soybean can generate profits, if an effective management is ensured.

In the same document, the pillar "Healthy environment" refers to the objective "Ensuring the fundamental right to a healthy and safe environment". The use of good agricultural practices by soybean producers in the Republic of Moldova, taking into account the environmental justification of crop rotation, is required as an important step in reducing the adverse environmental impact [11].

4. Soybean producer and processor survey aimed at improving the quality of specialist training for this sector in vocational education facilities

4.1 General data on the training programmes covered by the research

The survey targeted the postsecondary vocational education programmes *81110 Agronomy* and *72150 Plant products technology*. Table 2 shows general information on the programmes subjected to review.

Table 2. *General information on postsecondary vocational education programmes under review*

ISCED level, type of programme	**Name of the programme**	**Name of the institution**	**Description of the programme**
Level 4, postsecondary vocational education programme	*81110 Agronomy*	Centre for Excellence in Horticulture and Agricultural Technologies in Taul	The training process is carried out based on the post-secondary vocational education programmes providing the training of specialists in related areas, based on the Nomenclature of vocational training areas, specialties and qualifications for post-secondary vocational and non-tertiary postsecondary education, approved by Government Decision no. 853 of 14.12.2015.
		Agroindustrial College in Ungheni	
		Agricultural Technical College in Svetlai	
	72150 Plant products technology	Centre for Excellence in Horticulture and Agricultural Technologies in Taul	
		Centre for Excellence in Viticulture and Winemaking in Chisinau	

4.2 Evaluation of postsecondary vocational education programme

81110 Agronomy

In order to assess the extent to which the *81110 Agronomy* programme covers the competences relevant to the soybean production sector, course units relevant for the training of such professional competences have been identified and their content has been analysed. Table 3 shows the results of analysis of the selected curricula.

Table 3. *Findings of the 81110 Agronomy programme curriculum analysis*

Course unit name	**Addressed topics/gained competences**	**Notes**
Crop science 1	-	Soybean related topics are not addressed.

Crop science 2	Choice of crop growing technology; seed quality assessment; identification of varieties and sub-varieties; seed rate calculation; the extent to which the biological needs of the crop meet the soil and climate conditions in the analysed region; drafting of the technological sheet of the soybean agro-technical part	The phytotechnical particularities of soybean growing are missing in the recommended practical works.
Crop science 3	-	Soybean related topics are not addressed.
Crop science 4	-	Soybean related topics are not addressed.
Botany and plant physiology	Recommended practical works related to soybean production	-
Agricultural technology	Particularities of soil tillage, vegetation factors; weed control; crop rotation	There is no distinct specification of agricultural technology works by field crops, revealing an insufficient coverage of various aspects of soybean production.
Agrochemistry	Particularities of plants' chemical composition and nutrition; agro-technical properties of the soil; fertilizers and fertilization systems	Soybean is not addressed distinctly.
Plant protection	Plant protection systems	There are no specifications related to soybean protection.
Plant improvement	-	There are no topics addressing improvement of vegetables, including soybeans. Practical works are recommended for the topic "Developing the seed preparation plan for storage and placement in storage", for which only 2 hours are allocated, which does not allow addressing soybean production in a distinct and appropriate manner.

Source: developed by the authors based on 81110 Agronomy programme curriculum

The analysis of information shown in Table 3 shows the existence of a single course unit ("Botany and plant physiology"), teaching competences related to soybean production. The other course units included in the curriculum of *81110 Agronomy* specialty of relevance to the subject under research either address it insufficiently or do not refer to soybean at all.

Based on the findings and in coordination with the programme managers (deputy directors of the educational institutions responsible for the programme), the ***need to include a separate course unit or module in the curriculum was identified, in order to build the competences required for soybean production by fully addressing all technological aspects.***

4.3 Evaluation of postsecondary vocational education programme *72150 Plant products technology*

In order to assess the extent to which the postsecondary vocational education programme *72150 Plant products technology* covers the competences appropriate for the soybean-processing sector, the relevant course units have been identified and their content has been analysed. Table 4 shows the results of analysis of the selected curricula.

