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REPORT

On results of identifying the mid-term labour market demand for higher and vocational education in the areas of:

- PHYTOTECHNY
- HORTICULTURE
- PEDOLOGY AND SOIL PROTECTION
- PRODUCTION OF AGRICULTURAL CROPS AND LIVESTOCK BREEDING
- ANIMAL HUSBANDRY AND VETERINARY MEDICINE
- PRODUCTS OF PLANT ORIGIN TECHNOLOGY

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List of Abbreviations

CORM – Classification of Occupations in the Republic of Moldova
VETI – Vocational Education and Training Institutions
VET – Vocational Education and Training
GDP – Gross Domestic Product
STED - Skills for Trade and Economic Diversification
USA – United States of America
EU – European Union

Executive Summary

The respective study was carried out under the European Union Project "Development of Rural Areas in Republic of Moldova", Part I "Increasing Competitiveness of the agri-food sector through integration to domestic and global value chains, in particular in the soya sector", implemented by Austrian Development Cooperation in partnership with PRO DIDACTICA Education Centre and Donau Soja International Association (Austria). The Project envisages to contribute optimally to increasing the sector's capacity to get affirmed on the domestic and foreign markets, as well as to developing the capacities of the VET institutions in the agri-food sector so as to match the educational offer with related quality standards and labour market needs.

The study was undertaken as a deliverable under Activity 1.16: Involvement in drafting the Annual Plan for Students' Enrolment in VETI, in line with the labour market demand in agri-food sector. Due to the magnitude of the problem related to quality of initial and continuous vocational training in agri-food area (provided both in vocational education and higher education), the scope of the respective investigation was extended so as to cover by research the initial and continuous training activities at levels 3, 4 and 6, as well as integrated higher education, level 7, in the following areas: Phytotechny, Horticulture, Pedology and soil protection, Production of agricultural crops and livestock breeding, Animal husbandry and veterinary medicine, Products of plant origin technology.

The main goal of the study was to identify the Moldovan labour market needs for qualified specialists in the above-mentioned areas and to develop proposals for 2019 Admission Plan for related programs.

The specific objectives of the study are:

- to analyse the current situation and the trends emerging in the sectors related to investigated initial and continuous vocational training programs;
- to assess the quality of initial and continuous training system in the investigated areas based on employers' perception;
- to identify the skills to be improved among the future specialists;
- to identify new VET programs for initial and continuous training requested by employers;
- to study the employment demand for investigated specialties at the present moment as well as for a mid-term perspective in correlation with the existing supply;
- to forecast the number of places for 2019 admission in the investigated VET programs under the existing economic and educational context;
- to analyse the Classification of Occupations in the Republic of Moldova so as to assess the extent to which it correlates with the existing educational offer (from VET programs' perspective) and with new specialties and vocations;
- to provide recommendations regarding:
    - the number of places to be included in 2019 Admission Plan for the respective programs;
    - the initial and continuous VET programs to be included in the educational offer of responsible institutions;
    - to increase the quality of initial and continuous VET process in the related areas;
    - to harness the STED methodology in the process of labour market needs' study.

The respective study covers the period 2010-2018 for the sector analysis and the period 2016-2019 for educational offer analysis under the respective initial and continuous VET programs. The analysis of current and forecasted trends on the EU labour market covers the period 2005-2025.

Employers' target groups were identified for every investigated program before carrying out the opinion poll. The number of respondents under the opinion poll was different due to the differences existing in the number of entities per each area, as follows:

- "Agronomy" specialty (level 4 and 6) – 98 respondents;
- "Selection and Genetics" (level 6) – 10 respondents;
- "Fruits' and vegetables' grower" (level 3), "Vegetables' and fruit trees' growing" (level 4) and "Horticulture" (level 6) vocation/specialty – 77 respondents;
- "Forester" (level 3), "Parks' and public gardens' planning" (level 4), "Forestry and public gardens" (level 4 and 6) vocation/specialty – 25 respondents;
- "Ecology and environment protection" (level 4) and "Ecology" (level 6) specialties – 28 respondents;
- "Environmental engineering" (level 6) specialty – 15 respondents;
- "Beekeeper" (level 3), "Animal husbandry" (level 6) and "Agricultural bio-technology" (level 6) vocation/specialty – 65 respondents;
- "Veterinary medicine" (level 4 and 7) specialty – 35 respondents.

The survey itself was carried out during February-March 2019. The semi-structured interviewing method was used alongside questionnaires' filling in.

The following was undertaken during the same period of time: sector analysis, labour market trends' assessment for the Republic of Moldova and EU countries, investigation of initial and continuous vocational training system in the Republic of Moldova, situation analysis in the tertiary education system in EU countries, CORM analysis in relation to the existing educational offers according to the respective classifiers of vocational training areas and specialties/vocations, and employers' proposals for new programs. The sources of information used for the respective assignment were the data obtained through direct communication with employers and representatives of VETI management (11 units) and higher education institutions' management (5 units), data from the web-pages of investigated units, normative documents (strategies related to analysed sectors, classifiers of VET areas and specialties/vocations, Classification of Occupations in the Republic of Moldova, etc.), available national and EU statistical data, results of other studies in similar areas, and other.

Excel was used to process the results of opinion polls and interviews, as well as such research methods as: analysis, synthesis, clarification, formulation of conclusions and recommendations.

Main Findings

Analysis of agri-food production sector

According to the official data of the RM National Bureau of Statistics, a number of 3723 agricultural enterprises were registered in the Republic of Moldova in 2017. According to the same source, about 6000 enterprises are currently involved in agricultural activity, including 5280 involved in crop production, a part of them practicing agriculture as secondary activity; and 2402 out of 5280 enterprises hold multiannual plantations. About 636 enterprises (according to the data held by the Ministry of Agriculture, Regional Development and Environment) are engaged in livestock breeding. A number of 949 enterprises were involved in food industry in 2017. According to the data provided on the web-page of the National Food Security Agency, about 172 enterprises are currently involved in processing agricultural products of plant origin.

An increase in number of agricultural and food industry enterprises occurred during 2015-2017, mainly due to the increased number of entrepreneurial initiatives, rather than increased performance of the respective sector. The respective conclusion is supported by the results deriving from the analysis of a series of outcome indicators, both quantitative and qualitative ones, which reflect the enterprises' activity during 2010-2017 (some of indicators being also available for 2018). Hence, the following may be assessed positively:

a) insignificant increase of total area sown with agricultural crops, including perennial plantations managed by enterprises;
b) increased population of cattle, porcine, rabbits, ovine and caprine managed by enterprises;
c) positive trends in total global agricultural production development, as well as separately in production of plant and animal origin;
d) increased productivity for the majority of agricultural crops and livestock managed by enterprises;
e) increased volume of production obtained by food industry enterprises, except for vegetal cans and meat cans;
f) lack of gender gap in labour force employment in agricultural production and food industry.

At the same time, the following drawbacks should be pointed out in the agri-food production sector's development:

a) slow increasing rate for sown areas managed by enterprises;
b) reduced areas cropped with vegetables;
c) reduced area of vineyards managed by enterprises;
d) reduced population of livestock in households' sector, except for rabbits and bees (this is an important aspect, as it is an area on which the veterinary doctors' activity is focused);
e) reduced relevance of upward trends for global agricultural production, including the plant and animal origin production, due to the fact that the level achieved by the given indicators cannot serve as an incontestable evidence for sectors' increased performance when using the system of current prices because of the following reasons: these are outcome indicators, and not indicators showing activity efficiency; the value of production reflects fully the evolution of volumes and prices for plant and animal origin products;
f) missing stable trends in relation to growth-determining indicators during the surveyed period, just with small exceptions;
g) a rather high number of agricultural enterprises (47%) and food industry enterprises (54%) registering losses, according to data for 2017; as well as too slow decreasing rate for the number of inefficient enterprises in the analysed sector;
h) insignificant increase of the plant origin products' share and an almost unchanged situation for the share of animal origin products in the country's total volume of exports;
i) decreased share of animal origin production deriving from the processing industry in the country's total volume of exports;
j) in spite of increased number of population employed in agriculture, hunting and related services, much more modest trends were identified for the evolution in number of employees as compared to that of total employed population; similar trends (continuous decrease) are noted for labour force evolution in the EU countries. Hence, the rationale stipulated in the National Employment Strategy for 2017-2021 gets confirmed and namely – the employment growth in this sector was not accompanied by formal jobs' creation – a problem which still persists at the present moment.

Based on the above-established, it can be deduced that the current trends in the development of the agri-food sector cannot be considered as benchmarks for an optimist forecast for creation of additional jobs for the future graduates of the initial training programs tackled in this study.

Analysis of the Forestry Sector

According to the official data of the RM National Bureau of Statistics, currently the forestry sector is represented by 40 entities, registering a decreasing trend during 2015-2017.

The forestry fund accounted in 2017 for 421,5 thousand ha, including forests 378,2 th ha; hence the forestry coverage level is 11.2%.

There is relevant evidence supporting the importance of forestry fund, especially of forests, for the Republic of Moldova. Nevertheless, there is a number of problems related to this sector's management, which substantially decrease the contribution of the forestry sector to solving the country's social-economic problems: reduced rate for increasing the areas covered by forestry vegetation; creation of brush from artificially introduced species, which do not fit Moldova's natural ecosystems; emergence and extension of complex outbreaks of forestry pests and diseases, illegal cuts, lack of necessary equipment for wood processing, and other.

The problems identified in forestry resources' management refer to the (downward) evolution of labour force, as well as to the economic results achieved by the enterprises in the respective sector, as the number of enterprises active in the sector and registering losses in 2017 was over 27%. Although the share of enterprises registering losses is decreasing, the existence of over 27% of enterprises working inefficiently is a clear evidence of insufficient performance, and implicitly, of ***low potential to create jobs.***

Analysis of Land Irrigation Sector

According to the data provided on "Apele Moldovei" Agency's web page, the irrigation sector is represented currently by 16 entities. When analysing the development of this sector from quantitative and qualitative points of view, a number of problems may be established in relation to sector's degradation, which has led to its decreased efficiency. As a result, annually over 400 million MDL are lost because of non-irrigation of agricultural fields. Based on these circumstances, it is obvious that ***this sector is unable to create new jobs. At the same time, there is a need to train specialists of an appropriate quality, who would be able to deal with the sector's problems.***

Ecological problems in the Republic of Moldova

Alongside the ecological problems existing in relation to the forestry fund, the Republic of Moldova also encounters serious problems related to other basic natural resources' management: land, water, and air.

When analysing soils' management, the following problems are identified: an ecological misbalance between natural and anthropic ecosystems; inadequate use of agricultural fields as a result of excessive parcelling of the land fund, of distribution of agricultural fields on the slope (from hill to valley direction), of not respecting crop rotation and technologies for agricultural crops' growing; water- and wind-induced soil erosion, negative balance of humus and nutritive elements, soil salinization and alkalization as a result of irrigation and land drainage, destruction of agricultural fields due to landslides, etc.

Although registering an insignificant decrease over the last three years (starting in 2015), the level of air pollution remained to be very high over the last decades.

The following problems are identified in relation to water resources:

- insufficient water volume per capita (500 m^3 per capita per year, while the recommended threshold at the international level is 1700 m^3);
- considerable decrease of surface water volume and rivers' flow over the last years;
- intense degradation of water and sewerage supply networks, and other.

The above-mentioned problems may be solved by undertaken a set of organizational, managerial and educational actions. Although population education/schooling in the spirit of environment protection and ensuring premises for sustainable development was mentioned repeatedly as an important factor by different studies and in different strategic documents, it is absolutely obvious that there is a ***need of qualitative specialists, who would be able to ensure a progressive vision in relation to environmental problems.***

Analysis of the initial and continuous vocational training system in the Republic of Moldova

Currently, the initial vocational training system is represented in the Republic of Moldova by 45 secondary vocational training institutions, 41 post-secondary vocational training institutions and 29 higher education institutions. Under the influence of unfavourable demographic phenomena and massive emigration of population abroad, VET is in continuous quantitative decline, which is mirrored by decreasing number of institutions, as well as of pupils and students.

The decreasing number of pupils in gymnasiums and lyceums, as well as of those who pass the final school exams generates similar trends in the evolution in the number of pupils and students in VET institutions, with higher education being most vulnerable in this respect. At the same time, there is a much more rapid decreasing rate for higher education graduates in the area of "Agricultural Sciences" as compared to the total number of graduates. This fact implies the need to undertake additional efforts so as to ensure viability of vocational training programs in the area, taking into account the strategic importance of agriculture for the Republic of Moldova.

The comparative analysis of the trends existing in the EU tertiary education pointed out the fact that it is not affected so drastically by the demographic phenomena, registering even a non-essential increase of students' number in 2016 as compared to 2015 (by 0,1 million persons). According to the database Eurostat Statistics Explained, most of the students were enrolled in 2016 in Bachelor's Degree programs (61.4%), while 7.3% – short-cycle tertiary education programs, 27.6% – Master's Degree programs and 3.9% – PhD studies. The most attractive areas in 2016 were *social sciences, journalism, IT, business and administration,* and *law*, with about 32% of the total number of students opting for them. *Agricultural sciences* are less demanded by the young people from EU and this fact is mirrored as well by the data on the number of graduates – this area being the last one in the hierarchy of graduates' number. At the same time, the countries which registered in 2016 the highest number of graduates in the areas of *agriculture, forestry, fishery and veterinary medicine* were: Turkey (41,7 th), Poland (35,4 th), Spain (32,6 th), France (25,9 th) and Germany (14,2 th).

In spite of the fact that continuous vocational training is widely recognized as one of the main factors of organizations' performance, the situation in the Republic of Moldova shows a very slowly increasing rate for number of persons benefiting annually from different training activities. Analysing in a comparative way the situation in different areas of activity, essential discrepancies are identified related to the share of employees who have benefited from training out of the total number of unit's personnel. Hence, the areas registering the highest level of participation in training activities are: information and communication, financial and insurance activities, public administration and defence, in which over 30% of employees benefit annually from training. Agriculture, forestry and fishing would be on the opposite side – with only 3-4% of employees participating annually in such activities.

Assessing the opinion of external beneficiaries regarding the quality of initial and continuous vocational training in the areas of: Phytotechny, Horticulture, Pedology and soil protection, Production of agricultural crops and livestock breeding, Animal husbandry and veterinary medicine, Products of plant origin technology

Initial vocational training in the areas of Phytotechny, Horticulture, Pedology and soil protection, Production of agricultural crops and livestock breeding, Animal husbandry and veterinary medicine, Products of plant origin technology is carried out by 3 vocational schools, 6 colleges, 2 centres of excellence, and 5 universities. Continuous vocational training in the analysed areas is carried out by 2 institutions through training courses ("Forester" and "Tree cutter" programs) and reskilling courses ("Animal breeder" program).

The opinion poll with the employers' participation revealed the following: the highest appreciation was registered for "Agronomy" (level 6) specialty, denoting very good skills (4.6-5 points). The following vocations and specialties obtained 3.6-4.5 points – equivalent for "good" qualifier: "Vegetables' and fruits' grower" (level 3), "Forester" (level 3), "Agronomy" (level 4), "Vegetables' and fruit trees' growing" (level 4), "Parks' and public gardens' planning" (level 4), "Forestry and public gardens" (level 4), "Veterinary medicine" (level 4), "Horticulture" (level 6), "Forestry and public gardens" (level 6), "Ecology" (level 6), "Environmental engineering" (level 6), "Veterinary medicine" (level 7), "Food products' technology" (level 6). An average appreciation, within the limits of 2.1-3.5 points, equivalent of "poor" qualifier, was obtained by the following vocations and specialties: "Beekeeper" (level 3), "Ecology and environment protection" (level 4), "Selections and genetics" (level 6), "Animal husbandry" (level 6). The lowest appreciation – between 1.1 and 2 points, equivalent of "very poor" qualifier – was obtained by "Products of plant origin technology" (level 4) and "Agricultural bio-technology" (level 6). No respondents were identified to benefit from any current continuous vocational training programs, hence it was not possible to assess the quality of such training supply.

Most of employers mentioned among the skills needing prioritized attention the skills of applying new and more advanced technologies in the areas of reference. Implicitly, even though the analysed sectors will not be able to create jobs within 3-5 years timeframe, the requirements set for future specialists get changed, with a demand for more advanced skills, which would be in line with the development trends in the areas. The educational institutions should investigate much deeper every sector and based on established findings improve the vocational training programs so as to meet the exigencies of external environment.

According to the requests coming from the respondents (being recalculated depending on samples' representativeness), it was determined that the highest immediate demand for employees is registered for the specialty "Selection and genetics" (level 6) – 346 specialists; high demands are also registered for the following vocations/specialties: "Beekeeper" (level 3), "Vegetables' and fruit trees' growing" (level 4), "Agronomist" (level 6), "Veterinary medicine" (level 7).

By generalizing the mid-term demand of specialists, it may be established that increased demand is registered for the following vocations and specialists: "Vegetables' and fruits' grower" (level 3), "Beekeeper" (level 3), "Agronomist" (level 4), "Vegetables' and fruit trees' growing" (level 4), "Agronomist" (level 6), "Selection and genetics" (level 6), "Horticulture" (level 6), "Animal husbandry" (level 6), "Veterinary medicine" (level 7).

After assessing the demand of employees separately per every program as related to the forecasted rates of graduation and employment on the labour market, as well as taking into consideration the existing problems in vocational training system (as a result of deficiencies in demographic evolution and massive emigration of population abroad), a decision was formulated to **recommend the number of places for 2019 Admission Plan as follows:**

a) Phytotechny area:

- "Agronomy" (level 4) – 35 places;
- "Agronomy" (level 6) – 40 places;
- "Selection and genetics" (level 6) – 10 places;

b) Horticulture area:

- "Vegetables' and fruits' grower" (level 3) – 15 places;
- "Vegetables' and fruit trees' growing" (level 4) – 15 places;
- "Horticulture" (level 6) – 25 places;

c) Pedology and soil protection area

- "Forester" (level 3) – 10 places;
- "Parks' and public gardens' planning" (level 4) – 24 places;
- "Forestry and public gardens" (level 4) – 15 places;
- "Ecology and environment protection" (level 4) – 0 places;
- "Ecology" (level 6) – 60 places;
- "Forestry and public gardens" (level 6) – 40 places;
- "Environmental engineering" (level 6) – 15 places;

d) Production of agricultural crops and livestock breeding area:

- "Beekeeper" (level 3) – 40 places;

e) Animal husbandry and veterinary medicine area:

- "Veterinary medicine" (level 4) – 50 places;
- "Animal husbandry" (level 6) – 10 places;
- "Agricultural bio-technology" (level 6) – 10 places;
- "Veterinary medicine" (level 7) – 60 places;

f) Products of plant origin technology area:

- "Products of plant origin technology" (level 4) – 15 places;
- "Food products technology" (level 6) – 57 places.

12 programs for short-term courses, 4 programs for level 4 and 1 program for level 6 were identified after analysing the respondents' proposals for new vocational training programs. The analysis of new programs' proposals in correlation with the availability to employ the graduates of such programs allowed identifying the following programs to be **included in the educational offer:**

a) Phytotechny area:

- *Short-term program:* "Plants' protection"; "Advanced production technologies";

b) Horticulture area:

- *Short-term program:* "Advanced technologies in horticulture";
- *Specialty (level 4):* "Plants' protection";

c) Production of agricultural crops and livestock breeding area:

- *Specialty (level 4):* "Beekeeping";
- *Specialty (level 6):* "Beekeeping";

d) Animal husbandry and veterinary medicine area:

- *Short-term programs:* "Breeding and reproducing ovine and caprine"; "New treatment methods and new preparations"; "Food safety"; "Advanced production technologies";
- *Vocation (level 3):* "Domestic animals' breeder";
- *Specialty (level 4):* "Selection and reproduction of animals";

e) Products of plant origin technology area:

- *Short-term program:* "Advanced technologies in the area";

f) Food processing area

- *Vocation (level 3):* "Miller".

Based on a correlative analysis of the CORM and provisions of the respective classifiers of vocational training areas and specialties/vocations and deriving from the recommendations related to the new programs suggested to be introduced in the educational offer, it may be concluded that the current version of CORM covers occupations which comply with the existing educational offer, as well as the new specialties and vocations suggested by employers.

Final findings

In the existing conditions, VET and higher education covering in their education offer vocations/specialties from the analysed areas are faced with a series of ***challenges***, as follows:

- *Lack of vocations' and specialties' attractiveness* implies the need for more efficient actions focused on promoting the respective vocations and specialties in conditions of continuous aggravation of competitiveness on educational services' market. At the same time, one of the strengths of vocational training in the related areas should become the quality of vocational training, including its confirmation by employers;
- *Active communication with external beneficiaries* of vocational training programs – employers – should become one of the most efficient tools for efforts' operationalization for quality increase purpose. Employers should become active stakeholders in the training process at all stages, starting with programs' design. At the same time, consideration should be given to the fact if the educational institutions are motivated for such a dialogue by the immediate need to solve the problems of vocational training quality (this also being the factor contributing to institution's sustainability in competition conditions); the motivation for employers to get involved in the respective activities is much lower, relying mostly on their civic spirit and, in some cases, on the interest to obtain directly a specialist of requested qualification. In these circumstances, there is an obvious need to involve line ministries in monitoring communication with beneficiaries. The organization of stakeholders for dialogue and commitment for a moderator role would contribute substantially to making this process much more efficient;
- A new qualitative level of *efforts focused on internal beneficiaries – pupils/students* is necessary for achieving the goal of continuous increasing quality of the educational offer, and implicitly, of the institutions' sustainability. As good as it might be, the communication with employers would not have the expected results if maximum efforts are not taken so as to streamline the teaching-learning-evaluation process. One of the main factors for this purpose would be the adoption of an innovative teaching approach, which would be able to actively engage the trainees and to motivate them achieving high academic results;
- Based on the wide demand for *continuous vocational training* and the insufficient supply, there is an obvious need for the educational institutions to initiate the procedure of including the requested programs in the educational offer and to monitor continuously the quality of such programs' supply, relying as well on active communication with their potential beneficiaries;
- A *more efficient mechanism is necessary for keeping the records about graduates' employability on the labour market.* The efforts of the educational institutions would end with higher results in this respect, if a state mechanism is established to oblige the employers to report in a centralized way the data on qualified young specialists' employment on labour market, while for graduates of budget-

based studies – to provide information on place of work and professional path (at least during the first five years after graduation).

Final recommendations

a) For educational institutions:

- to organize more efficient communication with the representatives of business environment, to transform them into active stakeholders of initial and continuous vocational training;
- to review the system of skills for every vocational training program based on the employers' suggestions and focusing on the skills demanded by them;
- to review the teaching approaches in initial vocational training system, by adopting innovative teaching-learning-evaluation approaches, so as to contribute optimally to training specialist able not only to adjust themselves to the flexible conditions of the exogenous environment, but also to trigger a qualitative change in the related activity sectors;
- to initiate the procedure of including in the educational offer of initial and continuous vocational training programs requested by employers, continuous quality monitoring of respective programs' provision, relying on active communication with their potential beneficiaries;
- to implement a more efficient mechanism to keep the records on graduates' employment on labour market and their professional path.

b) For line ministries:

- for the line ministries (Ministry of Education, Culture and Research, Ministry of Agriculture, Regional Development and Environment, and other) to assume themselves the role of mediators in the process of institutions' communication with the representatives of business environment, as well as with well-known personalities from the related areas;
- to monitor permanently the frequency and quality of the dialogue between providers of initial and continuous vocational training and the representatives of business environment, as well as with the well-known personalities from the related areas;
- to assume the initiative to create a state mechanism which would oblige the employers to report in a centralized way the data on employability of qualified specialists on the labour market;
- to assume the initiative to create a state mechanism which would oblige the graduates of budget-based studies to provide the educational institutions they have graduated from data on the jobs they have and their professional path (at least during the first five years after graduation).

c) For potential beneficiaries of labour market needs' assessment methodology applied to rationalize it and to optimize the STED method's added value:

- Organization of employers' opinion investigation process in two stages:

a) to familiarize employers with the existing educational offer, including with curricular provisions (course units and skills) for every program (through a meeting);

b) to carry out an opinion poll to ask for employers' opinions about the quality of currently requested skills to be held by graduates, as well as the skills which would be needed in future depending on the expected sectors' development;

- Involvement in the process of identifying the future skills and of well-known specialists in the studied areas, as they might be the ones to provide valuable insights regarding the sectors' development and, implicitly, regarding the skills which would be needed in future;
- Organization of a more active communication with those who are responsible for initial and continuous vocational training programs so as to get more accurate data on evolution of pupils' population.

INTRODUCTION

Our state's concern for sustainable development implies a wide complex of ecological-economic objectives and actions. It is difficult to point out certain aspects to be focused on. Nevertheless, understanding the importance of developing all the sectors and areas in an environmentally friendly manner, we should be able identifying the key links of this process. In this context, we will mention agriculture's importance as an economic branch with the biggest natural and human potential.

As a strategic sector for the Republic of Moldova, agriculture represents an investigation topic of a huge significance. The focus of local scientists, decision makers and European community on agriculture is determined by the multiple roles this sector has in the economic development of the country, supply of food products to population and raw materials to processing industries, creation/maintenance of jobs for a good part of economically active population of the country, provision of an adequate social frame to rural population, and other. In spite of the existing awareness about its major importance, the respective sector remains to be insufficiently developed, hence being unable to perform correspondingly the above-mentioned roles. Thus, as mentioned in the results of the sector study carried out by the Organization for SME Sector Development during October-December 2016 (http://www.odimm.md/files/ro/pdf/publicatii/Analiza_Industria_agro-alimentar.pdf), although agriculture's share in GDP remains to be at a rather high level as compared to other European countries, it got reduced substantially over the last decade and a half, being much under the level registered in 1995 of about 30% (Table 1).

Table 1. Evolution of the total GDP and GDP obtained in agriculture, forestry and fishing in the Republic of Moldova during 2010-2017

Indicators	2010	2011	2012	2013	2014	2015	2016	2017
Total GDP in current prices, th MDL	86 275 377	98 772 814	105 480 184	119 532 871	133 481 634	145 753 642	160 814 564	178 880 890
including GDP obtained in agriculture, forestry and fishing, th MDL	9 629 417	11 244 547	11 020 752	13 806 479	16 317 844	16 769 347	18 330 739	20 521 677
Share of *GDP obtained in agriculture, forestry and fishing* in the total GDP, %	11.16	11.38	10.45	11.55	12.22	11.51	11.40	11.47

Source: developed by authors based on www.statistica.md

The data from Table 1 show a low share of agriculture, forestry and fishing in the GDP alongside the fluctuating trends in its development, hence revealing instability in sector's economic growth.

Coming back to the idea of agriculture's major importance for the economic and social prosperity of the Republic of Moldova, it is impossible to disregard the reliance the country has placed on this sector for achieving the objective of increasing the economic and social wellbeing of the state and of all citizens. A generalizing indicator which integrates the objective of state prosperity with citizens' individual wellbeing is the Gross Domestic Product per capita. There are frequent optimistic statements and estimations in relation to the respective indicator, according to which we register significant growth as compared to the world community (for instance, the finding provided by the Focus Economics group about the highest growth of GDP per capita in the world registered by the Republic of Moldova between 2016 and 2018 (http://evenimentul.md/focus-economics-moldova-a-inregistrat-cea-mai-mare-crestere-a-pib-pe-cap-de-locuitor-din-lume-din-2016-pana-in-2018/). It is important to assess comparatively not only the upward trend of the respective indicator, but also the level it achieved, so as to be able to understand the real situation in this respect. Hence, according to the World Bank's data, the GDP per capita in the Republic of Moldova accounted in 2017 for 2,289.88$, while the average for the EU countries was 33,723.27$, and in USA – 59,531.66$ (https://data.worldbank.org/indicator/ny.gdp.pcap.cd). Thus it may be concluded that in spite of the growth determined by analysts, the GDP per capita in the Republic of Moldova is 14.7 times lower than the average indicator in the EU countries and 25.9 times lower than in the USA.

The created situation can be addressed by increasing the efficiency of all the branches of the national economy, among which agriculture remains to be a strategic sector, hence needing priority interventions so as to be harnessed to maximum as a factor contributing to economic and social growth. Currently, this sector is faced with a number of difficulties: natural (erosions, droughts, landslides, etc.) and economic ones, which were analysed by many studies and fully tackled in the National Agricultural and Rural Development Strategy for 2014-2020. As it is stated in the respective document, the Republic of Moldova encounters such problems as declining agri-food trade balance, much lower productivity as compared to the European countries, reduced profitability of the agricultural sector, etc., mentioning at the same time a number of factors with negative impact on agriculture's prosperity, and namely:

- massive migration of population from rural areas;
- problematic development of the livestock sector;
- dominant position of crops with reduced value in agricultural production in the detriment of high-value crops;
- dual and fragmented structure of farms;
- agricultural producers' full dependence on import of phyto-sanitary products and fertilizers, seeds and fuel;
- unfavourable trade conditions for farmers;
- low prices for agricultural products;
- limited share of investments in agriculture;
- underdeveloped organizational structure of producers in the Republic of Moldova (lack of institutional entities for farmers which would facilitate their access on the markets, lack of cooperation and organization of farmers);
- slow development (sometimes negative) of food products' processing industry, etc.

Based on the above-mentioned, it may be deduced that food industry is in close connection with agricultural activities – this is a branch with substantial involvement in processing and optimum use of raw material supplied by agriculture, as well as population supply with food products. In this context, focusing the efforts on ensuring agriculture's prosperity goes hand in hand with focusing on food industry development, hence there is an emerging need to have synergy among the efforts for developing the agri-food sector.

It would be a mistake to tackle the problem of sustainable development without including the problem of natural resources' management (including that of forestry resources) in the resreach scope. Understanding very well the role of such resources in the economic and social development of the country, there is nevertheless a number of ecological-economic problems related to their management, problems which impose the need to focus attention on their management and, implicitly, on qualitative vocational training of future specialists who would be able to change the situation and ensure sector's good performance.

The problems related to the agri-food sector, as well as those dealing with the rational management of natural resources may be tackled through a more efficient and effective mobilization of all involved factors, with human factor having a decisive role, as it is the most appropriate to mobilize and manage all the other factors: natural, material, financial, informational. In this context, one more problem mentioned by the National Agricultural and Rural Development Strategy for 2014-2020 should be pointed out – the problem of reduced efficiency of the agricultural vocational education system, with mismatch between the provided skills and the labour market demand, absence of an efficient training program for agricultural entrepreneurs, as well as reduced efficacy of the agricultural research system.

We consider the respective study to be of significant importance based on above-mentioned, as it focuses on the following main objectives:

- to analyse the current situation and the evolution of the plant and animal production sector, forestry sector, plant products' processing sector, irrigation sector, as well as the ecological problems encountered by the Republic of Moldova;
- to assess the quality of initial and continuous training system in the investigated areas based on employers' perception;
- to identify the skills to be improved among the future specialists;
- to identify new VET programs for initial and continuous training requested by employers;
- to study the employment demand for investigated specialties at the present moment as well as for a mid-term perspective in correlation with the existing supply;
- to forecast the number of places for admission in 2019 to the investigated VET programs under the existing economic and educational context;
- to analyse the Classification of Occupations in the Republic of Moldova so as to assess the extent to which it correlates with the existing educational offer (from VET programs' perspective) and with new specialties and vocations;
- to provide recommendations regarding:
    - the number of places to be included in the 2019 Admission Plan for the respective programs;
    - the initial and continuous VET programs to be included in the educational offer of responsible institutions;
    - to increase the quality of initial and continuous VET process in the related areas;
    - to streamline the system of keeping the records on employment and professional path of graduates;
    - to harness the STED methodology in the process of labour market needs' study.

Characteristic of applied methodology

For the purpose of achieving the objectives of the study, the group of experts has used the methodological elements of the STED method (Skills for Trade and Economic Diversification). The STED method is defined as a sector approach to the process of identification and anticipation of strategic skills' needs of tradable

sectors at the international level (International Labour Office, 2015). After selecting the investigation sectors, the STED methodology envisages consecutive transit through the following stages:

I. Analysis of current situation and perspectives of the sectors;
II. Determining the sectors' development impacts on business capacities requested by enterprises;
III. Identification of future skills needed in line with the requested business capacities;
IV. Quantification of the necessary number of workers by types of skills, with the possibility to model the demand, if adequate data are available;
V. Elucidation of the qualitative gap between the skills requested for future and those available at the moment;
VI. Development of proposals for improving skills so as to eliminate the identified gap by providing practical solutions on:
    - how to use the existing institutions so as to cope better with the demand;
    - what additional sources of skills may be used;
    - how to anticipate better the demand for skills in future;
    - how enterprises can improve the skills of labour force (International Labour Office. Skills for trade and economic diversification: A practical guide).

Methodological approach of the study

I. Identification of institutions which deal with initial and continuous vocational training in the investigated areas. The following data were analysed for this purpose: the online platform in VET area https://mecc.gov.md/ro/content/prima-platforma-online-domeniul-invatamantului-profesional-tehnic-fost-lansata-moldova, publically available data on distribution of places in post-secondary and non-tertiary post-secondary (colleges and centres of excellence) vocational training programs – 2018-2019 school year https://mecc.gov.md/sites/default/files/distributia_postsecundar.pdf, publically available data on distribution of places in secondary VET programs (vocational schools and centres of excellence) – 2018-2019 school year https://mecc.gov.md/sites/default/files/distributia_secundar.pdf, web pages of the institutions offering such programs. At the same time, there was an active communication with the representatives of the respective institutions' management.

II. Development of the questionnaire for assessing the opinion of external beneficiaries (employers) of initial and continuous training programs in the investigated areas. The content of the questionnaires was developed based on the assignment set for the experts' team by the beneficiary of the study – Ministry of Agriculture, Regional Development and Environment. An essential and rather responsible aspect referred to the accurate formulation of the skills based on which the employers were to assess the training level of graduates under each program. To ensure an optimal relevance for this aspect, the educational plans were studied for every program, as well as the existing occupational standards and active collaboration was sought with the people responsible for programs, as well as some beneficiaries (Moldsilva Agency, Environment Protection Inspectorate, and others).

*III. Carrying out the opinion poll among the employers***.** The opinion poll was carried out using two methods: questionnaire and interviewing. The target groups of employers were identified in advance and the total number of such groups was stabled for every area. The number of agricultural enterprises, including those holding multiannual plantations (for the areas of "Phytotechny" and "Horticulture"), was supplied by the National Bureau of Statistics based on an official request. Subsequently, to determine exactly the representativeness of the sample for "Phytotechny" area, the total number of entities was decreased due to the number of entities which hold multiannual plantations and demand for employment only for agronomist-

horticulturists (they account for 11.68% of the total number of entities holding multiannual plantations). The number of enterprises carrying out such activities as A02 "Forestry and logging" and N81 "Landscaping activities and services for buildings" (for the area "Pedology and soil protection", "Forester" program (level 3), "Parks' and public gardens' planning" (level 4), "Forestry and public gardens" (level 4), "Forestry and public gardens" (level 6) was taken from statistics databank (http://statbank.statistica.md/pxweb/pxweb/ro/40%20Statistica%20economica/40%20Statistica%20economica__24%20ANT__ANT030/ANT030060.px/?rxid=9a62a0d7-86c4-45da-b7e4-fecc26003802). The number of organizations employing for programs "Ecology and environment protection" (level 4) and "Ecology" (level 6) was taken from the web page of the Environment Protection Inspectorate (http://ies.gov.md/). The number of organizations employing for programs "Environmental engineering" (level 6) was taken from the web page of "Apele Moldovei" Agency (http://www.apelemoldovei.gov.md/). The total number of beekeepers was taken from the web page of the National Association of Beekeepers from the Republic of Moldova (www.apicultura.md). The total number of enterprises from the area of livestock breeding was identified in collaboration with the Ministry of Agriculture, Regional Development and Environment. The number of entities in the area of veterinary services (veterinary pharmacies and clinics) was determined by consulting the web page of the National Food Safety Agency (http://www.ansa.gov.md/) and statistics databank, M75 "Veterinary activities" (www.statistica.md). Number of entities in the area of plant origin products' processing was determined based on the data available on the web page of the National Food Safety Agency.

IV. Studying the current situation and evolution of sectors related to the investigated areas. The current situation and the evolution of investigated sectors (agri-food sector, forestry sector, and irrigation sector), as well as the ecological problems encountered by the Republic of Moldova were analysed using the following methods:

- collecting, systematizing and analysing related quantitative, qualitative and structural indicators provided on the webpage of the National Bureau of Statistics of the Republic of Moldova, as well as those obtained directly upon request;
- studying some publications and analysing the trends in the evolution of the analysed sectors, as well as those on the labour market;
- investigating the trends on the EU labour market;
- studying the provisions of strategies related to the analysed sectors;
- identifying the trends in sectors' evolution by examining the dynamics of analysed indicators;
- formulating conclusions regarding the trends in the evolution of the analysed sectors and the extent to which they can be considered to be benchmarks for forecasting the need of specialists in the investigated areas.

V. Studying the situation in the system of initial and continuous training in the Republic of Moldova. The situation regarding the system of initial and continuous training was studied by analysing the statistical data regarding the evolution in number of pupils and students, as well as that in graduates of different levels of education and formulation of rationales regarding the impact of negative trends in the evolution in number of graduates of gymnasiums and lyceums on the development of the initial vocational training system. At the same time, an analysis was performed for the situation of tertiary education in EU countries by consulting the web page Eurostat Statistics Explained (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Labour_market).

The trends of continuous vocational training system in the Republic of Moldova were studied by analysing the statistical data on number of persons benefiting annually from vocational training by areas of activity and their share in the total number of employees.

VI. Processing survey results. The results of the opinion poll with the participation of employers were processed with the help of Excel tools, with all questionnaires being entered in the respective database in advance. After processing and systematizing the opinion poll results, final conclusions were formulated regarding:

a) the current quality of the initial and continuous training system in the investigated areas according to employers' perception;
b) skills to be improved among the future specialists;
c) new programs of initial and continuous vocational training requested by employers;
d) current and mid-term employment demand by investigated specialties.

The following steps were used in the process of quantifying the current and mid-term employment demand for investigated specialties:

- quantification of representativeness of all samples, including from territorial profile, by correlating the number of respondents with the number of entities in every area;
- recalculating the number of employment requests (including for newly suggested specialties), considering the coefficient of samples' representativeness;
- studying the current situation of investigated programs (number of students, number of graduates, graduation rates) by requesting officially the respective information from institutions, as well as by communicating directly with the management representatives of the institutions providing such programs.

Quantification of the number of persons for 2019 Admission Plan was carried out by considering the trends in sectors' evolution, the total number of requests coming from employers recalculated depending on samples' representativeness, the real possibilities of the institutions to cope with admission plans, the stable decreasing trends in number of graduates of gymnasiums and lyceums and available date regarding the level of graduates' employment on labour market. The average graduation rate for the investigated programs was determined as an arithmetic average of the graduation rates in the institutions involved in such training, the respective data being provided by the institution upon experts' request. In case of missing accurate statistics on graduates' employment on labour market, the following two publications were used as benchmarks:

a) Buciuceanu-Vrabie M., Gagauz O., 2017. Youth on RM labour market: skills and aspirations (https://www.undp.org/content/dam/moldova/docs/tinerii_pe_piata_muncii_final.pdf). According to this source, based on studies carried out in 2015, it was determined that the averaged employment rate for young persons with higher education was 53%, and in rural area – only 43%;
b) Concept to restructure research-innovation system, education and rural extension in agri-food area (https://cancelaria.gov.md/sites/default/files/document/attachments/proiectul_158.pdf). The respective document mentions that starting in 2013 the employment rate for graduates of centres of excellence and colleges has continuously decreased, registering the lowest share in 2017 – 31.9% of the total number of graduates.

At the same time, relying on the positive impact of the national strategies related to development of sectors dealing with the investigated programs (National Agricultural and Rural Development Strategy for 2014-2020; Environment Strategy for 2014-2023; Forestry Sector Sustainable Development Strategy and other), as well as the National Employment Strategy for 2017–2021, the experts' team agreed to forecast a 50% employment rate according to acquired skills for all levels of education in a period of 3 years.

VII. Studying the content of Classifier of Occupations in the Republic of Moldova in correlation with existing educational offer. The CORM was analysed in detail to identify the extent to which the

occupations match the existing educational offer, as well as the new specialties and vocations suggested by employers.

VIII. Drafting final recommendation of the experts' commission on increasing the quality of training specialists under investigated programs. The final recommendations of the experts' group were formulated by summarizing the findings determined for all investigated aspects.

Basic limitations of the study

- Low representativeness of the number of respondents especially in the areas: Phytotechny, Horticulture, Production of agricultural crops and livestock breeding;
- Impossibility to model a determinist functional relation between the number of places suggested for admission and the influence factors because of the impossibility to express quantitatively all the factors, as well as lack of a database regarding the rate of graduates' employment on labour market according to acquired skills;
- Lack of accurate statistics on employment of graduates on labour market;
- Employers' bias when assessing the quality of specialists;
- Refusal of some of respondents to come up with proposals for skills to be developed (limiting themselves only to assessment and employment forecast);
- Lack of certainty in request of specialists stated by employers due to subjective approach to the problem, as well as to the future business development and, implicitly, future potential to create jobs.

CHAPTER I. ANALYSIS OF AGRI-FOOD PRODUCTION SECTOR

1.1 General data on sector's profile

1.1.1 Agricultural production

According to the official data of the RM National Bureau of Statistics, a number of 3723 enterprises were registered in 2017 in the Republic of Moldova with agriculture as their main type of activity. According to the same source, 6000 enterprises are currently involved in agricultural activity, including 5280 enterprises involved in plant production, and a part of them practicing agriculture as a secondary type of activity; 2402 of the 5280 mentioned enterprises hold multiannual plantations.

About 636 enterprises are involved in livestock breeding (according to the data held by the Ministry of Agriculture, Regional Development and Environment).

By analysing the number of agricultural enterprises during 2015-2017, a slight increasing trend may be noted, as shown in Figure 1.