Table 4. *Findings of 72150 Plant products technology curriculum analysis*

Course unit name	Addressed topics/gained competences	Notes
Plants products storage	Storage of soybean seeds	-
Introduction to raw materials production	Cereal and technical crops production technology; cereal, oilseeds and technical crops harvesting techniques (including soybean production particularities)	-
Processes and equipment in food industry	Production of flour, groats, preserves, frozen and dried products; processes in the food industry (mechanical, hydro-mechanical, thermal, diffusion, electro-physical)	Soybean processing competences are not taught.
Plant products processing	-	There is no specific reference to soybeans in the training units.
Quality control of products of phytotechnical origin	Methods and procedures for the assessment of organoleptic quality of soybeans	-

Source: developed by the authors based on 72150 Plant products technology curriculum analysis

By generalizing the data presented in Table 4, we can conclude that the topics related to soybean processing are addressed in the course units “Plant products storage", "Introduction to raw material production" and "Quality control of products of phytotechnical origin". At the same time, there is some insufficient coverage of these topics in the course units "Processes and equipment in the food industry" and "Processing of phytotechnical products". This conclusion has been confirmed by the staff teaching these course units, who, in addition to gaps in the curriculum, also noted the insufficient number of contact hours provided by the curriculum for the course unit "Processes and equipment in the food industry".

4.4 Soybean producers’ survey on the improvement of postsecondary vocational education curriculum

81110 Agronomy

The survey was conducted on a sample of 59 representatives of soybean production entities, including 55 in the North and 4 in the Centre regions (Annex 1). The survey was carried out based on a telephone questionnaire (Annex 2).

The use of questionnaire for the soybean producer survey revealed the following:

I. According to 51 producers (86.4%), ***a separate unit/module should be included in the curriculum for the 81110 Agronomy specialty***, in order to build advanced soybean production competences of prospective specialists.

II. With regard to including the competences suggested by the group of experts in the respective course unit, the producers had different opinions, as summarized in Table 5. The hierarchy of declared preferences is shown in Figure 12. Thus, we have found that all producers included in the survey (100%) consider it necessary to include the following professional competences in the training programme:

- determining the sowing density, preparing the seeds before sowing;
- sowing;
- determining the degree and type of weeding;
- diagnosing diseases and pests;
- applying weed control methods according to the used technology;
- applying treatment methods against diseases and pests;
- applying harvesting methods (direct or divided);
- determining and interpreting the harvesting quality indices;
- assessing the economic efficiency of soybean production.

According to 95% - 99.9% respondents, the following professional competences need to be included in the programme:

- performing soil tillage, establishing the succession of soil tillage operations;
- applying conservative technologies in soybean production;
- justifying the fertilization needs, quantifying (determining) the necessary amount of fertilizers;
- determining the needs for seeding material, fuel, lubricants, plant protection products and other materials.

According to 90% - 94.9% respondents, the following professional competences should be included in the training:

- environmental and economic justification for including soybean in the crop rotation system;
- establishing the share of the area occupied by soybean and its place in the crop rotation;
- fertilization (by applying appropriate methods and dosing);
- identification of sources of supply of raw materials and materials for crop establishment and maintenance;
- seed inoculation.

86.44% of respondents mentioned the competence: determining the mechanized works and labour needs.

Table 5. *Assessment of producers' opinion on the topics that should be included in the 81110 Agronomy programme*

Competences	**Mentioned as necessary**	
	pers.	**%**
Environmental and economic justification for including soybean in the crop rotation system	54	91.53
Establishing the share of the area occupied by soybean and its place in the crop rotation	54	91.53

Performing soil tillage, establishing the succession of soil tillage operations	57	96.61
Applying conservative technologies in soybean production	58	98.31
Justifying the fertilization needs, quantifying (determining) the necessary amount of fertilizers	58	98.31
Fertilization (by applying appropriate methods and dosing)	56	94.92
Determining the needs for seeding material, fuel, lubricants, plant protection products and other materials	58	98.31
Determining the mechanized works and labour needs	51	86.44
Identification of sources of supply of raw materials and materials for crop establishment and maintenance	55	93.22
Determining the sowing density, preparing seeds before sowing	59	100.00
Seed inoculation	56	94.92
Sowing	59	100.00
Determining the degree and type of weeding	59	100.00
Diagnosing diseases and pests	59	100.00
Applying weed control methods	59	100.00
Applying treatment against diseases and pests	59	100.00
Applying harvesting methods (direct and divided)	59	100.00
Determining and interpreting harvesting quality indices	59	100.00
Assessing the economic efficiency of soybean production	59	100.00

Source: developed by the authors based on soybean producer survey

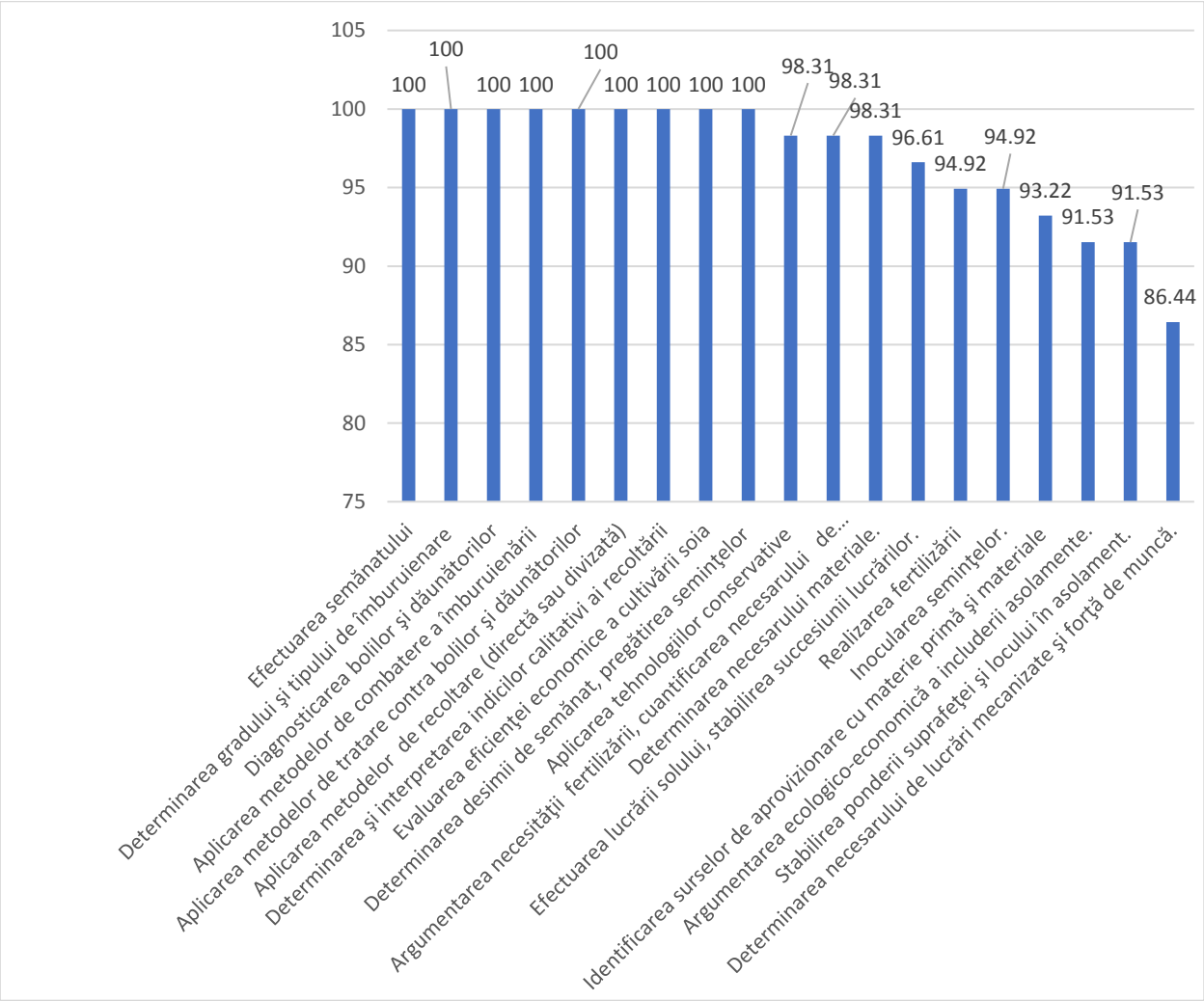

Figure 12. *Hierarchy of producers' views on the topics to be included in the 81110 Agronomy programme*
Source: developed by the authors based on soybean producer survey

Producers' suggestions on the competences that should be included in the programme, in addition to those suggested by the team of experts are shown in Figure 13.