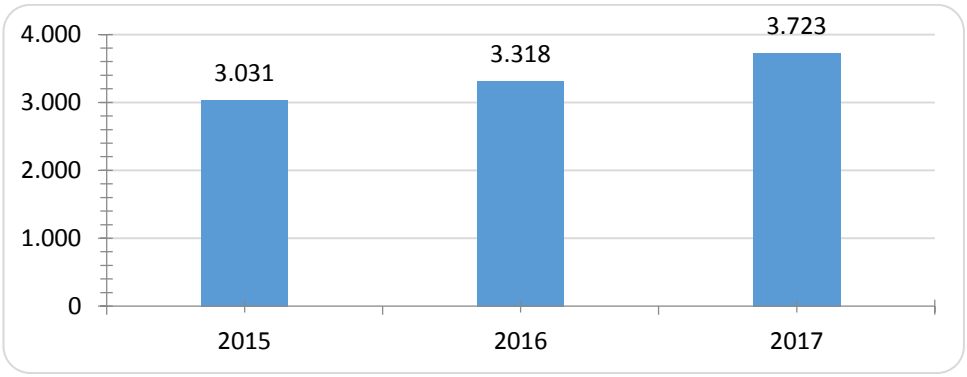

Figure 1. Evolution in number of enterprise with "Agriculture, hunting and related services" as their main type of activity, in the Republic of Moldova during 2015-2017

Source: developed by authors based on www.statistica.md

The most of agricultural enterprises (over 47%) are located in the Centre; 30% of the total number are located in the North, and only 22% are active in the southern part of the country. The territorial representativeness of agricultural enterprises did not suffer any essential changes during the studied period (Figure 2).

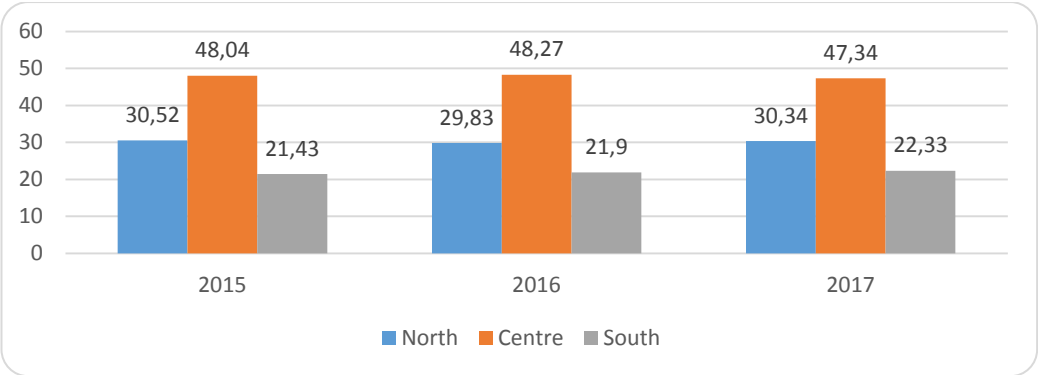

Figure 2. Distribution of agricultural enterprises in territorial profile in the Republic of Moldova, 2017, %

Source: developed by authors based on www.statistica.md

When analysing the distribution in territorial profile of agricultural fields managed by enterprises, it may be noted that North is on the first place by sown areas and fruit-tree plantations, while vineyards are mainly concentrated in the South (Figure 3).

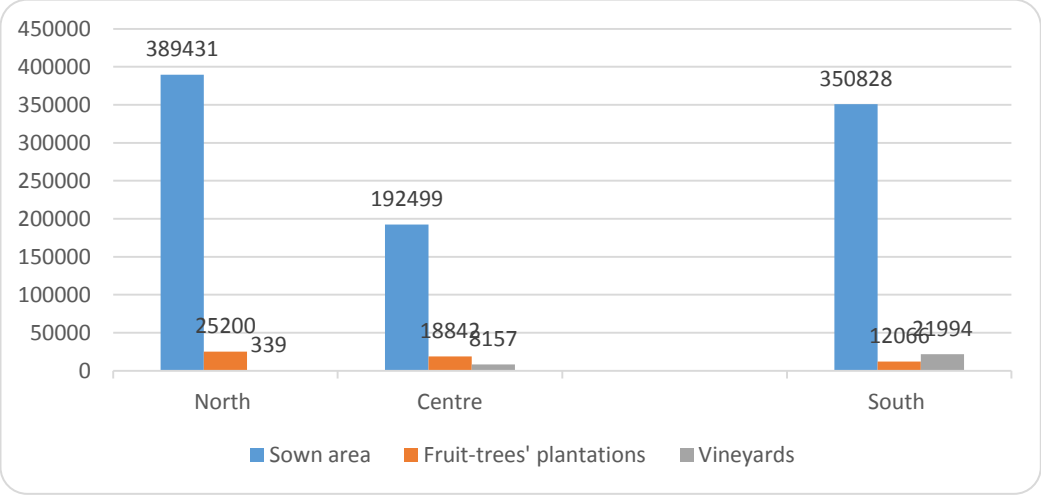

Figure 3. Territorial hierarchy of agricultural fields managed by agricultural enterprises in the Republic of Moldova in 2017

Source: developed by authors based on www.statistica.md

The total population of livestock managed by agricultural enterprises as of 1.01.2018 accounts for 19069 heads of cattle, 184478 heads of porcine, 25708 heads of ovine and caprine, 275 heads of horses, 13233 heads of rabbits, 2581 bee families. Private sector holds the majority of population of livestock, while enterprises manage 45.39% of the total number of porcine, 11.39% of the total number of cattle, and respectively 3.05%, 0.82%, 3.51% and 1.58% of ovine and caprine, horses, rabbits and bee families (Table 2).

Table 2. Livestock population as of 1.01.2018 in RM in territorial profile

Indicators	**Livestock population**		**Share of livestock population managed by enterprises in total population, %**
	Total	**Including in agricultural enterprises**	
Cattle, heads	167423	19069	11.39
Porcine, heads	406411	184478	45.39
Ovine and caprine, heads	842446	25708	3.05
Horses, heads	33579	275	0.82
Rabbits, heads	376483	13223	3.51
Be families, units	163589	2 581	1.58

Source: developed by authors based on www.statistica.md

Note: No official data were identified regarding the number of poultry.

Analysing the distribution of livestock population managed by enterprises in territorial profile (Table 3), it may be noted that Centre registers the biggest concentration of cattle (56.4%), porcine (79.39%) and bee

families (38.94%), while South gets most of ovine and caprine (44.97%) to be managed by enterprises and North has the highest shares for horses (51.81%) and rabbits (93.07).

Table 3. Distribution of livestock population managed by enterprises in the RM, in territorial profile, as of 01.01.2018

Indicators	Cattle		Porcine		Ovine and caprine		Horses		Rabbits		Bee families	
	heads	%	heads	%	heads	%	heads	%	heads	%	units	%
Total in the country	19069	100	184478	100	25708	100	276	100	13223	100	2 581	100
North	5123	26.87	16684	9.04	4224	16.43	143	51.81	12307	93.07	914	35.41
Centre	10755	56.4	146450	79.39	9923	38.6	67	24.28	916	6.93	1005	38.94
South	3191	16.73	21344	11.57	11561	44.97	66	23.91	0	0.00	662	25.65

Source: developed by authors based on www.statistica.md

The distribution of livestock population held in the private sector in territorial profile shows a different situation as compared to the livestock population managed by enterprises. Hence, Centre holds most of porcine (40.39%), while most of cattle (48.96%), horses (45.36%) and rabbits (43.09%) are hold by citizens from Centre, and most of ovine and caprine (51.04%) are held by individual households from the South of the country (Table 4).

Table 4. Distribution of livestock population managed by individual households in the RM, in territorial profile, as of 1.01.2018

Indicators	Cattle		Porcine		Ovine and caprine		Horses		Rabbits	
	heads	%	heads	%	heads	%	heads	%	heads	%
Total in the country	148354	100	221933	100	816738	100	33303	100	363260	100
North	72641	48.96	76226	34.35	196168	24.02	12511	37.57	100266	27.60
Centre	48153	32.46	89644	40.39	203707	24.94	15107	45.36	156529	43.09
South	27560	18.58	56063	25.26	416863	51.04	5685	17.07	106465	29.31

Source: developed by authors based on www.statistica.md

Note: No official data were identified regarding the distribution of bee families managed by individual households in the Republic of Moldova in territorial profile.

1.1.2 Food industry

According to the data of the National Bureau of Statistics, a number of 949 enterprises were active in food industry in 2017.

An increasing trend – by 17 units - was registered during 2015-2017 for the total number of enterprises in food industry (Figure 4).

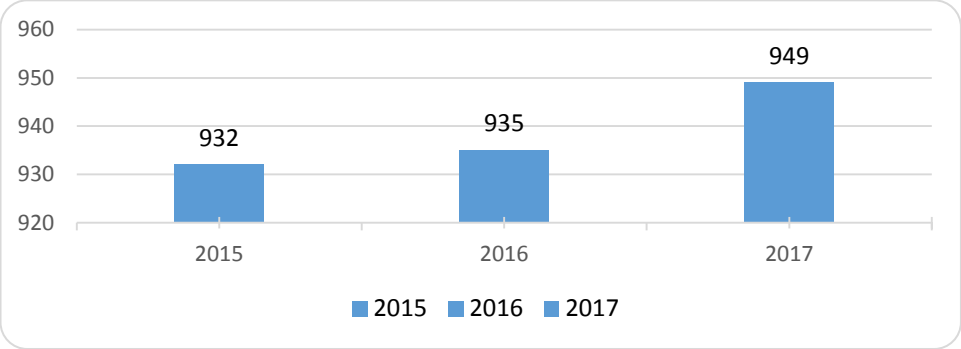

Figure 4. Evolution in number of enterprises in food industry in RM during 2015-2017
Source: developed by authors based on www.statistica.md

In line with the data held by the National Food Safety Agency, 172 enterprises are involved in plant production processing. The number of enterprises by processing areas and their distribution in territorial profile is provided in Table 5.

Table 5. Territorial distribution of plant production processing units in RM, as of 01.03.2019

Units in the area of activity	Total	North	Centre	South
1. Units for rapid freezing of fruits and vegetables	4	1	-	3
2. Units for drying fruits, vegetables and other plant origin products	23	4	15	4
3. Units for production of juice, concentrated juices and nectars	9	4	2	3
4. Units for production of canned fruits and vegetables	23	6	13	4
5. Elevators	18	16	2	
6. Mills	53	25	21	7
7. Units for processing and packing cereals and oilseeds	6	1	2	3
8. Units for sugar production	4	3	1	-
9. Units for vegetal oil production	32	14	14	4
Total	172	74	70	28

Source: developed by authors based on data extracted from the official page of the National Food Safety Agency http://www.ansa.gov.md/

According to data provided in Table 5, about 84% of plant products' processing enterprises are located practically evenly in the North and Centre of the country, while South locates only 16% of the total number of enterprises.

1.2 Trends' assessment in agri-food production sector development

1.2.1 Trends' assessment in agricultural production evolution

The increase of the total number of agricultural enterprises by 692 during 2015-2017 reveals an upward trend for the number of entrepreneurial initiatives. To elucidate the entities' capacity to create jobs (in relation to the concern to make more rational the admission plans for VET institutions), it is necessary to assess their

productive potential, alongside other aspects. For this purpose, Table 6 provides data on developments in the total sown areas, including areas managed by enterprises during 2010-2017.

Table 6. Evolution of sown areas in the RM during 2010-2017

Indicators	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Total sown area, th ha	1 460	1 447	1 468	1 494	1 503	1 503	1 520	1 533
incl. in agricultural enterprises of all types	806,6	799,9	822,7	862,9	872,2	881,2	905,1	932,8
Share of sown areas managed by agricultural enterprises in total sown areas, %	55.25	55.28	56.04	57.76	58.03	58.63	59.55	60.85

Source: developed by authors based on www.statistica.md

The data provided by Table 6 show an insignificant extension of sown areas during the analysed period. Hence, the absolute growth rate during the period of eight years accounted only for 5%, as the sown areas increased only by 73 thousand ha. At the same time, a little bit higher increasing rate is registered for areas managed by enterprises, with an absolute growth rate of 15.6%. The share of sown areas under enterprises' management did not change significantly during the analysed period, registering an increase only by 2.07 p.p.

To elucidate the situation in the horticultural sector, Tables 7 and 8 show the evolution of areas with orchards and vineyards, as well as the areas cropped with vegetables during 2010-2017.

Table 7. Evolution of areas with orchards and vineyards in RM during 2010-2017

Indicators	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Total area of orchards, th ha	116	119	120	122	122	136	135	138
incl. in agricultural enterprises of all types	*53,9*	*54,5*	*55,8*	*56,7*	*64,2*	*63,8*	*61,5*	*64,1*
Share of orchards' area managed by agricultural enterprises in total area of orchards, %	46.47	45.80	46.50	46.48	52.62	46.91	45.56	46.45
Total area of vineyards, th ha	145	140	141	137	140	135	135	130
incl. in agricultural enterprises of all types	36,8	35, 1	34,3	32,1	31,9	30,5	30,4	30,5
Share of vineyards' area managed by agricultural enterprises in total area of vineyards, %	25.38	25.07	24.33	23.43	22.79	22.59	22.52	23.46

Source: developed by authors based on www.statistica.md

The data provided in Table 7 show an increase in total area of orchards during the analysed period by 22 th ha, while the areas managed by enterprises increased by 10,2 th ha, hence the absolute growth rate is almost identical – about 19%. The share of orchards managed by enterprises in total area of orchard did not change essentially, remaining at the level of 46.5%.

A reverse evolution is noted for the vineyard areas, which register a decrease of total area by 15 th ha, and the areas managed by enterprises – by 6,3 th ha. The share of vineyards areas managed by enterprises in the total area of vineyards has decreased by 1.92 p.p.

Table 8. Evolution of areas cropped with vegetables in RM during 2010-2017

Indicators	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Total area cropped with vegetables, th ha	77	73	65	66	63	57	59	57
incl. in agricultural enterprises by all types	15,2	12,8	10,6	9,4	9,8	7,4	8,2	6,9
Share of area cropped by vegetables by agricultural enterprises in total sown area, %	19.74	17.53	16.31	14.24	15.56	12.98	13.90	12.11

Source: developed by authors based on www.statistica.md

According to the data provided in Table 8, it may be noted that areas cropped with vegetables also have registered a continuous decreasing trend during the analysed period, with significant changes in case of areas managed by enterprises. Hence, if in 2017 the total areas cropped with vegetables were 36% less than those cropped in 2010, in case of areas managed by enterprises this rate is 55% as compared to the year of reference.

The evolution of the productive potential of the livestock sector may be revealed through the trends identified in the dynamics of animal population. Tables 9-11 provide data on evolution of total population of livestock, as well as separately for livestock managed by enterprises and households during 2010-2017.

Table 9. Evolution of total livestock population in RM during 2010-2017

Indicators	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Cattle, th heads	216	203,9	191,2	188,9	191,2	186,1	182,3	167,4
Porcine, th heads	478,5	438,6	410,4	420	472,8	453,2	439	406,4
Ovine and caprine, th heads	905,5	832,4	824	849,2	874,7	868,4	869,8	841,7
Horses, th heads	52,2	49,6	46,4	45	41,9	39,4	36,8	33,6
Donkey, th heads	2,8	2,5	2,4	2,1	2,2	2	3,1	5
Rabbits, th heads	277	277,4	267	296,2	326,1	350,2	366,7	376,5
Bee families, th units	105,2	111,7	110,6	115,9	124,3	135,9	148,1	163,6

Source: developed by authors based on www.statistica.md

Note: No complete official data were identified on evolution of poultry population.

Table 10. Evolution of livestock population managed by enterprises in RM during 2010-2017

Indicators	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Cattle, th heads	11,6	12,1	11,6	12,3	13,7	15,1	18,3	19,1
Porcine, th heads	139,4	120,6	142	158,7	196,8	185,7	191,4	184,5
Ovine and caprine, th	20	20,8	17,6	19,7	23,9	27,5	25,1	25

heads								
Horses, th heads	1,1	0,9	0,8	0,6	0,5	0,4	0,4	0,3
Rabbits, th heads	1,3	0,7	0,7	1	0,6	15,1	11,4	13,2
Bee families, th units	4,6	3,6	3,8	3,7	3,2	2,9	3,1	2,6

Source: developed by authors based on www.statistica.md

Table 11. Evolution of livestock population held by individual households in the RM during 2010-2017

Indicators	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Cattle, th heads	204,4	191,8	179,6	176,6	177,5	171,0	164,1	148,3
Porcine, th heads	339,1	318,0	268,4	261,3	276,0	267,4	247,6	221,9
Ovine and caprine, th heads	885,5	811,6	806,4	829,5	850,8	840,9	844,7	816,7
Horses, th heads	51,1	48,7	45,6	44,4	41,4	39,0	36,4	33,3
Donkeys, th heads	2,8	2,5	2,4	2,1	2,2	2,0	3,1	5,0
Rabbits, th heads	275,7	276,7	266,3	295,2	325,5	335,1	355,3	363,3
Bee families, th units	100,6	108,1	106,8	112,2	121,1	133,0	145,0	161,0

Source: developed by authors based on www.statistica.md

The data provided by Table 9 reveal a decrease in the total population of cattle (by 48,6 th heads), porcine (by 72,1 th heads), ovine and caprine (by 63,8 th heads) and horses (by 18,6 th heads) during 2010-2017, as well as an increase in the total population of donkeys (by 2,2 th heads), rabbits (by 99,5 th heads) and number of bee families (by 58,4 th). The general decreasing trends for the total livestock population may be deduced from Figure 5 as well.

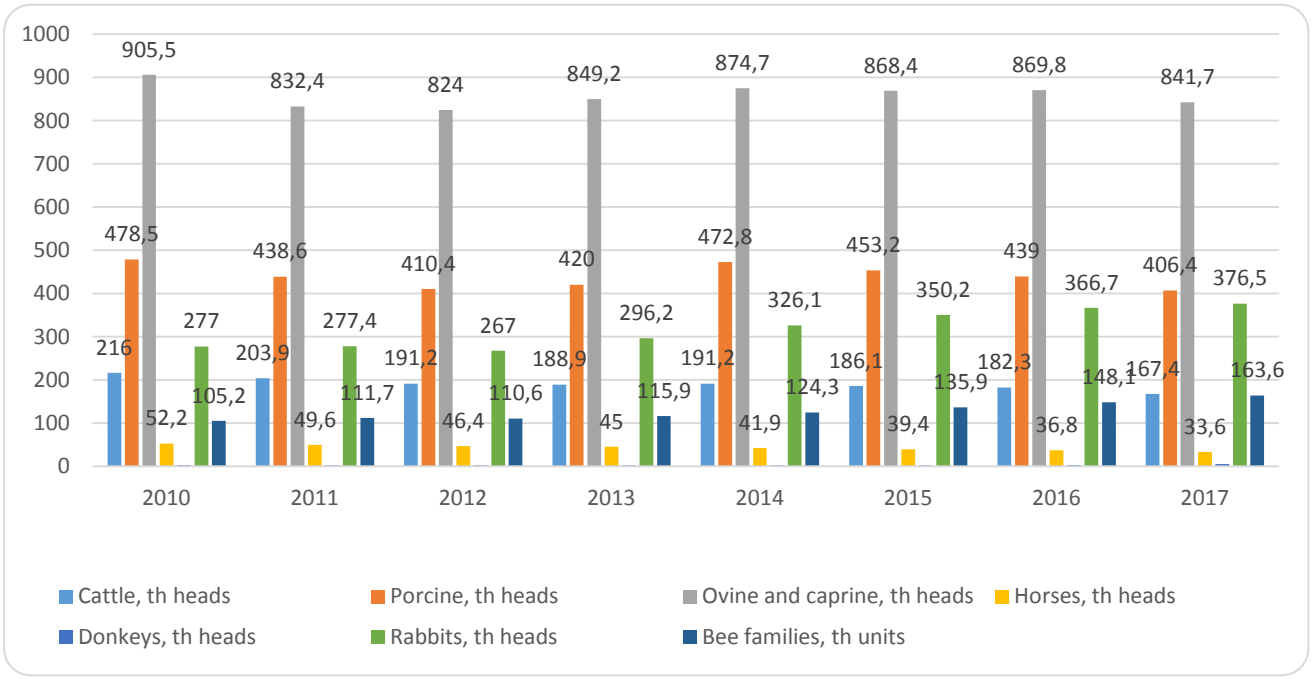

Figure 5. Evolution of total livestock population in the RM during 2010-2017

Source: developed by authors based on www.statistica.md

Analysing the evolution of livestock population managed by enterprises during the respective period of time (Table 10), a better situation may be noted with an increase in the population of cattle by 7,5 th heads, porcine by 45,1 th heads, rabbits by 11,9 th heads, and ovine and caprine by 5 th heads. An exception would be the horses and bee families which registered decreasing trends during these 8 years by 0,8 th heads and respectively 2 th families. These trends are reflected in Figure 6.