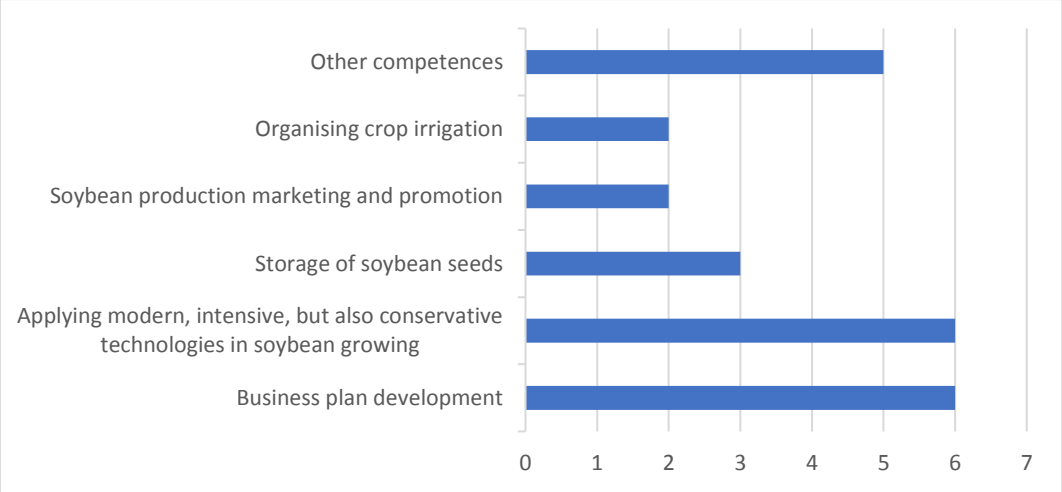

Figure 13. *Hierarchy of producers' preferences regarding additional skills related to soybean cultivation to be included in the 81110 Agronomy programme*
Source: developed by the authors based on soybean producer survey

By generalizing the results of soybean producer survey and taking into account the expert recommendations, the following **recommendations** have been made*:*

a) completing the curriculum of *81110 Agronomy* specialty with an additional unit/module aimed at building advance soybean growing competences in prospective specialists;
b) designing a training unit/module to ensure the teaching of the following competences to prospective specialists:
   - environmental and economic justification for including soybean in the crop rotation system; establishing the share of the area occupied by soybean and its place in the crop rotation system;
   - performing soil tillage operations, establishing their sequence;
   - applying modern, intensive, but also conservation technologies in soybean growing;
   - justifying the fertilization needs, quantifying (determining) the necessary amount of fertilizers;
   - fertilization (by applying appropriate methods and dosing);
   - determining the needs for seeding material, fuel, lubricants, plant protection products and other materials;
   - determining the needs for mechanized works and labour;
   - identifying sources of supply of raw materials and materials for crop establishment and maintenance;
   - selecting soybean varieties for seeding;
   - determining the sowing density, preparing the seeds before sowing;
   - seed inoculation;
   - sowing;
   - determining the degree and type of weeding;
   - diagnosing diseases and pests;
   - applying weed control methods;
   - applying methods of treatment against diseases and pests;
   - organising crop irrigation;
   - applying harvesting methods (direct or divided);
   - determining and interpreting the harvesting quality indices;
   - storage of soybean seeds;
   - assessing the economic efficiency of soybean production;
   - soybean production marketing and promotion;
   - business plan development.

4.5. Soybeans processors' survey on the improvement of postsecondary vocational education curriculum

72150 Plant products technology

The soybean processor survey was conducted on a sample of 12 entities: 5 in the North and 7 in the Centre region (Annex 3). To this end, the structured thematic interview method (Annex 4) was used via telephone communication.

The interviewing of soybean processors revealed the following:

I. All interviewees agreed with the need to separately address the topics related to soybean processing in the course units "Processes and equipment in the food industry" and "Processing of phytotechnical products" in the curriculum of *72150 Plant products technology* specialty;

II. For the course unit “Processes and equipment in the food industry”, the interviewees suggested that the following competences should be included in the curriculum:

- modern soybean processing equipment and machinery (including mechanical and electric aspects in the operation of soybean processing equipment);
- software and programmes used in soybean processing;
- drying equipment;
- processes and equipment used in production of soy milk, mayonnaise and cheese;
- processes and equipment used in production of soy oil;
- processes and equipment used in production of soy forage.

The hierarchy of processors' preferences regarding the competences that should be included in the soybean processing training programme in the course unit "Processes and equipment in the Food Industry" is shown in Figure 14.

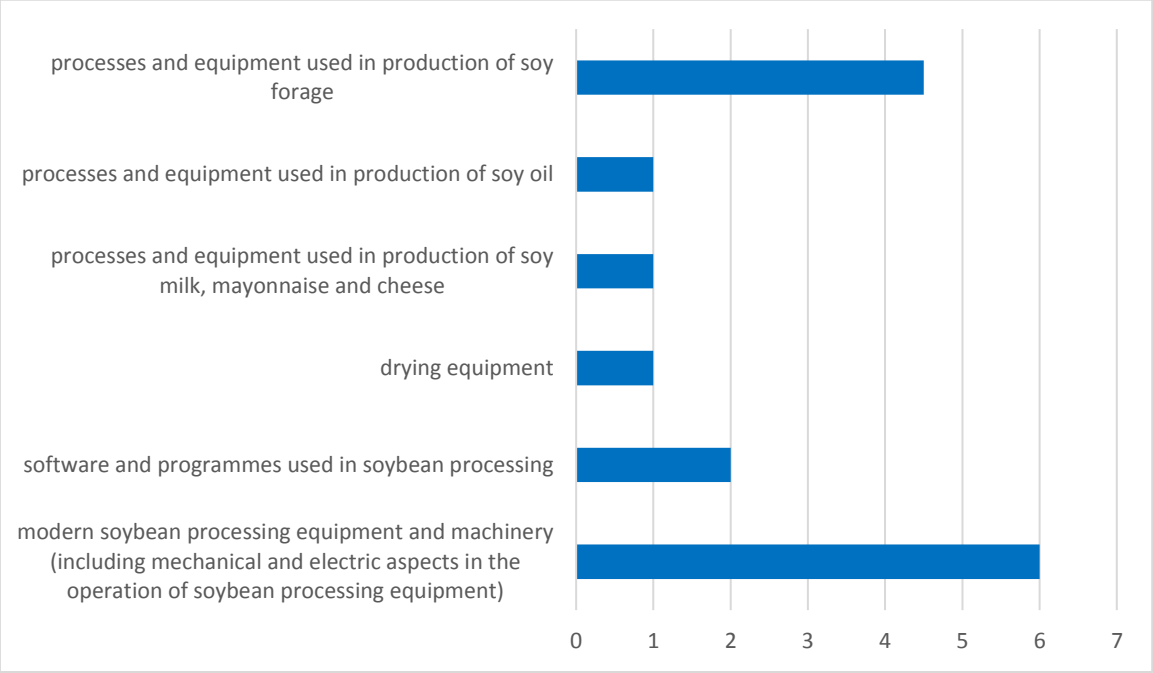

Figure 14. *Hierarchy of processors' preferences regarding the skills to be included in the course unit "Processes and devices in the food industry" of the 72150 Plant Products Technology programme*
Source: developed by the authors based on soybean processors' survey

III. For the course unit “Processes and equipment in the food industry”, the interviewees suggested the following competences to be included in the curriculum:

- soybean extrusion processes and technologies;
- pre-processing testing;
- soybean primary processing;
- soybean processing for milk, mayonnaise and cheese;
- soybean processing for oil;

- soybean processing for forage;

The hierarchy of processors' preferences regarding the competences that should be included in the soybean processing training programme in the course unit “Processing of phytotechnical products" is shown in Figure 15.