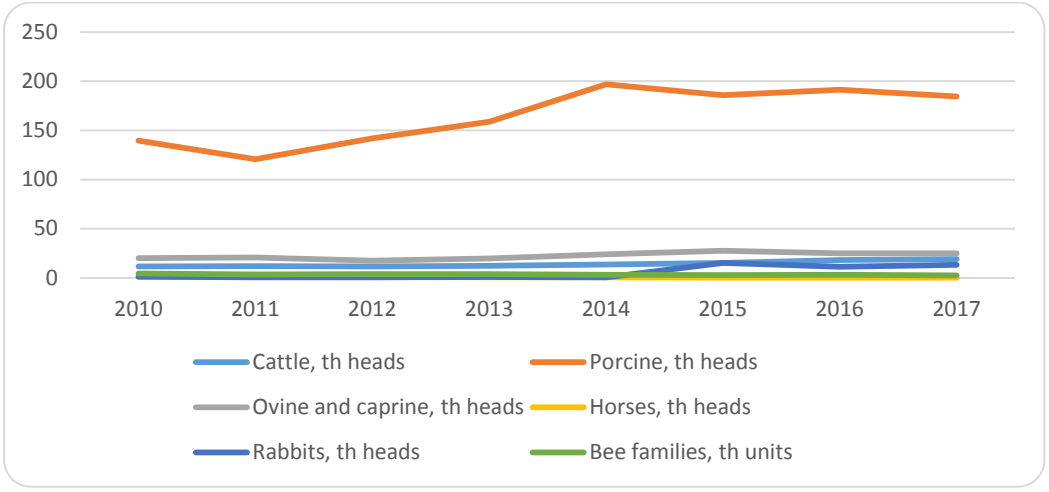

Figure 6. Evolution of livestock population managed by enterprises in RM during 2010-2017
Source: developed by authors based on www.statistica.md

Individual households (Table 11) register a significant decrease of population of porcine (by 117,2 th heads), ovine and caprine (by 68,8 th heads), cattle (by 56,1 th heads), horses (by 17,8 th heads). A reversed trend is noted for the population of rabbits, bee families and donkeys, which register an absolute growth of 87,6 th heads, 60,4 th families and 2,2 th heads, respectively. These trends are reflected graphically in Figure 7.

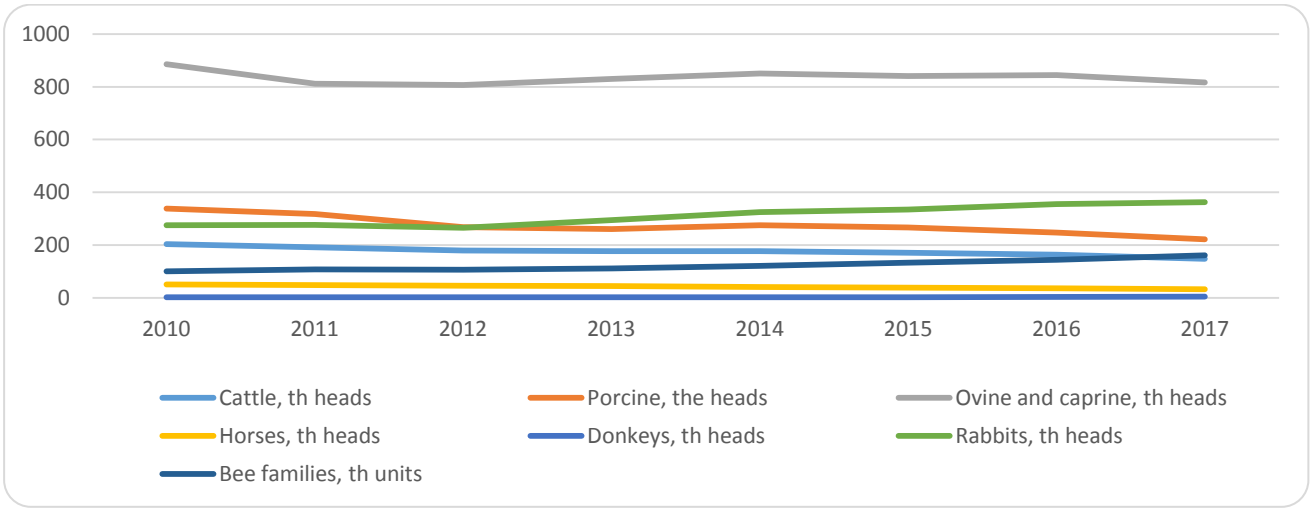

Figure 7. Evolution of livestock population held by individual households in RM during 2010-2017
Source: developed by authors based on www.statistica.md

For the purpose of obtaining more relevant information regarding the development trends in the agricultural production sector, some data will be presented regarding the evolution of total agricultural production, including plant and animal production, during 2010-2018 (Table 12).

Table 12. Evolution of global agricultural production in RM during 2010-2018

Indicators	2010	2011	2012	2013	2014	2015	2016	2017	2018
Global agricultural production, mln MDL	19873	22619	19922	23814	27254	27193	30362	34142	32506
including:									
plant production	13616	15751	11968	15480	17341	18082	21098	24435	22788
animal production	5786	6347	7529	7930	9417	8584	8768	9191	9198

Source: developed by authors based on www.statistica.md

The data provided in Table 12 reveal positive trends for total global agricultural production, as well as separately for plant production and animal production (clearly mirrored by the diagrams in Figures 8 and 9). Hence, the value of plant production exceeded in 2018 the level registered in 2010 by 1.7 times, and the value of animal production exceeded the level registered in 2010 by 1.58 times. Nevertheless, the level achieved by these indicators cannot serve as basis of incontestable evidence for sector's increased performance, due to the following reasons:

1. Represents outcome indicators, and not those of activity efficiency;
2. The production value is calculated in current prices, thus reflecting fully the evolution of volumes and prices for plant and animal products.

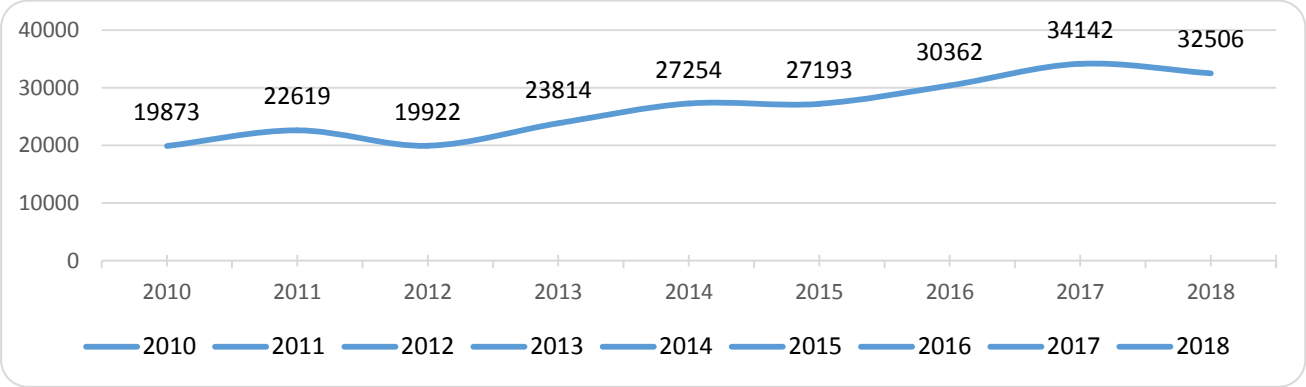

Figure 8. Evolution of global agricultural production in the RM during 2010-2018

Source: developed by authors based on www.statistica.md

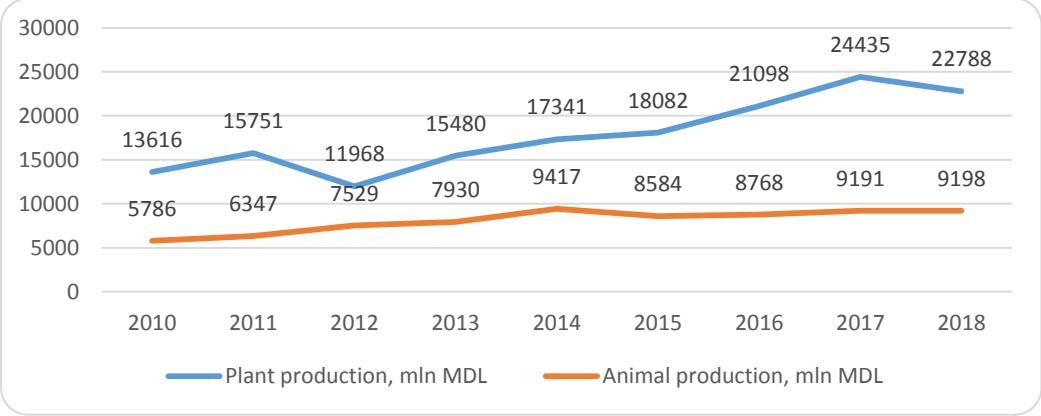

Figure 9. Evolution of global plant and animal production in the RM during 2010-2018

Source: developed by authors based on www.statistica.md

Another aspect decreasing the relevance of the rationale related to sector trends would be the statistical reflection of global agricultural production obtained by farms in the "private sector" compartment alongside the data for households. As a result of this approach, it is impossible to assess with maximum accuracy the trends in the evolution of the respective indicator obtained by all agricultural enterprises, and not only by those with the status of legal entity (farms being also individual enterprises with status of natural person, according to the RM legislation).

To identify the trends related to efficiency evolution in the agricultural production sector, Tables 13 and 14 provide the dynamics for agricultural crops' and animals' productivity.

Table 13. Plant productivity in agricultural enterprises in RM during 2010-2017, q

Indicators	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Cereals and leguminous crops	22,3	25,4	14,3	30,8	34,0	25,1	35,0	39,2
Sugar beet	326,6	240,1	191,4	358,6	501,6	255,5	329,0	381,8
Tobacco	17,6	15,3	13,1	15,4	17,4	16,2	13,9	18,3
Sunflower	15,4	15,7	10,3	20,5	18,4	15,5	19,8	21,8
Soya	18,7	13,4	8,0	16,7	21,5	7,2	11,8	14,4
Potatoes	30,9	152,3	105,9	157,7	184,3	114,7	139,5	149,7
Field vegetables	67,1	88,5	73,6	88,8	105,1	115,2	138,1	142,2
Melon crops	46,5	50,4	38,4	59,7	35,5	52,2	54,3	69,4
Root crops for fodder	275,9	264,4	204,1	273,2	404,0	272,9	143,4	41,5
Maize for silage, green mass and hay	152,8	148,7	48,6	171,4	177,1	97,7	190,5	193,7
Pome fruits	42,3	56,6	60,6	81,8	92,9	67,6	89,7	119,9
Stone fruits	27,1	18,4	19,8	37,2	41,2	49,9	51,9	48,4
Tree nuts	1,7	2,2	0,9	3,9	3,5	3,7	3,5	3,8
Berries	8,7	8,6	10,8	10,5	17,0	11,0	14,5	19,5
Grapes	23,1	44,8	40,5	62,1	51,3	53,3	62,3	79,0

Source: developed by authors based on www.statistica.md

The data on productivity of agricultural crops reveal that although most of analysed crops, except for soya and root crops for fodder, register in 2017 productivity indicators exceeding the level of 2010, none of them registers a stable productivity increasing trend, but just fluctuations in their evolution.

The highest productivity increase rate was registered in 2017 as compared to 2010 by potatoes (484.47%), while a drastic productivity decrease - by root crops for fodder (over 85%) (Table 14).

Table 14. Comparative analysis of plant productivity in agricultural enterprises in RM during 2017 as compared to 2010, q

Indicators	**2010**	**2017**	**Deviations (+,-) 2017 as compared to 2010**	**Growth rate, %**
Cereals and leguminous crops	22,3	39,2	16,9	175.78
Sugar beet	326,6	381,8	55,2	116.90

Tobacco	17,6	18,3	0,7	103.98
Sunflower	15,4	21,8	6,4	141.56
Soya	18,7	14,4	-4,3	77.01
Potatoes	30,9	149,7	118,8	484.47
Field vegetables	67,1	142,2	75,1	211.92
Melon crops	46,5	69,4	22,9	149.25
Root crops for fodder	275,9	41,5	-234,4	15.04
Maize for silage, green mass and hay	152,8	193,7	40,9	126.77
Pome fruits	42,3	119,9	77,6	283.45
Stone fruits	27,1	48,4	21,3	178.60
Tree nuts	1,7	3,8	2,1	223.53
Berries	8,7	19,5	10,8	224.14
Grapes	23,1	79,0	55,9	341.99

Source: developed by authors based on www.statistica.md

In relation to animal and poultry productivity (Table 15), the available statistical data reveal a better situation with a stable increasing rate for the annual average volume of milk per cow, and maintaining the same level of shorn wool volume per sheep, except for years 2012 and 2017. Annual average production of eggs per laying hen registered fluctuations during the analysed period.

Table 15. Productivity of animals and poultry in agricultural enterprises in RM during 2010-2017

Indicators	2010	2011	2012	2013	2014	2015	2016	2017
Annual average volume of milk per cow, kg	2 993	3 224	3 380	3 225	3 742	3 468	3 939	4 363
Annual average production of eggs per laying hen, pieces	224	210	177	196	213	193	196	206
Annual average volume of shorn wool per sheep, kg	2	2	1	2	2	2	2	1

Source: developed by authors based on www.statistica.md

One of the indicators summarizing the efficiency of performed activities would be the gross profit obtained by enterprises. According to the data in Table 16, 47% of enterprises working in the area "Agriculture, hunting, and related services" registered losses in 2017. Hence, even though the number and the share of such enterprises is decreasing, a significant number of agricultural enterprises are currently working inefficiently.

Table 16. Evolution of financial situation in enterprises active in "Agriculture, hunting and related services" in the RM during 2015-2017

Indicators	2015	2016	2017
Number of agricultural enterprises that obtained profits	1 530	1 935	2 431
Number of agricultural enterprises that suffered losses	1 377	1 254	1 163

Source: developed by authors based on www.statistica.md

Another important aspect to be tackled when assessing a sector's development level would be its role in extending the country's exports. In this context, Figure 10 provides the analysis of the agricultural production share in total exports of the country during 2010-2017.

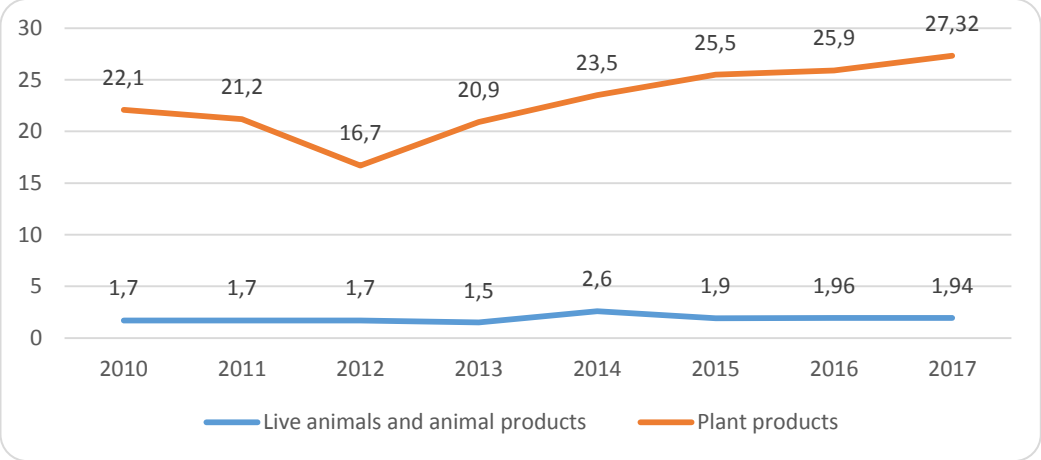

Figure 10. Evolution of agricultural production share in RM exports' structure during 2010-2017, %
Source: developed by authors based on www.statistica.md

The data provided in Figure 10 reveal an insignificant increase for plant products' share and an almost unchanged situation for the share of animal products in the country's total volume of exports. Hence, the share of plant production in exports has increased over 8 year by only 5.22 p.p., while the share of animal production has exceeded in 2017 the level registered in 2010 only by 0.24%.

1.2.2 Trends' assessment in food industry development

The evaluation of food industry evolution may be carried out by assessing some quantitative and qualitative indicators. As it was previously mentioned, an increase by 17 units was registered during 2015-2017 for the number of enterprises in food industry. To provide more insights, Table 17 presents the volume evolution for the main food products obtained in RM food industry during 2010-2017 (Table 17).

Table 17. Volume evolution for the main food products obtained in RM food industry during 2010-2017

Indicators	2010	2011	2012	2013	2014	2015	2016	2017
Meat, th tones	23,7	27,8	31,0	34,5	43,1	44,6	44,2	54,3
Sausages, th tones	13,2	14,5	15,9	17,2	16,3	17,2	16,4	18,4
Preserved meat, th tones	1,5	1,3	1,5	0,9	0,7	0,5	0,5	0,5
Fruit and vegetable juices, th litters	27 115,0	29 715,3	46 055,2	49 059,1	49 074,9	39 242,5	49 687,1	55 689,1
Preserved fruits and vegetables, th tones	29,9	26,3	24,3	25,1	30,4	15,7	16,7	19,6
Processed and preserved fruits, th tones	8,0	6,8	4,7	10,7	7,6	7,9	9,4	8,2
Crude oil not modified chemically, th tones	80,7	89,7	93,5	53,9	109,6	109,5	79,9	86,8
Milk and cream with	65,1	62,9	62,4	65,3	78,7	80,0	86,0	80,0

<6% fat, th tones								
Milk and cream in solid form, tones	1 217,0	625,0	536,0	439,0	1 042,0	1 357,0	1 674,6	2 473,6
Butter, tones	4 199,0	3 878,0	3 764,0	4 159,0	4 673,0	4 787,0	5 868,7	4 771,9
Hard cheese and fat cheese, tones	1 779,0	2 087,0	2 113,0	2 435,0	2 427,0	2 469,0	2 402,4	2 868,9
Curdled milk, curdled milk cream, yogurt, kefir, sour cream and other fermented products, tones	25 615,0	27 314,0	27 314,3	30 215,7	31 541,7	32 658,9	32 743,6	31 107,0
Ice-cream and other forms of ice with or without cacao, th litters	12 491,0	12 375,0	14 064,0	15 160,0	15 633,0	15 969,0	16 472,9	16 962,6
Flour, th tones	108,0	118,2	101,9	117,9	118,4	113,2	103,8	112,0
Groats, meal and pellets, th tones	5,6	4,8	3,6	4,4	4,7	5,7	5,3	6,7
Bread and pastry, th tones	129,0	130,0	129,3	132,5	128,4	131,5	129,2	130,1
Confectionary and farinaceous products, th tones	26,9	28,3	30,6	33,9	34,0	33,6	34,4	35,4
Granulated sugar, th tones	103,2	88,4	83,4	140,3	177,7	84,5	100,0	129,0

Source: developed by authors based on www.statistica.md

By comparing the level achieved in 2017 as against 2010 based on the data provided in Table 17, an increase in volume of obtained production is noted for the majority of analysed products; an exception would be preserved meat, vegetables and fruits, which decreased in volume by 1 and respectively 10,3 th tones. At the same time, a fluctuating trend is observed even for the types of products which registered increases in production volume, except for three groups of products which enjoyed a stable increasing trend: meat, curdled milk, curdled milk cream, yogurt, kefir, sour cream and other fermented products and ice cream.

For the purpose of assessing activity efficiency in food industry, Table 18 provides an analysis of available data regarding the enterprises obtaining profit and those registering losses (Table 18).

Table 18. Evolution of the financial situation of food industry enterprises in the Republic of Moldova, period 2015-2017

Indicators	2015	2016	2017
Number of enterprises which obtained profit	369	399	418
Number of enterprises which suffered losses	528	493	490

Source: developed by authors based on www.statistica.md

According to data provided in Table 18, more than half (54%) of food industry processing enterprises registered losses in 2017. Hence, even though the number of inefficient enterprises is decreasing, the growth rate is too slow for estimating optimistically the situation.

A precarious situation is identified as well as a result of analysing the share of food production in the total volume of country's exports in dynamics (Figure 11). Thus, the respective indicator decreased by 5.44 p.p. during 2010-2017.

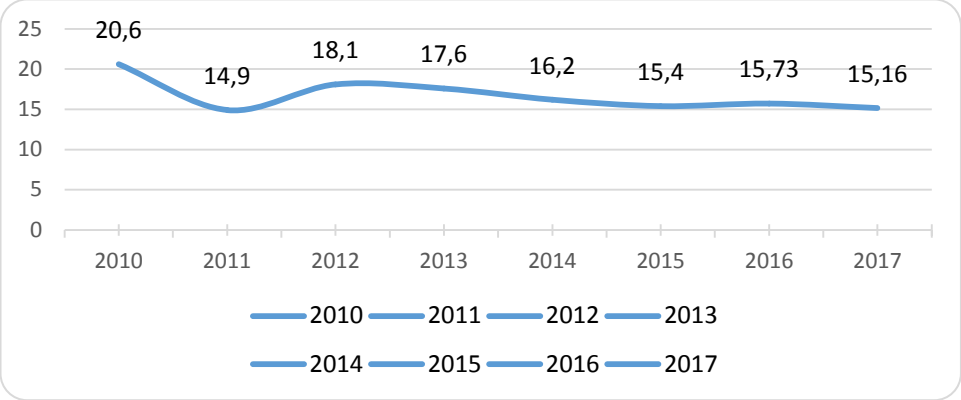

Figure 11. Evolution of food production share in RM exports' structure during 2010-2017, %

Source: developed by authors based on www.statistica.md

1.3 Labour force in agri-food production sector

To reveal the quantitative and structural changes occurring in labour force evolution within agri-food production sector, Figure 12 shows the initial dynamics of population employed in "Agriculture, hunting, fishing" activities during 2010-2018.