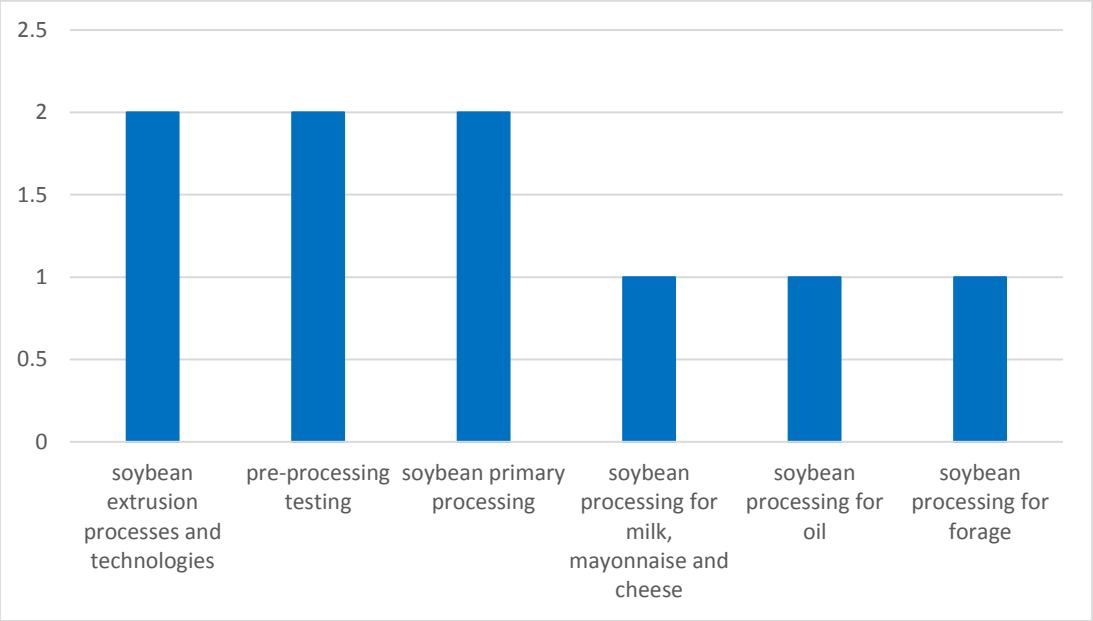

Figure 15. *Hierarchy of processors' preferences regarding the skills to be included in the course unit “Processing of phytotechnical products" of the 72150 Plant Products Technology programme*
Source: developed by the authors based on soybean processor survey

Based on the analysis of the results of soybean processor survey, ***it is recommended****:*

IV. To include the following competences in the course unit "Processes and equipment in the Food Industry" in the curriculum of *72150 Plant products technology programme:*
   - modern soybean processing equipment and machinery (including mechanical and electric aspects in the operation of soybean processing equipment);
   - software and programmes used in soybean processing;
   - drying equipment;
   - processes and equipment used in production of soy milk, mayonnaise and cheese;
   - processes and equipment used in production of soy oil;
   - processes and equipment used in production of soy forage.

V. To include the following competences in the course unit “Processing of phytotechnical products” in the curriculum of *72150 Plant products technology programme:*
   - soybean extrusion processes and technologies;
   - pre-processing testing;
   - soybean primary processing;
   - soybean processing for milk, mayonnaise and cheese;
   - soybean processing for oil;
   - soybean processing for forage.

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Annex 1

List of soybean producers involved in the opinion poll

1. ”Stancăuți” SRL
2. ”Friptuleac Iu.” GȚ
3. ”Rom-Cris” SRL
4. ”Stâncă Ion” GȚ
5. ”Refoma CM” SRL
6. ”Palmoc Agro” SRL
7. ”Vilata Nouă” SRL
8. ”Valea Sofiei” SRL
9. ”Tehrubsor” SRL
10. ”Bonagrovest” SRL
11. ”Bosvelia” SRL
12. ”Bitic Agro” SRL
13. ”Cortulus” SRL
14. ”Cariopsa” SRL
15. ”Bejan Mihai” GȚ
16. ”Danulschii” SRL
17. ”Biamus Prim” SRL
18. ”Dimazcom” SRL
19. ”Bindagro-Com” SRL
20. ”Bursemcom” SRL
21. ”Avraman Ion” GȚ
22. ”Ascensiune” SRL
23. ”AntaAgro” SRL
24. ”Amonti-Agro” SRL
25. ”Agrifix-Com” SRL
26. ”Agrodenistan” SRL
27. ”AgroMilari” SRL
28. ”Accesal-Grup” SRL
29. ”GodAgroPlus” SRL
30. "Agrostoc" Entrepreneurs' Cooperative
31. "AGDAV" SRL
32. “Plaiul Bîrlădean” LLC
33. "WeTrade"
34. “Cereale de Aur”
35. “Drebozaci” LLC
36. “Agro SZM”
37. GȚ “Corina Gaibu”
38. “Agroprestserv” SRL
39. "Agro-Nistru" SRL
40. “Acord” SA
41. SC “Agrodena” SRL
42. “Hotin” SRL
43. “Badrageanca” SRL
44. “Balasinord” CA.
45. “Carhol-Agro” SRL
46. “Chetoprim” SRL
47. “Gordagro-Plus” CAP
48. “Climăuțanul Agro” SRL
49. "Cutezătorul Agricol" SRL
50. “Golserv-agro” SRL
51. “Duval” SRL
52. NFF Edinet
53. GȚ “Paraschino”
54. GȚ “Rastașanu Gheorghe”
55. GȚ “Slivciuc Serghei”
56. “Restabilire” SRL
57. GT “VDodu”
58. “Prograin Organic Moldova”
59. "Gospodarul-Rediu" LLC

Annex 2

Opinion poll conducted with soybean producers

(Survey)

Dear entrepreneurs,

CE PRO DIDACTICA, in partnership with Donau Soja Moldova and MARDE, as part of the project financed by the European Union ***"Increasing the competitiveness of the agri-food sector through integration to domestic and global value chains, in particular in the soya sector"****, invites you to participate in a survey that aims at identifying ways of improving the quality of training of specialists in vocational education institutions, in order to develop the skills needed to ensure the performance of the soybean production and processing sector in the Republic of Moldova.*

We would appreciate if you could fill in this questionnaire by selecting the appropriate answers from your point of view. Personal data will neither be made public without your consent, nor used for purposes other than those of the survey.

Select or fill in the answers:

1. Name of the company you work for:

_____

(Name of the company)

2. Area you work in (check): SOUTH_____, NORTH_____, CENTRE_____

UTA Gagauzia_____ city of Chisinau _____

3. In your opinion, is it necessary to include a separate subject to offer advanced training in soybean cultivation to students studying the specialty *Agronomy* in TVET?

Yes ☐ No ☐

4. Please assess the need to develop the following students' competences (knowledge, abilities, skills) to ensure the performance of the soybean production sector:

No.	Competences	Yes	No
1	Environmental and economic justification for including soybean in the crop rotation system		
2	Establishing the share of the area occupied by soybean and its place in the crop rotation system		
3	Performing soil tillage operations, establishing their sequence		
4	Applying conservation technologies in soybean cultivation		
5	Justifying the fertilization needs, quantifying (determining) the necessary amount of fertilizers		
6	Fertilization (by applying appropriate methods and correct dosing)		
7	Determining the needs for seed material, fuel, lubricants, plant protection preparations and other materials		

No.	Competences	Yes	No
8	Determining the needs for mechanized works and labour		
9.	Identifying sources of supply of raw materials and materials for crop establishment and maintenance		
10	Determining the sowing density, preparing seeds before sowing		
11	Seed inoculation		
12	Sowing		
13	Determining the degree and type of weeding		
14	Diagnosing diseases and pests		
15	Applying weed control methods according to the applied technology		
16	Applying methods of treatment against diseases and pests		
17	Applying (direct or divided) harvesting methods		
18	Determining and interpreting the harvesting quality indices		
19	Assessing the economic efficiency of soybean cultivation		
20	Other competencies (please specify):		
21			
22			
23			
24			
25			

Thank you very much for your cooperation!

Annex 3

List of soybean processors involved in the opinion poll

1. ”Olseg_VT” SRL
2. "Verum Capital" SRL
3. "Axedum" SRL
4. "Rusagro Prim" SRL
5. "Avicola Teovera" SRL
6. "Sarur Con" SRL
7. SRL „RAILEAN-PLUS”
8. SA "AVICOLA"
9. “BIO COMPONJ RAPS” SRL, JOINT VENTURE
10. ÎS „Moldsuinhibrid”
11. "Biograin Company" SRL
12. SRL "ROLIMEX-COM"

Annex 4

Opinion poll conducted with soybean processors

(structured thematic interview)

Dear entrepreneurs,

CE PRO DIDACTICA, in partnership with Donau Soja Moldova and MARDE, as part of the project financed by the European Union ***"Increasing the competitiveness of the agri-food sector through integration to domestic and global value chains, in particular in the soya sector"****, invites you to participate in a survey that aims at identifying ways of improving the quality of training of specialists in vocational education institutions, in order to develop the skills needed to ensure the performance of the soybean production and processing sector in the Republic of Moldova.*

We would appreciate if you could fill in this questionnaire by selecting the appropriate answers from your point of view. Personal data will neither be made public without your consent, nor used for purposes other than those of the survey

.

1. **Name of the company you work for?**

_____

_____

(Name of the company)

2. **Area you work in (check): SOUTH_____, NORTH_____, CENTRE_____**

UTA Gagauzia_____ city of Chisinau _____

3. **PLEASE BE INFORMED that under the programme 72150** ***Technology of processes of plant origin*****, students are familiarized with the following topics related to soybean processing:**

- In the subject "*Preservation of phytotechnical products*" ― ***Preservation of soybean seeds*****;**
- In the subject "*Fundamentals of raw material production*" ― ***Soybean cultivation technology*****;**
- In the subject "*Quality control of products of phytotechnical origin*" ― ***Methods and techniques for assessing the organoleptic quality of soybean seeds.***

It was found that within the subjects "*Processes and devices in the food industry" and "Processing of plant protection products*" <u>soya-related topics are not studied separately.</u>

<u>QUESTIONS:</u>

4. **<u>Do you think that soya-related topics should be addressed separately</u> within the subjects "*Processes and devices in the food industry" and "Processing of phytotechnical products"?***

Yes ☐ No ☐

5. **<u>What skills would you propose to be developed in soybean cultivation:</u>**

2.1 In the subject "Processes and devices in the food industry":

_____

_____

_____

_____

2.2 In the subject "Processing of phytotechnical products":

_____
_____
_____
_____

6. <u>In your opinion, what new course units (subjects)</u> should be included in the curriculum in order to develop students' skills needed for the soybean processing sector?