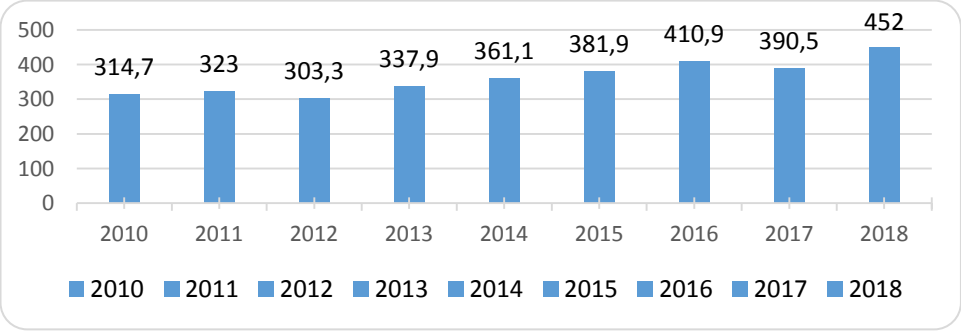

Figure 12. Dynamics of population employed in "Agriculture, hunting, fishing" activities in the Republic of Moldova during 2010-2018, thousand persons.

Source: developed by authors based on www.statistica.md

The data provided by Figure 12 show an increasing trend for population employed in "Agriculture, hunting, fishing" activities in the Republic of Moldova during 2010-2018, with an absolute growth level of 137,3 thousand persons in 2018 as compared to 2010. To assess the potential of this sector to create and offer jobs, it is necessary to clarify the trends in the evolution of employees' number (Figure 13).

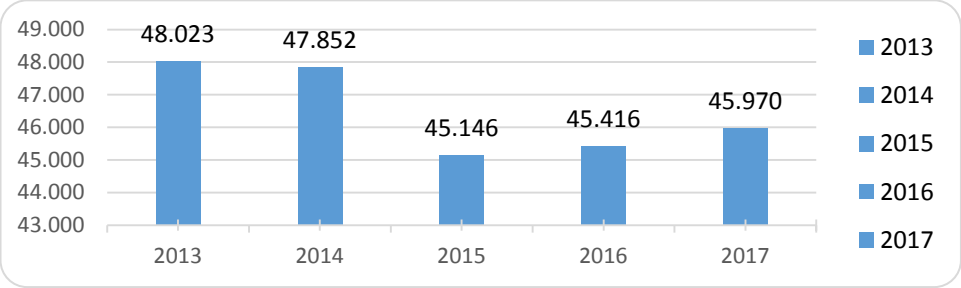

Figure 13. Evolution of number of employees in agriculture, hunting and related services in RM during 2013-2017, persons.

Source: developed by authors based on www.statistica.md

According to the data provided in Figure 13, much more modest trends are noted in the evolution in number of employees in agriculture, hunting, and related services during the analysed period (2013-2017) as compared to the trends related to total employed population. Thus, even though, a stable increasing trend started in 2015 for the respective indicator, the total number of employees in the respective sector in 2017 is under the level registered in 2013. Recognizing the fact that based on the seasonal nature of agricultural activities, many persons are employed just temporarily, the evolution of the respective indicator is really concerning in conditions when only a permanent work place may contribute to increasing people's wellbeing. Thus, the rationale provided in the National Employment Strategy for 2017-2021 gets confirmed – employment increase in this sector was not accompanied by creation of formal jobs, and this problem still persists nowadays. In this context, it should be mentioned that according to the same strategic document, agriculture represents one of the few sectors (together with constructions) which did not improve its performance by creating formal jobs over the last period of time.

In the same perspective, taking into account the objectives of the present investigation, it should not be ignored the fact that a decrease in the total number of employees logically means a decrease of qualified potential. As there are no accurate statistical data on distribution of employees in agriculture, hunting and related services by levels of education, Table 19 analyses the dynamics of total population employed in agriculture, hunting and related services based in this criterion.

Table 19. Evolution of total employed population in agriculture, hunting and related services with different levels of education in RM during 2010-2018

Indicators	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Total employed population, th pers.	314,7	323	303,3	337,9	361,1	381,9	410,9	390,5	452
including:									
with higher education level, %	3.84	3.59	4.12	4.00	3.43	4.11	4.14	3.92	4.40
with secondary professional level, %	7.88	8.39	8.77	8.70	8.36	8.56	8.06	8.37	8.74
with secondary vocational level, %	27.68	26.59	25.59	26.01	26.70	24.30	23.51	24.43	24.96

Source: developed by authors based on www.statistica.md

According to the data provided in Table 19, it may be noted that the increasing rate for total population employed in agriculture, hunting and related services during the analysed period (9 years) accounts for 143.6%; the share of employed population with higher education and secondary professional education level registers a much more modest increasing trend (of 114% and 111% respectively), and the share of employed population with secondary vocational education level decreased by 2.72 p.p.

A correlated analysis of data from 2010, 2014 and 2018 is provided in Tabled 20 to reveal women's situation in the structure of qualified employed population in agriculture, hunting and related services.

Table 20. Share of women in total employed population and qualified employed population in agriculture, hunting and related services in RM, during 2010-2018

Indicators	2010	2014	2018
Share of women in total employed population, %	44.36	43.42	46.00
Share of women in employed population with higher level of education, %	37.19	41.13	42.21
Share of women in employed population with secondary professional level of education, %	52.02	49.34	50.38
Share of women in employed population with secondary vocational level of education, %	24.91	24.59	26.15

Source: developed by authors based on www.statistica.md

Based on data provided in Table 20, it may be noted that in 2018 women accounted for 46% of total employed population in the respective sector, over 42% of employed population with higher education level, over 50% of employed population with secondary professional education level, and only 26% in employed population with secondary vocational education level. At the same time, there is an increasing trend for women's share in total employed population in agriculture, hinting and related services, as well as for women's share in employed population with higher and secondary vocational level of education, while women's share in employed population with secondary professional level of education registers a slight decrease (by 1.64 p.p.). This situation allows excluding the idea of gender gaps in the respective sector.

In relation to food industry labour force, it may be concluded that according to the data of the National Bureau of Statistics, as of 1 January 2018, a number of 26976 persons were employed in the respective branch. An increase in number is observed during the period 2013-3017 based on data provided in Figure 14 regarding the evolution in number of persons employed in this branch.

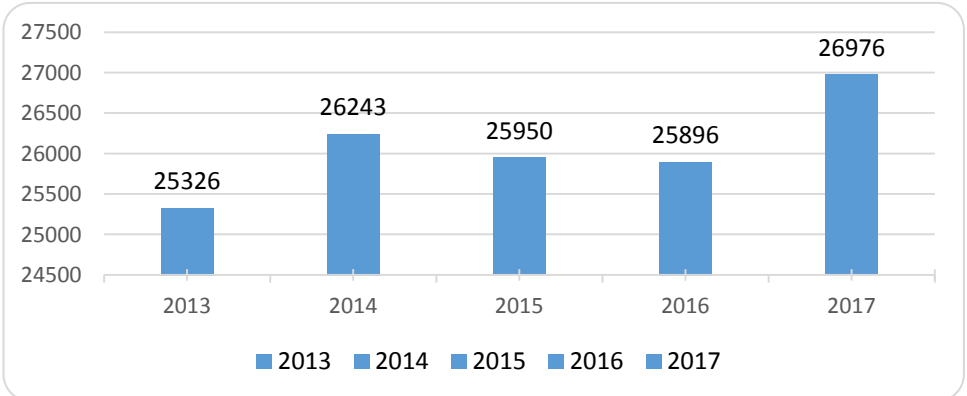

Figure 14. Evolution in number of employees in food industry in RM during 2013-2017, persons.

Source: developed by authors based on www.statistica.md

The dynamic evaluation of women's share in the total number of employees in food industry during 2013-2017 (Figure 15) reveals a decrease by 1.81 p.p. of the respective share. Even though decreasing, the share of women of 51.59% in the total number of employees in this branch in 2017 allows deducing that there is no gender gap in employability.

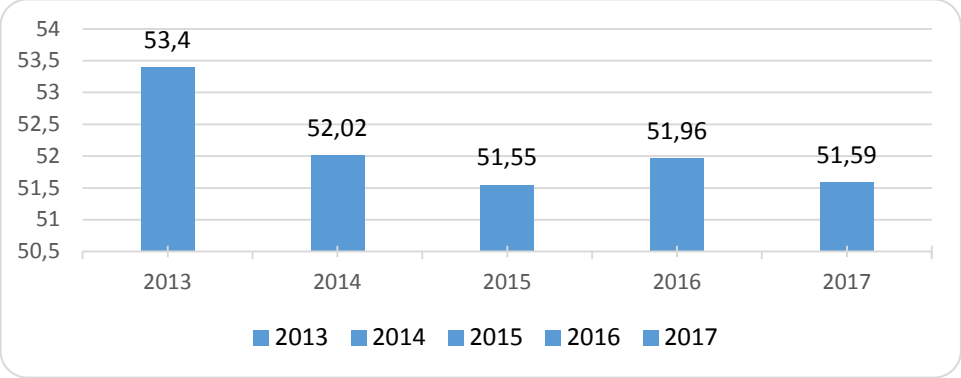

Figure 15. Dynamics of women's share in total number of employees in food industry in RM during 2013-2017, %

Source: developed by authors based on www.statistica.md

1.4 Analysis of labour force demand trends in EU countries

Labour force employment is a key component of Europe 2020 Strategy, stipulating the role of decent employment for achieving adequate living standards. In general, EU countries' labour market registered positive dynamics over the last period of time, after the decline generated by the financial crisis in 2008. At the same time, labour market reform is envisaged under the influence of changes occurring in EU population demographic structure and technologic progress.

One of the targets of Europe 2020 Strategy is to achieve by 2020 a 75% employment rate for the population aged 20 - 64 years old. In 2017 the average employment rate for EU population was 72.2%. It is estimated that if the respective indicator keeps the growth rate initiated in 2013, the stipulated target will be achieved. At the same time, it is specified that in 2017 nine EU member states had already achieved the targets set at the national levels, and namely Ireland, Czech Republic, Lithuania, Estonia, Germany, Sweden, Latvia, Malta and Croatia (Eurostat Statistics Explained).

A stable increasing trend is observed after 2013 for the employment rate of people with tertiary level of education (5-8 ISCED) (Figure 16).

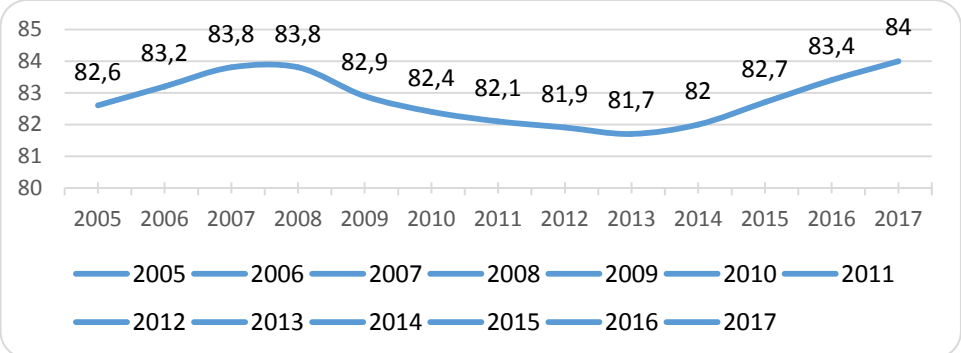

Figure 16. Employment rate evolution for population with tertiary level of education, EU, 2005-2017
Source: developed by authors based on: Eurostat Statistics Explained

According to the Eurostat statistical database, 4.4% of the total employed population were working in 2015 in agriculture. About 3/4 (72.8%) of EU agricultural labour force was concentrated in 7 countries: Romania, Poland, Italy, France, Spain, Bulgaria and Germany.

The countries with the highest share of population employed in agriculture in total employed population are: Romania (25.8%), Bulgaria (18.2%), Greece (11%) and Poland (11%). At the same time, an insignificant part of employed population is working in agriculture in Germany (1.4%), Sweden (1.3%), Belgium (1.2%), Malta (1.2%), Great Britain (1.1%) and Luxemburg (0.8%).

A lower level is noted as comparing to total employed population, when analysing the level of education of population employed in agriculture. Thus, if the average rate in EU of employed population with tertiary level of education is 33.9%, in agriculture - it is only 8.9%.

As for the mid-term demand of qualified labour force, it is estimated that it will be determined by a series of factors, among which the demographic, structural, technological, and climate factors will have an essential role. As a result, according to Cedefop (2016) skills' forecast, there will be a decline in primary branches' employment (including agriculture), while such areas as commercial services, distribution and retail will register a significant increase for labour employment.

To elucidate more eloquently the forecasted trends for labour force employment in agriculture, Figure 17 analyses them comparatively with the general employment trends (in all areas).

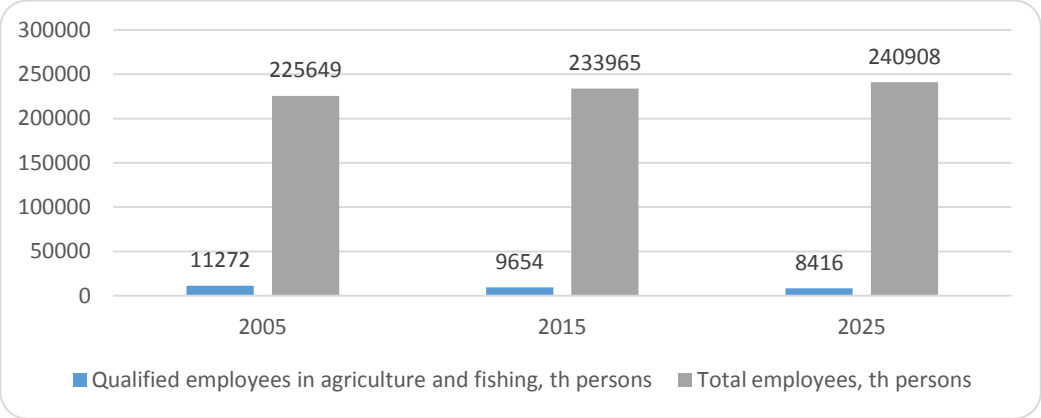

Figure 17. Comparative evaluation of trends forecasted for labour force evolution in agriculture and total labour force in EU during 2005-2025
Source: developed by authors based on: Cedefop, 2016

According to the same source, the number of newly-created jobs in agriculture and fishing in 2025 (employment opportunities) will account only for 73.3% as compared to 2015, hence registering a decrease by 26.7% over ten years.

When analysing the employment opportunities by level of qualification, it is forecasted that 2252 th (38.6%) out of the total number of 5834 th will be workers with low qualification, 2535 th (43.4%) – workers with medium qualification and only 1047 th (18%) – specialists with high qualification.

Table 21. Dynamics of population employed in agriculture and fishery in EU countries during 2015-2025

Country name	2015	2025	Growth rate, %
Austria	186	182	97.85
Belgium	66	71	107.58
Bulgaria	343	292	85.13
Croatia	135	86	63.70
Cyprus	5	5	100
Czech Republic	70	60	85.71
Denmark	53	41	77.36
Estonia	11	7	63.64
Finland	94	87	92.55
France	932	983	105.47
Germany	733	755	103
Greece	452	375	82.96
Hungary	147	96	65.31
Ireland	98	91	92.86
Italy	569	458	80.49
Latvia	24	17	70.83
Lithuania	87	94	108.05
Luxemburg	7	7	100
Malta	4	3	75.00
Holland	195	173	88.72
Poland	1634	1183	72.40
Portugal	423	428	101.18
Romania	2090	1709	81.77
Slovakia	21	18	85.71
Slovenia	42	23	54.76
Spain	455	342	75.16
Sweden	89	83	93.26
Great Britain	479	554	115.66
Norway	58	43	74.14
Switzerland	144	141	97.92
Island	7	7	100

Source: developed by authors based on: Cedefop, 2016

Table 21 shows that the number of population employed in agriculture and fishing is forecasted to remain unchanged in Cyprus, Luxemburg and Island. An increase of population employed in the respective branch is forecasted for a number of countries (Belgium, France, Germany, Lithuania, Portugal and Great Britain), with the most prominent rise attributed to Great Britain (by 15.66%). Most of the EU member states are expecting for the population employed in agriculture and fishing to decrease; the most significant decline being expected in Slovenia (by 45.24%), Estonia (by 36.36%), Croatia (by 36.3%) and Hungary (by 34.69%).

Generalizations for Chapter I

According to the official data of the RM National Bureau of Statistics, 3723 enterprises were registered in the country in 2017 with agriculture being their main type of activity. According to the same source, under 6000 enterprises are effectively involved in agricultural activity, including 5280 enterprises involved in plant production, a part of them practicing agriculture as secondary type of activity; 2402 out of the 5280 mentioned enterprises hold multiannual plantations, while 636 enterprises are engaged in livestock breeding (according to the date held by the Ministry of Agriculture, Regional Development and Environment). A number of 949 enterprises were involved in food industry in 2017. By consulting the web page of the National Food Security Agency, it is noted that 172 enterprises are currently involved in processing agricultural products of plant origin.

An increase in number of agricultural and food industry enterprises occurred during 2015-2017, mainly due to the increased number of entrepreneurial initiatives, rather than increased performance of the respective sector. The respective conclusion is supported by the results deriving from the analysis of a series of outcome indicators, both quantitative and qualitative, which reflect the enterprises' activity during 2010-2017 (some of indicators being also available for 2018). Hence, the following may be assessed positively:

a) insignificant increase of total area sown with agricultural crops, including perennial plantations managed by enterprises;
b) increased population of cattle, porcine, rabbits, ovine and caprine managed by enterprises;
c) positive trends in total global agricultural production development, as well as separately in production of plant and animal origin;
d) increased productivity for the majority of agricultural crops and livestock managed by enterprises;
e) increased volume of production obtained by food industry enterprises, except for vegetal cans and meat cans;
f) lack of gender gap in labour force employment in agricultural production and food industry.

At the same time, the following drawbacks should be pointed out in the agri-food production sector's development:

a) slow increasing rate for sown areas managed by enterprises;
b) reduced areas cropped with vegetables;
c) reduced area of vineyards managed by enterprises;
d) reduced population of livestock in households' sector, except for rabbits and bees (this is an important aspect, as it is an area on which the veterinary doctors' activity is focused);
e) reduced relevance of upward trends for global agricultural production, including the plant and animal origin production, due to the fact that level achieved by the given indicators cannot serve as an incontestable evidence for sectors' increased performance when using the system of current prices because of the following reasons: these are outcome indicators, and not indicators showing activity efficiency; the value of production reflects fully the evolution of volume and prices for plant and animal origin products;
f) missing stable trends in relation to growth-determining indicators in the surveyed period, just with small exceptions;
g) a rather high number of agricultural enterprises (47%) and food industry enterprises (54%) registering losses, according to data for 2017; as well as too slow reducing rate for the number of inefficient enterprises in the analysed sector;
h) insignificant increase for plant origin products' share and an almost unchanged situation for the share of animal origin products in the country's total volume of exports;

i) decreased share of animal origin production deriving from the processing industry in the country's total volume of exports;

j) in spite of increased number of population employed in agriculture, hunting and related services, much more modest trends were identified for the evolution of the number of employees as compared to that of total employed population; similar trends (continuous decrease) are noted in the labour force evolution in the EU countries. Hence, the rationale stipulated in the National Employment Strategy for 2017-2021 gets confirmed and namely – the employment growth in this sector was not accompanied by formal jobs' creation – a problem which still persists at the present moment.

Based on the above-established, it can be deduced that the current trends in the development of the agri-food sector cannot be considered as benchmarks for an optimist forecast for creation of additional jobs for future graduates of initial training programs tackled in this study.

CHAPTER II. ANALYSIS OF FORESTRY SECTOR

2.1 General data on sector's profile and trends

According to the official data of the RM National Bureau of Statistics, the forestry sector is currently represented by 40 entities, with a decrease of this number registered during 2015-2017 (Figure 18).

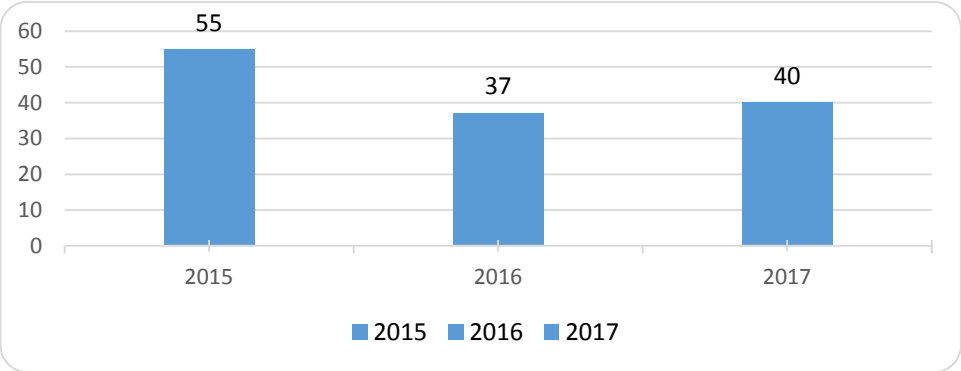

Figure 18. Dynamics of enterprises' number in the area of forestry and logging in RM during 2015-2017
Source: developed by authors based on www.statistica.md

The forestry fund of the Republic of Moldova accounted in 2017 for 421,5 th ha, including forests 378,2 th ha, the level of forestry coverage being 11.2% (Table 22).