_____
_____
_____
_____

Thank you very much for your cooperation!

The points of view expressed in this report are those of the authors and do not in any way engage the institutions to which they belong, just as it does not reflect the position of the care institution that financed the for elaboration or that ensured the project implementation.

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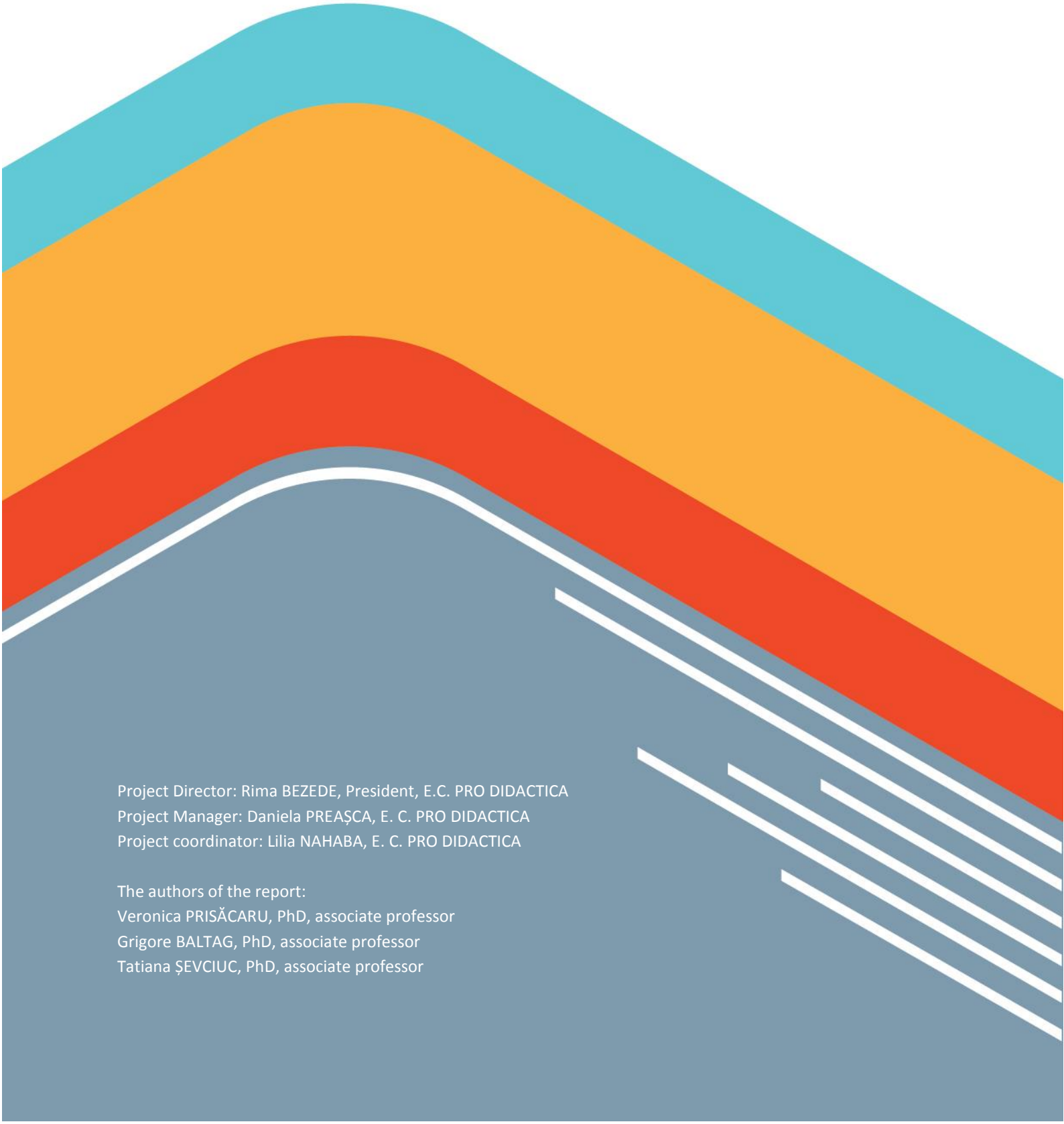

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