Table 22. Dynamics of the RM forestry fund during 2010-2017

Indicators	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Total area of the forestry fund, thousand ha	419,1	419,2	419,5	420,6	426,0	421,7	421,7	421,5
Area of fields covered with forests, total, thousand ha	374,5	374,8	375,3	372,8	377,5	378,1	378,1	378,2
including:								
• resinous	7,9	7,9	7,9	7,0	7,0	7,0	7,0	7,0
• hard deciduous	349,1	349,4	349,9	349,0	353,6	354,2	354,2	354,3
• soft deciduous	17,5	17,5	17,5	16,8	16,9	16,9	16,9	16,9
Afforestation level, %	11.1	11.1	11.1	11.1	11.2	11.2	11.2	11.2

Source: developed by authors based on www.statistica.md
Note: Besides forests, the forestry fund includes, as well, areas meant for cultural needs, production and administration of the forestry sector, fields meant for afforestation and forest planning.

Forests are distributed extremely unevenly: 60% (with afforestation level of 13.5%) are located in the Centre, about 26% (with afforestation level of 7.2%) – in the North, and only 14% (with afforestation level of

6.7%) – in the South, which is affected in particular by drought and erosions, and registering aquatic resources' deficit.

The forests from the Republic of Moldova are covered in the first functional group, having exclusive functions of environment protection. The following functional sub-groups are identified in relation to the functions they perform:

a) forests with water protection functions – 1.5 %;
b) forests with soil and land protection functions – 6.7%;
c) forests with functions of protection against harmful industrial and climate factors – 48.7%
d) forests with recreational functions – 29.5%;
e) forests of scientific interest and with functions to protect forestry genofund and ecofund – 13.6%.

The capacity of forests to absorb carbon dioxide from the atmosphere – about 2230 thousand tones per year is among one of the most relevant evidence of the forestry fund's significance, especially that of forests, for the Republic of Moldova. Forests also come up with a substantial contribution to decreasing the processes of soil erosion and landslides. In Moldova's conditions with substantial alternations of temperatures, frequent droughts, water deficit, fields prone to landslides, and soil fertility decrease due to erosion process intensification, the protective role of forests is of vital importance.

Annually, the forestry sector brings into the national economy a revenue of about 34-35 million MDL, which is 0.3-0.4% of GDP. The forestry sector supplies annually about 360 thousand m^3 timber to the national economy. As a result, the population needs for fire wood are met at a ratio of 70-80%.

At the same time, there is a series of problems related to forestry fund management:

- starting in the '90, the possibilities to create forestry crops on huge areas decreased, thus leading to decreasing the rhythm for extending the fields covered with forestry vegetation;
- over one third of stand is created from artificially introduced species, which do not fit Moldova's natural ecosystems, and about 90% of holm stand and over 60% of oak stand derive from sprouts of II-IV generations. Thus, their vegetation condition and their resistance to unfavourable biotic and abiotic factors are very low;
- certain disturbances related to the structure of existing forests and influence of unfavourable weather factors from the last years have conditioned the appearance and extension of complex outbreaks of forestry diseases and pests, hence aggravating forests' phyto-sanitary condition. Annually, 30-40 thousand ha or 9-13% of forests need for special measures to be applied to combat the pests;
- although in line with their specific composition in which the deciduous prevail (97%), the Moldovan forests are classified in the category of those with low fire danger, other threats are identified – illegal cuts, unauthorized grazing and pollution of the forestry fund with domestic, construction and other types of waste and residuum;
- forestry authorities' enterprises register a total capacity for wood processing of about 100 th m^3 per year (less than the third part of harvested timber), but only about 7% of the timber harvested in Moldovan forests are processed. At the same time, due to missing equipment, the range of wood products is limited and of low value (cannot bring essential profit to the respective branch and to the national economy, in general);
- forests' non-wood products are also insufficiently harnessed. The annual potential of Moldovan forests for accessory products, such as forest fruits and berries, nuts, mushrooms, medical plants, etc., accounts for about 4 th tones, but only 3 th tones of such products are harvested per year;

By generalizing the above-mentioned, the following circumstances may be pointed out as conditioning the reduced contribution of the forestry branch to solving social-economic problems (they are reflected in the

RM Forestry Sector Sustainable Development Strategy and National Agricultural and Rural Development Strategy for 2014-2020):

- insufficient level of country's territory afforestation and, as a result, reduced possibilities to harvest and process timber and forest accessory products;
- insufficient harnessing of timber reserves which could be harvested without damaging forests' condition;
- low level of ensuring the forestry sector with modern equipment for efficient processing of timber, which influences negatively the range, quality and competitiveness of forest final products, as well as the harvest of accessory products;
- insufficient development of some auxiliary activities, such as nurseries, growing snails and pheasants for trade, hunting tourism, ecotourism, etc., which would bring revenues, and this could be used for additional financing of basic activities;
- illegal and irrational use and exploitation of biodiversity (illegal cuts, hinting, fishing, wildlife and fishery poaching, illegal and unorganized grazing, illicit trade of nature's products); intensification of processes leading to biodiversity loss, obvious increase in number of critically endangered species, which need to be protected in national context;
- missing national ecological networks and fragmentation of natural ecosystems and habitats of many species, hence restraining migration paths for species of animals;
- insufficiency of institutional and management frameworks for objects and complexes of state protected natural areas and lack of necessary financial sources for ensuring their sustainable management;
- very small surface of state protected natural areas (only 5.5% of the territory), as well as those of forests (only 11.1% of the territory of the country);
- insufficient assurance and development of sustainable management of forests, green spaces, pastures, wetlands; there are about 150 th ha of floodplains and wetlands which need ecological recovery and economic harnessing;
- continuous degradation of rivers' and river basins' forestry protection bands, which provokes losses of habitats and ecosystems;
- degradation of biodiversity and ecosystems is costly for society, especially for economic units which depend on ecosystem services.

The problems identified in managing the forestry resources are also found in the economic results of the enterprises from the respective sector. Hence, it may be noted that 11 enterprises registered losses in 2017, which is 27% of the total number of enterprises from the sector. Even though the share of enterprises registering losses is decreasing (Figure 19), the existence of over 27% enterprises working inefficiently represents an evidence of insufficient performance and , implicitly of reduced potential to create jobs.

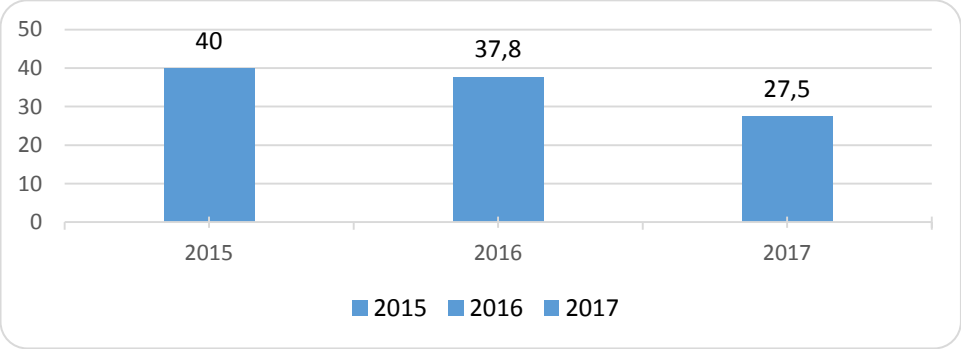

Figure 19. Evolution of share of enterprises registering losses in the total number of enterprises in forestry sector in the Republic of Moldova during 2015-2017, %

Source: developed by authors based on www.statistica.md

2.2 Labour force in forestry sector

According to the official statistical data, the total number of employees in the forestry sector as of 31 December 2017 accounted for 3480 persons. By assessing the evolution of this indicator during 2013-2017 (Figure 20), it may be noted that it has decreased, hence in 2017 there were 270 employees less in the sector than in 2013.

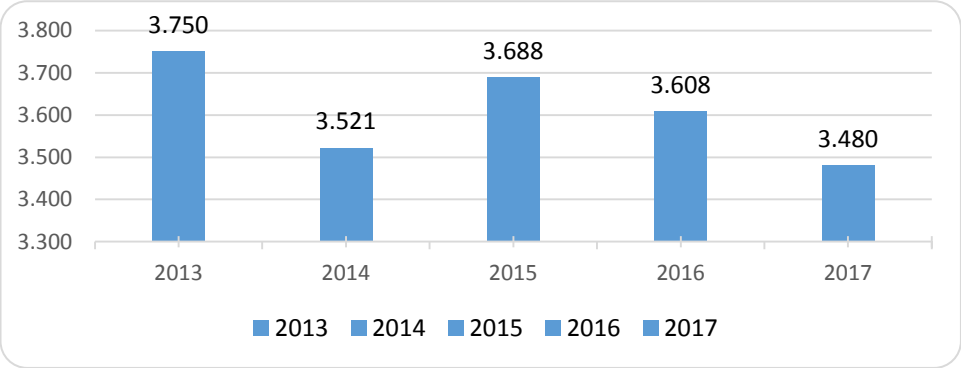

Figure 20. Evolution in number of employees in the forestry sector in RM during 2013-2017

Source: developed by authors based on www.statistica.md

A decreasing trend is also registered for the share of women in the total number of employees (Figure 21), but this cannot be qualified as gender gap, taking into account the specific nature of work performed in this sector.

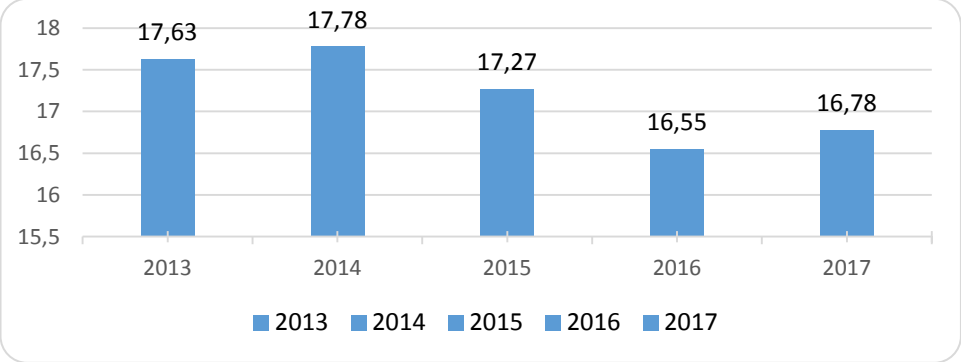

Figure 21. Evolution of women's share in the total number of employees in the forestry sector of RM during 2013-2017, %

Source: developed by authors based on www.statistica.md

Generalizations for Chapter II

According to the official data of the RM National Bureau of Statistics, the forestry sector is currently represented by 40 entities, noting a decreasing trend during 2015-2017.

In 2017, the forestry fund accounted for 421,5 th ha, including forests 378,2 th ha, and the level of forestry coverage being 11.2%.

Although there is relevant evidence for forestry fund's importance for the Republic of Moldova, especially that of forests, a number of problems are identified in relation to its management, which diminish substantially the contribution of the forestry branch to solving the country's social-economic problems: decreased extension rate of fields covered with forestry vegetation, creation of stand of species artificially introduced, which do not fit Moldovan natural ecosystems, appearance and extension of complex outbreaks of forestry pests and diseases, illegal cuts, lack of equipment for wood processing, etc.

The problems identified in managing the forestry resources are also found in the evolution of labour force (which is decreasing), as well as in the economic results of the enterprises in the respective sector, hence the number of enterprises registering losses in 2017 accounted for over 27%. Although the share of enterprises registering losses is decreasing, the existence of over 27% of enterprises working inefficiently represents an evidence of insufficient performance and implicitly ***of reduced potential to create jobs.***

CHAPTER III. ANALYSIS OF FIELDS' IRRIGATION SECTOR

According to the data provided on the web page of "Apele Moldovei" Agency, the irrigation sector is represented currently by 16 entities. By analysing the evolution of this sector in the Republic of Moldova from quantitative and qualitative point of view, a series of problems may be identified. Based on some estimations (https://forum.md/ru/902741), it is determined that in spite of the fact that annually the Republic of Moldova is crossed by 12 milliard cubic meters of water through the transboundary Prut and Nistru Rivers, this volume being more than enough for irrigation of agricultural fields in the country, over 400 million MDL are lost annually because agricultural fields are not irrigated.

As it is mentioned in the National Agricultural and Rural Development Strategy for 2014-2020, the irrigated fields decreased during 1990-2005 from 193000 ha to about 24000 ha.

Based on the Informative Note of the Ministry of Agriculture, Regional Development and Environment, placed on the web page of "Apele Moldovei" Agency (http://apelemoldovei.gov.md/libview.php?l=ro&idc=130&id=1043), it results that an entire series of factors disrupt the irrigation process, among which: introduction of fees for water, increase of prices for electricity and energy carriers, physical destruction of water supply systems for irrigation, distribution of irrigation technique among land owners, dismantling of pipes and distribution hydrants from the inter-farms networks, total physical wear and tear of equipment, electrical devices, cables, gate and control valves at the pump stations, physical destruction of irrigation networks, etc..

The evaluation of the electromechanical equipment, pump stations' buildings, water reservoirs and pipes' condition, carried out by Moldova Sustainable Development Fund under the project initiated in September 2017 upon the request of "Apele Moldovei" Agency, allowed determining the following irrigation and drainage infrastructure:

- 11 state enterprises providing irrigation/drainage services
- 87 centralized irrigation systems
- 284 pump stations
- 110 water intake stations
- 162 pump stations at the compensatory reservoirs
- 19 centralized drainage systems
- 43 pump stations.

At the same time, it was noted that when launched into operation, the centralized irrigation and drainage systems were ensuring the irrigation of 130 628 ha and drainage of 58 143 ha of agricultural fields. Due to their decreased functionality over the time (only 8 out of 11 technological irrigation stations are still providing irrigation services), the situation changed radically (Table 23).

Table 23. Information on irrigated areas at the moment the irrigation stations were built compared to the existing situation in RM in 2018

No.	Name of state enterprises in irrigation area i	Area of irrigable fields when launched into operation, ha	Area of irrigated fields in 2018, ha
1	SGA Nistru-Centru	8 288	309
2	STI Bender	7214	218

3	STI Ştefan Vodă	24 244	328
4	STI Briceni	7 570	1 043
5	DNH Costeşti-Stânca	1 295	5
6	STI Ungheni	8 286	116
7	STI Hânceşti	6 498	25
8	STI Cahul	22 826	62
	TOTAL	86 221	2 306

Source: Informative Note of Ministry of Agriculture, Regional Development and Environment (http://apelemoldovei.gov.md/libview.php?l=ro&idc=130&id=1043)

According to the same source, only 24% of the total number of pump stations under "Apele Moldovei" Agency are functional, 31% are not functional and 45% are destroyed/ruined. Only 5 pump stations out of the total included I the drainage systems are functional, 29 are in unsatisfactory condition and 9 are destroyed.

Generalizations for Chapter III

Currently, according to the data provided on the "Apele Moldovei" Agency's webpage, the irrigation sector is represented by 16 entities. By analysing the evolution of this sector in the Republic of Moldova from quantitative and qualitative perspective, a series of problems were identified, especially the degradation of the sector, which have led to sector's decreased efficiency. As a result, because agricultural fields are not irrigated, over 400 million MDL are lost annually. In these circumstances, it is obvious that ***the sector in unable to create new jobs. At the same time, it may be deduced the need to train specialists of a corresponding quality, with potential to solve the problems in the sector.***

CHAPTER IV. ECOLOGICAL PROBLEMS OF THE REPUBLIC OF MOLDOVA

Alongside the ecological problems of the forestry fund, the Republic of Moldova faces a series of ecological problems in the process of managing other main categories of natural resources: land, water bodies and air, being reflected below.

4.1 Soils' degradation problem

Although considered to be a zone favourable for agriculture, the Republic of Moldova has various fields with different relief and quality. According to the well-known Russian pedologist Docuceaev, who has studied the soils from Bessarabia, all categories of fields specific for Russia's European part may be found here, except for tundra soils. Black soil, considered to be soil with high natural productivity, covers over 70% of the total area and 80% of the areas meant for agriculture.

According to the data presented in Table 24, it may be noted that the share of agricultural fields in the structure of Moldovan land fund is higher than the average registered for European countries (where the agricultural fields represent half of the total land area). At the same time, the arable area per capita in the Republic of Moldova exceeds twice the world average (0.26 ha) and even more the European average (0,236 ha). In other words, the statement that Republic of Moldova has insufficient agricultural fields is totally wrong. At the same time, there is a number of problems related to management of country's land resources.

Table 24. Land Fund dynamics in the RM during 2012-2017, th ha

Indicators	Year					
	2012	2013	2014	2015	2016	2017
Total fields	3 384,6	3 384,6	3 384,6	3 384,6	3 384,6	3 384,6
Fields meant for agriculture	2 008,9	2 014,5	2 024,2	2 026,5	2 028,3	2 039,8
Fields of localities	312,2	312,8	313,1	314,8	314,3	313,6
Reserve fund	466,4	461,3	452,4	449,0	446,3	436,2
Fields meant for industry, transportation, communication and other special destinations	58,9	59,6	59,4	58,7	58,8	58,9
Fields of the forestry fund and meant for environment protection	450,6	450,4	450,4	450,5	451,7	451,0

Source: developed by authors based on www.statistica.md

According to the same table (24), it may be noted that the share of agricultural lands remains to be rather high (about 60%) during the entire analysed period. The agricultural land fund is characterized by high qualitative indicators. Hence, as mentioned in the National Agricultural and Rural Development Strategy for 2014-2020, the soil in the Republic of Moldova is characterized, first of all, by hilly fields with fertile black soils and productive agricultural fields. Almost every second hectare of land is of higher quality than the average level, of which 689000 ha (27% of agricultural land) are of very good quality.

By analysing the information mentioned in normative documents, as well as in different investigations, a number of problems are found in relation to soil management. Boian et al. (2005) identify the following main problems referring to combating soil degradation and fields' desertification:

a. Ecological misbalance between natural (forests, meadows, aquatic resources, swamps, wetlands) and anthropic (arable land, pastures, fruit-tree plantations and vineyards) ecosystems;
b. Inadequate use of agricultural fields as a result of excessive parcelling of the land fund, of distribution of land fields' shares on the slopes with hill-valley direction, of not respecting crop rotation and technologies for agricultural crops' growing;
c. Water- and wind-induced soil erosion, negative balance of humus and nutritive elements (chemical degradation), soil salinization and alkalization as a result of irrigation and land drainage, destruction of agricultural fields due to landslides;
d. Insufficient training, schooling and awareness of population, especially in rural area, regarding soil fertility conservation, combatting of desertification and environment protection;
e. Acute lack of finance for land improvement works and environment protection;
f. Insufficiency of highly qualified specialists, dispersion of state institutions' and public organizations' responsibilities.

According to the National Agricultural and Rural Development Strategy for 2014-2020, the soil quality has decreased over 30 years by 5 points, especially as a result of climate changes and use of industrial agricultural technique. The medium land quality level for the country is 63 points for the time being. The highest level of agricultural land erosion is registered in Călăraşi (56.1%), Cahul (44.4%), Hânceşti (43.7%), Ungheni (43.4%), Nisporeni (43.4%). The annual losses of fertile soil from agricultural fields caused by erosions accounts, according to some estimations, for 26 mil. tones, including humus – 700 th tones, nitrogen – 50 th tones, phosphor – 34 th tones, potassium – 597 th tones. The respective process indirectly induces some other consequences as well: siltation of ponds and other water bodies, pollution of soils, ground water with phyto-sanitary products and fertilizers, destruction of communication ways, hydro-technical constructions, etc..

Generalizing the data on soil condition in the Republic of Moldova, the National Agricultural and Rural Development Strategy for 2014-2020 points out the following problems:

1. Deficient, misbalanced and inadequate management of soil resources (characterized by lack of agricultural crop rotation and anti-erosion measures, neglect of good practices for soil conservation, mass parcelling of fields) and useful mineral resources;
2. Pollution of soil resources caused by waste and dangerous chemical substances, irrational use of fertilizers and pesticides (1588 locations contaminated with persistent organic pollutants);
3. Continuous triggering of soil degradation processes (40% of agricultural fields which is 880 th ha are degraded fields, 21.57 th ha of fields are subject to landslide);
4. Destruction of 3 th ha from soil protection forestry carcass and its absence on at least 50% of agricultural fields;
5. Inefficient management of underground natural resources.

As it is mentioned in the Program for harnessing new fields and increasing soils' fertility, approved via Government Decision No. 841 of 26.07.04, the most unfavourable humus condition of arable soils was registered in the Republic of Moldova over the last decades. The uncompensated annual losses of humus in agricultural fields as a result of their mineralization exceed the level of 700 kg/ha, and the total deficit is 1100 kg/year, taking into account the erosion losses.

Table 25 shows the evolution of humus balance in arable soils of the Republic of Moldova during 1971-2000.

Table 25. Evolution of humus balance in arable soils of the Republic of Moldova during 1971-2000, t/ha

Years	Applied organic fertilizers, t/ha	Humus balance	
		without erosion losses	with erosion losses
1971-1975	2,9	-0,5	-0,9
1976-1980	3,9	-0,4	-0,8
1981-1985	6,0	-0,1	-0,5
1986-1990	5,6	-0,1	-0,5
1991-1995	2,6	-0,4	-0,8
1996-2000	0,1	-0,7	-1,1

Source: Andrieş, 2011

During the next period of time, the humus balance did not change essentially, remaining to be (-1) t/h (Andrieş, 2011).

The main factors conditioning the negative balance of organic materials in the soil are:

- lack of crop rotation meant to preserve soil fertility;
- water-induced erosion;
- use local organic fertilizers in very small volumes, when fertilizing agricultural crops, etc.

Referring to ecological-economic reasoning for crop rotation, it is important to mention the need to take into consideration the humus balance in the soil. Table 26 provides data regarding the losses of organic substances in the soil due to dehumification depending on the agricultural crop.

Table 26. Humus balance in the soil depending on agricultural crops (average for 1990-1999), t/ha

Crop name	Stored humus	Humus loss	Humus balance
Winter wheat	0,90	1,06	-0,16
Winter barley	0,68	1,09	-0,41
Spring barley	0,60	1,06	-0,46
Oat	0,49	0,85	-0,36
Maize for grain	0,74	1,56	-0,82
Sunflower	0,38	1,20	-0,82
Sugar beet	0,69	2,00	-1,31
Leguminous crops	0,22	0,57	-0,32
Peas	0,46	0,60	-0,14
Beans	0,29	0,37	-0,08
Soya	0,32	0,84	-0,52
Silage maize	0,32	0,87	-0,55
Perennial herbs	0,85	0,62	+0,23

Source: developed by authors based on Andrieş, 2011

Hence, the specialists in this area point out that such crops as maize for grain, sugar beet and other cause most of organic substances' losses in the soil. The situation gets worse due to the fact that currently the rate of the respective crops in the crop rotation schemes is excessive (about 65%). At the same time, to preserve and improve soil humus balance, it is necessary to include annual and perennial leguminous crops in the field crop rotations. Humus balance after peas and beans is balanced, and after perennial herbs – positive. The share of leguminous crops in the field crop rotations should be 20-22%, including alfalfa – 10-12% (Andrieş, 2011).

In the Republic of Moldova, about 80% of agricultural fields are located in slopes, and the soils of the slopes being subject to *erosions.* As a result, according to the local specialists' estimations, annually about 26 mil. tones of fertile soil (containing about 603 th tones of humus) are lost from the agricultural fields. In conditions of not respecting anti-erosion measures, the loss of humus due to erosion accounts for 0,3-0,4 t/h. It was established that losses of organic materials due to erosion are about 550-555 kg/ha, and as a result of dehumification process – 1054-1171 kg/ha.

Another problem related to managing agricultural fields in the Republic of Moldova refers to use of fertilizers at a unsatisfactory level, the embedded volumes being insufficient for compensating the losses of organic materials. Hence over the last two decades, the volume of embedded organic fertilizers decreased by 30 times, of mineral fertilizers – by 10-15 times. At the same time, according to the estimations provided by research in the area, to have a levelled balance of humus, it is necessary to apply annually 10 t/ha of manure and an optimal doze of mineral fertilizers of 160-180 kg/ha.

In these conditions, in line with the provisions of the Program for preserving and increasing soil fertility for 2011-2020, approved via Government Decision No. 626 of 20.08.2011, the following actions are set to be undertaken so as to preserve and increase soil fertility:

- implementation of zonal crop rotation;
- carrying out works for soil conservation;
- cultivating leguminous crops;
- applying organic and mineral fertilizers.

Under the National Agricultural and Rural Development Strategy for 2014-2020 there is a *Specific Objective 6.3: To improve the quality of soils and to ecologically reconstruct the degraded fields affected by landslides and of agricultural fields' protection bands for a ratio of 100%, as well as to manage and protect useful mineral resources in a sustainable way.* The achievement of this objective implies several specific actions for:

- combating soil erosion;
- reconstructing ecologically the degraded fields and those influenced by landslides;
- creating the natural carcass for soil conservation;
- recovering the land fields contaminated with persistent organic pollutants and other dangerous chemical substances;
- ensuring rational use, protection and conservation of useful mineral resources.

4.2 Air pollution problem

Atmosphere air pollution in the Republic of Moldova is generated by three main sources: 1) *stationary sources*, which include electro-thermic plants and boiler shops, operating industrial enterprises; 2) *mobile sources*, which include road, railroad, air, rive transport and agricultural technique; 3) *transportation of pollutants to long distance*.

According to statistical data, the quality of atmosphere air in big cities (for instance Chisinau, Balti) is mainly influenced by transport emissions, electro-heat plants, big enterprises, while in district centres and rural localities – by emissions from small enterprises, boiler shops, and domestic sources.

The main causes for air pollution are: use of used transportation units, use of low quality fuel, use of obsolete technologies, lack of emissions' self-monitoring, inadequate evaluation and compensation of damages provoked to environment, etc.

The data show that the atmospheric air condition does not correspond to the requirements of legislative and normative acts in force. The actions for air quality protection and improvement are not an usual practice for the economic unit and local public administration authorities.

The level of air pollution registered a decreasing trend over 1990-2000 and an increasing trend during 2000-2010, with an insignificant decrease between 2011 and 2012, due to industrial enterprises' stop at the first stage, and increase of number of road vehicles – starting in 2000.

The data regarding air pollution in the Republic of Moldova are shown in Table 27.

Table 27. Discharge of pollutants by stationary sources of economic units by ingredients and years in the Republic of Moldova during 2010-2017, th tones

Indicators	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Discharge of polluting substances – total	15,5	15,0	14,8	15,6	15,0	15,8	15,1	13,8
including:								
• solid	4,2	3,5	3,5	3,4	3,1	2,8	2,6	2,3
• gas and liquid	11,3	11,5	11,3	12,2	11,9	13,0	12,5	11,5

Source: developed by authors based on www.statistica.md

Data on discharge of polluting substances in the atmospheric air by road vehicles in the Republic of Moldova are shown in Figure 22.

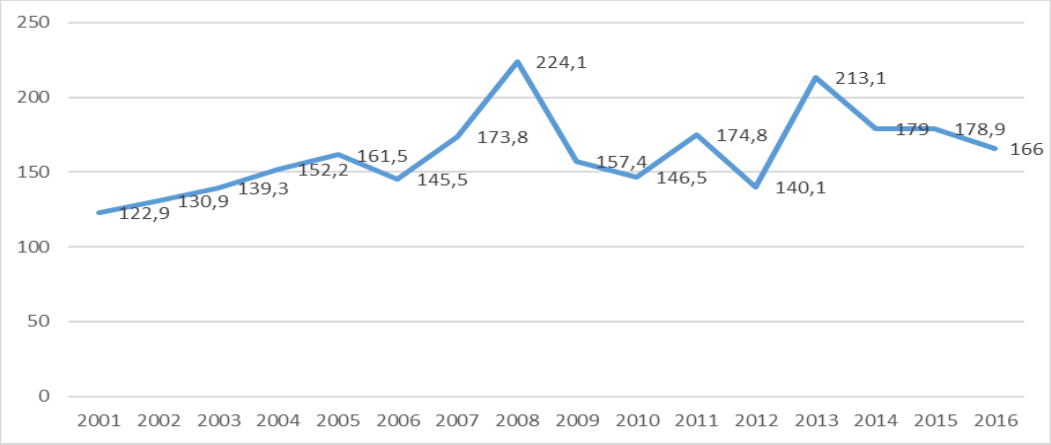

Figure 22. Discharge of polluting substances in atmospheric air by road vehicles in the Republic of Moldova during 2001-2016, th tones

Source: developed by authors based on www.statistica.md

By generalizing the situation regarding the atmospheric air pollution in the Republic of Moldova, the following problems were pointed out in the National Agricultural and Rural Development Strategy for 2014-2020:

- lack of institutional capacities of central environmental authorities for drafting and implementing policies and legislation in the area of air protection and climate changes;
- imperfect development/organization of emissions' inventory system; lack of emissions' estimation and forecasting system, as well as of national emission thresholds;
- excessive pollution of air from mobile and stationary sources;
- use by industrial enterprises of obsolete installations and equipment;
- use of low quality fuel, as well as of obsolete transportation means;
- obsolete approaches and standards for air quality, which are not in line with EU ones;
- heavy greenhouse gas emissions in all the sectors of national economy, causing destruction of the ozone layer, climate change and global warming.

4.3 Ecological-economic problems related to water resources' management in the Republic of Moldova

The water resources are represented in the Republic of Moldova by 3 621 rivers and runlets with a total length of over 16 th km, 4 126 natural lakes and artificial reservoirs with an area of 40 878 ha, located and built on water flows and in riverbeds, ground waters from over 7 801 artesian wells and about 166 542 wells and ponds taking water from phreatic sources.

The most important aquatic arteries in the country are the transboundary Rivers Nistru and Prut, with a length on the territory of the Republic of Moldova of 660 km and 695 km respectively and a total area of the water bodies of 19 070 km^2.

This network of water bodies ensures surface water discharge and regulation, supply of drinking and technical water, use for irrigation, navigation and for other purpose. Surface water is the most important source of water supply, especially from the River Nistru, which accounts for 83%, and from the River Prut – 1.8% and other – 0.2%. The ground water sources taken from artesian well, mine wells and ponds represent about 15% of the necessary consumption volume.

Currently, about a half of 170 mineral water deposits in the Republic of Moldova are not exploited due to different reasons (especially due to content of fluorine and hydrogen sulphide exceeding the maximum admissible limit by 10 and 8 times, respectively).

The water volume available in Moldova accounts for about 500 m^3 per capita per year or even less. The recommended thresholds at the international level account for a volume of 1700 m^3 per capita per year as a safe level of renewable freshwater availability. If the available water volume is less than 1000 m^3 per capita per year, lack of water may impede the economic development and may impact people health and living standards.

The statistical data regarding the water use by needs in the Republic of Moldova are provided in Table 28.

Table 28. Main indicators on water use by needs in the Republic of Moldova during 2010-2017, mil. m^3

Indicators	2010	2011	2012	2013	2014	2015	2016	2017

Indicators	2010	2011	2012	2013	2014	2015	2016	2017
Water intake from natural reservoirs, total	851	847	850	839	837	840	843	840
incl. water intake from ground water sources	130	130	129	128	127	128	126	127
Water use (without using water repeatedly and via closed circulation), total	785	785	786	782	777	777	776	777
including:								
• for production needs	581	580	580	580	579	579	578	583
• of drinking water	17	17	17	17	16	17	16	20
• for agricultural needs	39	39	39	38	38	39	38	38
• for domestic needs	118	119	118	118	113	114	115	113
Loss of water in transportation	66	62	64	57	60	63	67	63

Source: developed by authors based on www.statistica.md

Water problems should be mentioned alongside other problems identified in management of natural resources of the Republic of Moldova. Hence, in spite of the numerous reservoirs, the volume of surface water and the rivers' flow decreased considerably over the last years. As mentioned in the National Agricultural and Rural Development Strategy for 2014-2020, the volume of surface water decreased by 30-50% as compared to the multiannual average, for a number of important hydrographic zones, and by 20-40% for small hydrographic zones and rivers. In this context, the precarious condition of the irrigation sector in the Republic of Moldova should be mentioned as well. As a result, severe impediments are created in the process of transition to high value agriculture. Water quality is also decreased and affects negatively the productivity of agricultural fields.

Another problem related to water resources refers to the fact that an intense degradation of water supply and sewerage networks occurred over the last two decades. Hence, as mentioned by Boian et al. (2005), over 50% of country's population consumes water which does not correspond to sanitary norms, as a result of aquatic resources' quality reduction and depletion, as well as due to lack or unsatisfactory condition of water treatment systems and technologies. The loss of drinking water caused by poor condition of water networks is estimated for an average of 30% (in some localities reaching up to 70%). Only about 45% of rural inhabitants have centralized water supply networks.

By generalizing the situation regarding the management of water resources, the National Agricultural and Rural Development Strategy for 2014-2020 formulated the following problems:

1. inefficiency of sector policies for supervision, management and protection of water resources;
2. assumption of partial and insufficiently defined responsibility or identification of existing overlaps of institutions' duties for coordination at the national level;
3. unavailability of water resources and this influences the economic development capacity of the country;
4. deficient, misbalanced and inadequate management of water resources;
5. continuous degradation and pollution of surface water resources (especially in small rivers) and ground water resources, caused by household sanitation systems, discharge of insufficiently treated

or untreated used water, infiltrations originating from sewerage systems and from areas of inadequate storage of solid waste, agricultural waste and floods;

6. poor quality of drinking water and services delivered to consumers;
7. high risks related to natural disasters (droughts, floods, drying of wetlands);
8. unsatisfactory technical condition of water supply, sewerage and used water treatment infrastructure;
9. reduced access of population (especially from rural area) to safe water sources and sewerage systems;
10. budgetary constraints, insufficient investments, lack of private sector's interest to invest in development of water supply and sewerage infrastructure.

Generalization for Chapter IV

Alongside the ecological problems of the forestry fund mentioned in chapter II, the Republic of Moldova also faces serious problems in managing other basic natural resources: land, aquatic and air resources.

As for soils' management, problems are identified in relation to the ecological misbalance between the natural and anthropic ecosystems; inadequate use of agricultural land as a result of excessive parcelling of the land fund, of distribution of agricultural fields' shares on the slopes in the hill-valley direction, of not observing the crops' rotation and agricultural crops' cultivation technologies; water- and wind-induced erosion, negative balance of humus and nutritive elements, salinization and alkalization as a result of irrigation and drainage, destruction of agricultural fields due to landslides, etc.

The level of air pollution remained to be very high over the last decades, although there was an insignificant decreased in the last three years (starting in 2015).

The following problems are found in relation to water resources:

- insufficient water volume per capita (500 m^3 per year, when the internationally recommended threshold is 1700 m^3 per year);
- considerable decrease over the last years of surface water volume and river flow;
- intense degradation of water supply and sewerage networks, and other.

These problems may be solved only via a complex of organizational, managerial and educational actions. Even though one of the factors repeatedly mentioned in different studies and strategic documents is population education/schooling in the spirit of environment protection and assurance of premises for sustainable development, it is obviously necessary to ***train qualitative specialists able to ensure a progressive vision in relation to environment problems.***

CHAPTER V. ANALYSIS OF INITIAL AND CONTINUOUS VOCATIONAL TRAINING IN THE REPUBLIC OF MOLDOVA

5.1 Initial vocational training system

In line with the normative provisions, the initial vocational training is carried out within (secondary and postsecondary) vocational and higher education institutions. The evolution in number of institutions providing educational services in the initial vocational training area is set in Table 29.

Table 29. Dynamics of number of institutions involved in initial vocational training in the Republic of Moldova during 2010-2018

Indicators	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Secondary VET institutions	75	70	67	67	61	47	45	45
Postsecondary VET institutions	48	48	47	45	45	45	41	41
Higher education institutions	33	34	34	32	31	31	30	29

Source: developed by authors based on www.statistica.md

The data provided in Table 29 show a stable decrease in number for all types of institutions, more pronounced being the decrease in number of secondary VET institutions.

Based on a comparative analysis of the evolution in number of public and private institutions (figures 23 and 24), the same trends are noted for both categories.

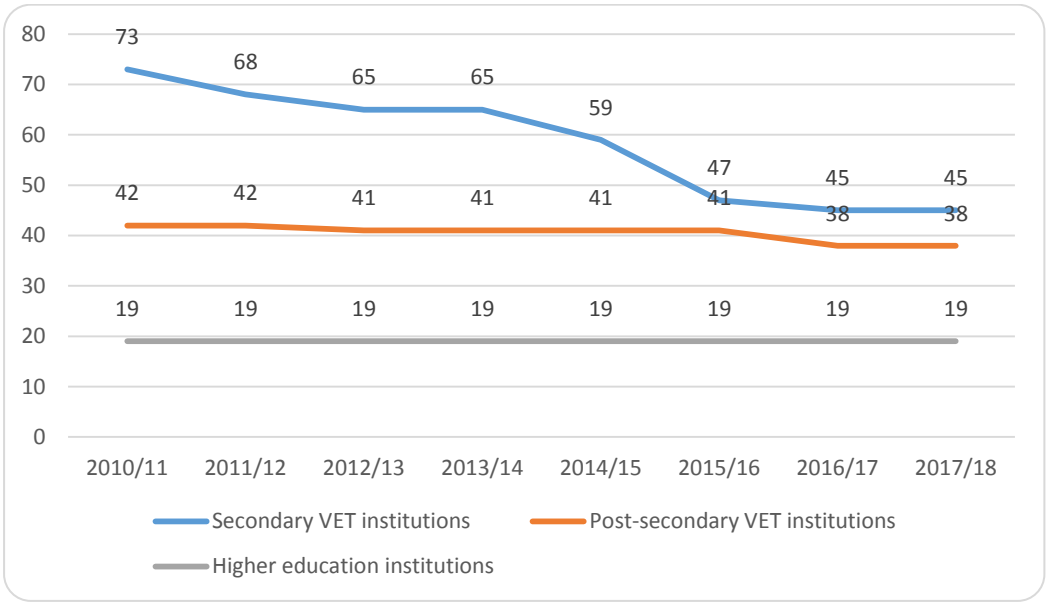

Figure 23. Dynamics of number of public institutions involved in initial vocational training in the Republic of Moldova during 2010-2018

Source: developed by authors based on www.statistica.md

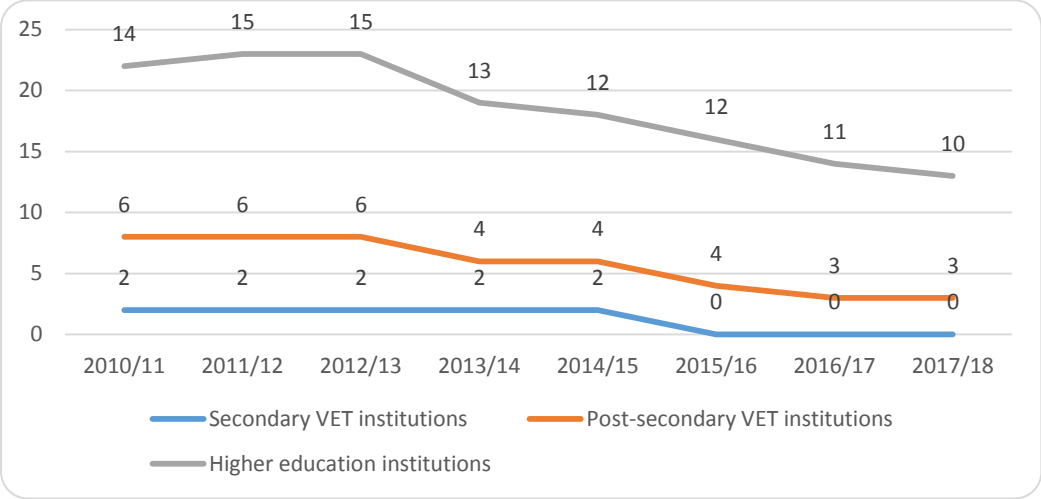

Figure 24. Dynamics of number of private institutions involved in initial vocational training in the Republic of Moldova during 2010-2018

Source: developed by authors based on www.statistica.md

Under the influence of unfavourable demographic phenomena and massive emigration of population abroad, vocational education is faced with a continuous quantitative decline, which is pointed out not only by decreased number of institutions, but also decreased number of pupils and students. To come up with a diagnosis of this problem, it is sufficient to analyse the evolution in number of pupils of IX and XII grades (Figure 25), as they are the potential candidates to study in VET and higher education institutions.

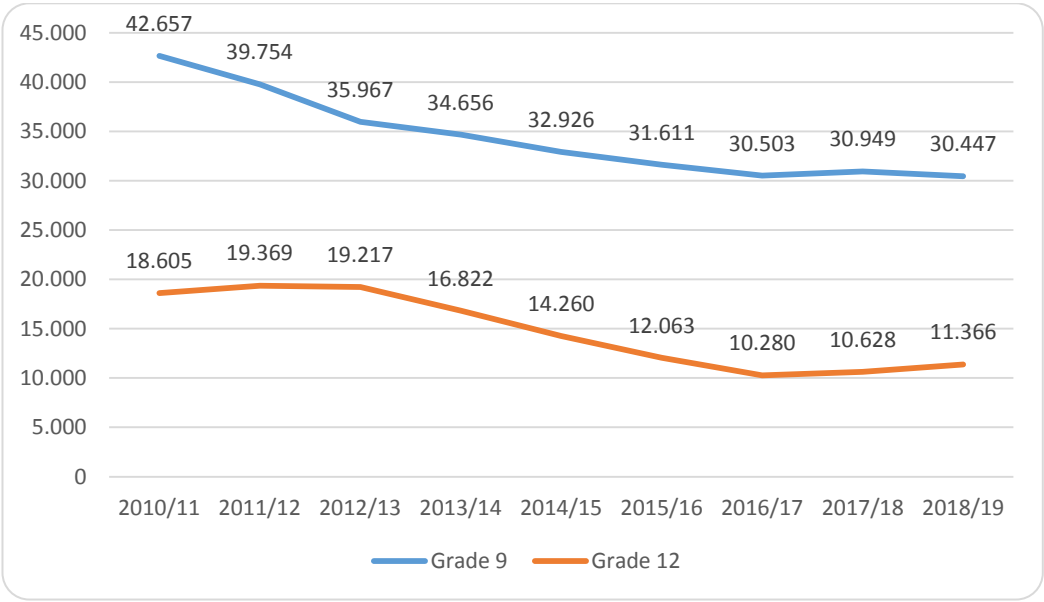

Figure 25. Evolution in number of pupils of IX and XII grades in the Republic of Moldova during 2010-2018

Source: developed by authors based on www.statistica.md

The data provided in Figure 25 eloquently reflect the decreasing trends for the number of pupils in graduation grades of gymnasium and lyceum. The insignificant increase in number of graduates of XII grade during 2018/2019 cannot be qualified as start of improved situation, as the results are not known about education finalization. In this context, it is important to consider the quality impact of final exams' taking. Analysing the results for 2014-2017, according to the data of the National Agency for Curriculum and

Evaluation, the number of persons who have passed successfully the final exams, after a non-substantial increase in 2015, has decreased continuously over the next two years (Figure 26).

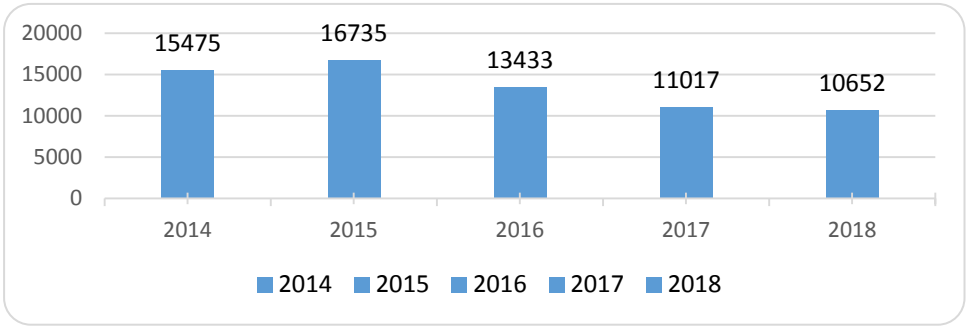

Figure 26. Evolution in number of pupils who have passed the final exams in the Republic of Moldova during 2014-2018, persons

Source: developed by authors based on www.aee.edu.md

The decrease in number of pupils in gymnasiums and lyceums, as well as the decrease in number of those who have passed the final exams is also reflected in similar decreasing trends for the number of pupils and students in VET institutions. By analysing Figure 27, it may be noted that higher education level was affected more, registering a constant reduction in number of students. The number of pupils in secondary and post-secondary VET institutions also decreased, but at a slower rate.

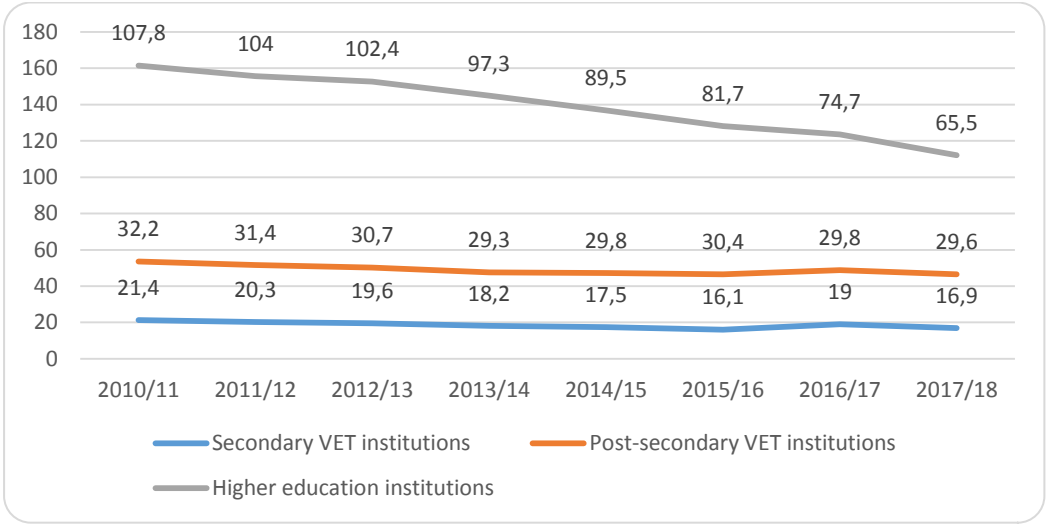

Figure 27. Evolution in number of pupils and students of VET and higher education institutions in the Republic of Moldova during 2010-2018

Source: developed by authors based on www.statistica.md

As for the number of pupils in the area of agriculture, forestry, fishery, and veterinary, by examining the evolution of this number over 2 consecutive years (2016-2017; 2017-2018), it may be noted that the number of pupils at level 3 decreased by 122 persons and that of pupils at level 4 by 40 persons. As well, there is a decrease in number for enrolled pupils by 24 and 39 persons respectively, while the number of graduates has increased by 123 persons at level 3 and by 19 persons at level 4. The data regarding the evolution in number of pupils studying in vocations/specialties related to agriculture, forestry, fishery and veterinary, level 3 and 4, are shown in Table 30.

Table 30

Evolution in number of pupils of secondary and postsecondary VET institutions in the area "Agriculture, forestry, fishery and veterinary" in the Republic of Moldova during 2016-2018, persons

Area	2016-2017									2017-2018								
	Number of pupils, pers.			Number of enrolled pupils			Number of graduates			Number of pupils			Number of enrolled pupils			Number of graduates		
	total	including:		total	including:		total	including:		total	including:		total	including:		total	including:	
		budg.	contr.		budg.	contr.		budg.	contr.		budg.	contr.		budg.	contr.		budg.	contr.
A	12	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Level 3, secondary VET																		
Agriculture, forestry, fishery and veterinary, total	412	412	-	162	162	-	43	43	-	290	290	-	138	138	-	166	166	-
including:																		
production of agricultural crops and livestock breeding	279	279	-	99	99	-	43	43	-	198	198	-	80	80	-	111	111	-
horticulture	54	54	-	25	25	-	-	-	-	47	47	-	25	25	-	28	28	-
forestry	79	79	-	38	38	-	-	-	-	45	45	-	33	33	-	27	27	-
Level 4, postsecondary VET																		
Agriculture, forestry, fishery	816	681	135	256	191	65	144	129	144	776	593	183	217	143	74	163	147	16

and veterinary																		
including:																		
production of agricultural crops and livestock breeding	271	234	37	75	60	15	51	49	51	239	203	36	43	37	6	53	49	4
horticulture	168	163	5	66	61	5	11	11	11	159	153	6	38	38	-	52	51	1
forestry	168	124	44	30	15	15	50	40	50	135	63	72	51	14	37	25	16	9
fishery	30	15	15	30	15	15	-	-	-	52	25	27	30	14	16	-	-	-
veterinary medicine	179	145	34	55	40	15	32	29	32	191	149	42	55	40	15	33	31	2

1) *Source: www.statistica.md*

2) *Note: Number of graduates of level 4 (postsecondary VET) is indicated for 2016 (in columns 8-10) and 2017 (in columns 17-19).*

Based on the fact that higher education is more vulnerable, as it was established, to problems of continuous decrease in number of students, Figure 28 presents the evolution in number of enrolled students during 2010-2018.

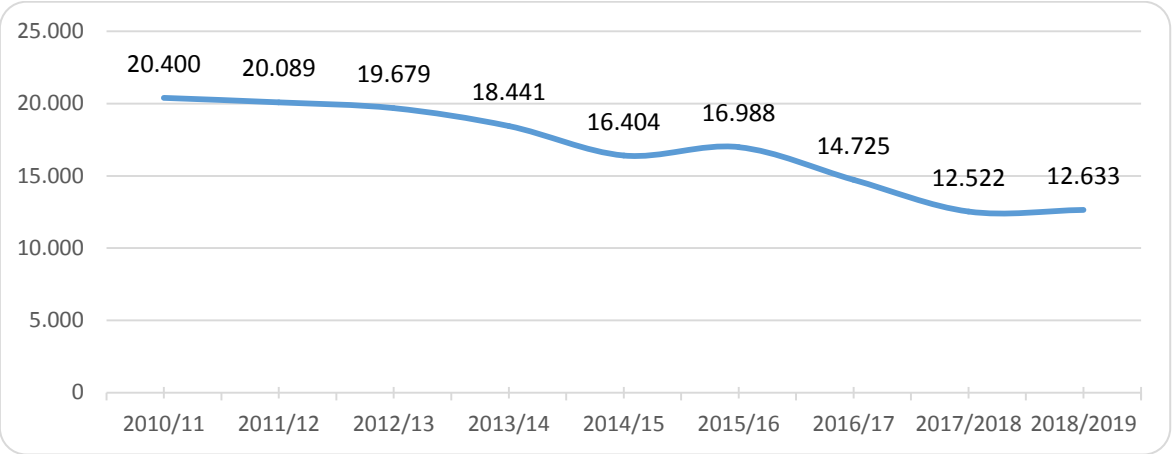

Figure 28. Number of students enrolled in higher education institutions, cycle I, in the Republic of Moldova during 2010-2018, persons

Source: developed by authors based on www.statistica.md

Figure 28 shows a significant decrease in number of enrolled candidates during 2010-2018. The respective trend has influenced, as it is logical, the evolution in number of graduates (Figure 29).

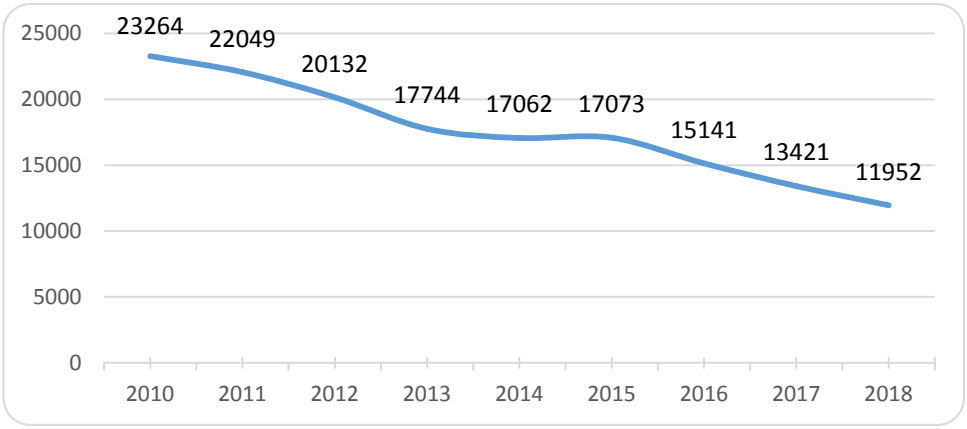

Figure 29. Evolution in number of graduates of Bachelor's degree higher education and integrated studies in the Republic of Moldova during 2010-2017

Source: developed by authors based on www.statistica.md

In conditions of continuous decrease in number of graduates, it is important to point out the trends of this phenomenon for the area of "Agricultural sciences", based on its significance and lack of attractiveness. Analysing Figure 30, a drastic decrease may be noted for the number of graduates in this area and a higher decreasing rate as compared to that registered in the dynamics of total number of graduates (presented in Figure 29). Hence, if the total number of graduates of higher education decreased in 2018 by 49% as compared to 2010, the number of graduates in area of "Agricultural sciences" decreased with over 66%. A much more favourable situation is noted for the number of graduates in the area of "Veterinary medicine", analysed in parallel, with different trends being registered in different years.

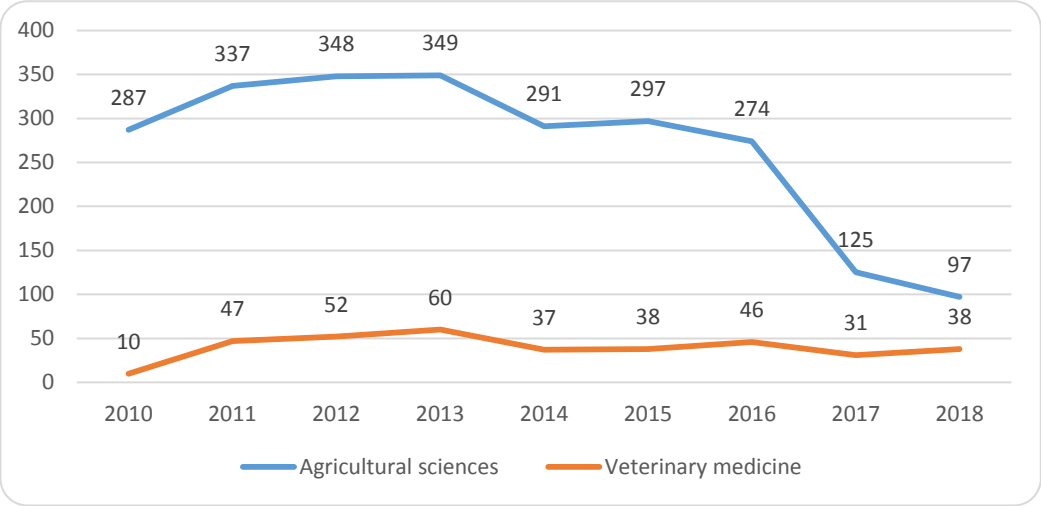

Figure 30. Evolution in number of graduates of Bachelor's degree higher education in the area of "Agricultural science" and of integrated studies in the area of "Veterinary medicine" in the Republic of Moldova during 2010-2017

Source: developed by authors based on www.statistica.md

5.2 Analysis of tertiary education in European Union countries

According to the data published by Eurostat (Eurostat Statistics Explained), the number of students in tertiary education (ISCED levels 5-8) in EU countries in 2016 accounted for 19,6 million, which is 0,1 million more than the number registered in the previous year. A share of 7.3% of the total number were involved in the tertiary education with short cycle, 61.4% were studying for Bachelors' degree, 27.6% – Masters' degree and 3.9% – PhD studies.

The biggest number of students in tertiary education was registered in Germany, accounting for about 3 million persons (15.5% of the total number of students in EU countries). A higher number of students is also registered in France, Great Britain, Spain, Italy, Poland, and Holland. Figure 31 shows the EU countries with the highest number of students in tertiary education.

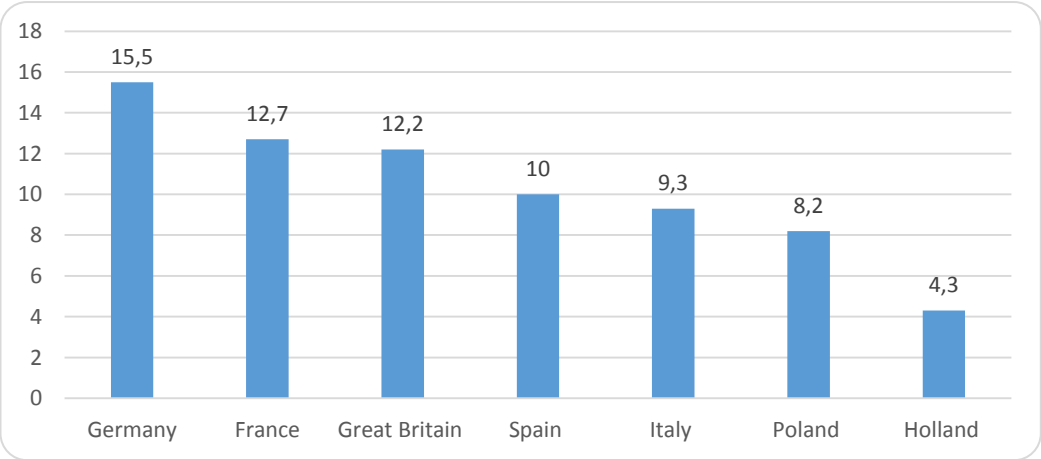

Figure 31. EU countries with the highest number of students in tertiary education, %

Source: developed by authors based on Eurostat Statistics Explained.

The highest share of students in short-cycle tertiary education was registered in Turkey (33,2%), France (20%), Spain, Latvia, Austria and Malta (15-19%).

Most of the students were enrolled in 2016 in Bachelors' degree programs. Hence, only in France, Austria and Luxemburg their share was under 50%, registering higher shares in other countries (Figure 32).

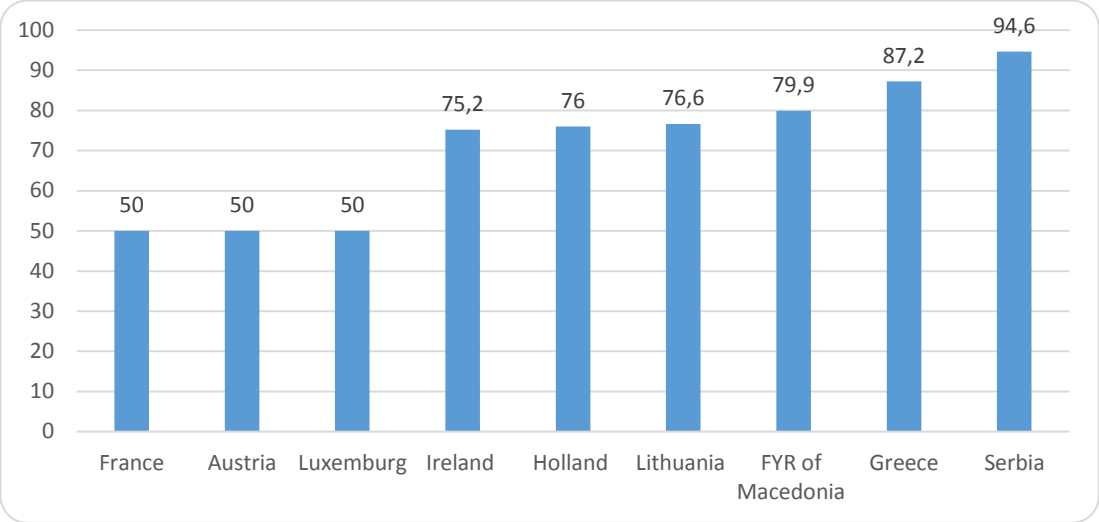

Figure 32. EU countries with the highest shares of students in Bachelors' degree programs, %
Source: developed by authors based on Eurostat Statistics Explained

As for students involved in Masters' degree programs – they represented less than one fifth in Holland, Belgium, Great Britain, Spain, Ireland, and Serbia, and about one tenth of the total number of students in Greece, Turkey and former Yugoslav Republic of Macedonia. At the same time, it may be noted that the biggest part of students (1/3 of the total number) were involved in Masters' degree programs in Portugal, Czech Republic, France, Luxemburg, Croatia, Cyprus, Slovak and Italy.

The most attractive areas for students are social sciences, journalism, IT, business and administration – which registered in 2016 about 32% of the total number of students. The second position is taken by engineering, processing industries and constructions – accumulating 15.7% of EU countries' students. And the third place is taken by the area of health and social assistance, with 13.4% of students.

Agricultural sciences are less demanded by young people and this thing is revealed by the number of graduates. Hence, thanks to the same source of data, it may be noted that this area is the last one in the hierarchy according to the number of graduates. At the same time, it may be noted that in 2016, the countries with most of graduates in the area of agriculture, forestry, fishery and veterinary medicine were: Turkey (41,7 th), Poland (35,4 th), Spain (32,6 th), France (25,9 th), Germany (14,2 th).

5.3 Continuous vocational training system

The extremely flexible conditions for carrying out activities in all the areas pointed out continuous vocational training as one of the main factors contributing to organizations' performance. Acknowledging human resources' value as a competitiveness factor, the investments in continuous vocational training are attributed the same value or are considered to be superior to other investments.

According to the Regulation on adults' continuous training, approved via Government Decision No. 193 of 24.03.2017, adults' continuous vocational training is carried out through reskilling programs, additional

training programs, specialization programs, multiple skills' programs and advanced training programs, and fulfils the following functions:

- favours personality development;
- completes basic education with recurrent or compensatory education;
- increases vocational skills;
- directs adults towards a new way of solving important problems;
- provides a new chance to obtain a skill;
- enhances the capacities of using the benefits provided by information technology and communications;
- ensures acquiring of necessary skills and competences for performing every citizen's rights and social responsibilities;
- educates, cultivates individual interests and competences of the citizen for fulfilling an active social role; promotes community and personal action.

The above-mentioned points out the multiple roles of continuous vocational training, which are not restricted just to organizations' benefits, but also provide ample opportunities for personality development.

According to the regulatory provisions in force, the continuous training activities may be carried out through courses organized by employers within their own premises or under institutions specialized in vocational training, additional skilling, reskilling, advanced training, multiple skilling and specialized training within vocational and higher education institutions or with involvement of continuous vocational training providers, internships or specialized practices within enterprises in the country and abroad, on-job training, different seminars, conferences, round tables, workshops and distance learning courses.

By analysing the real situation regarding employees' continuous training in the Republic of Moldova during 2014-2017, a stable increased is noted for the number of persons who have benefited from training, as well as their share in the total number of employees (Table 31). At the same time, the growth rate is too slow so as to conclude that the situation in this sector is good.

Table 31. Evolution in number of employees who have benefited from continuous vocational training and their share in the total number of enterprise employees in the Republic of Moldova during 2014-2017

Indicators	2014	2015	2016	2017
Total number of employees who have benefited from continuous vocational training, pers.	92 008	92 236	93 659	101 183
Share of number of employees who have benefited from continuous vocational training in the total number of the enterprise employees, %	14,5	14,7	15,0	16,1

Source: developed by authors based on www.statistica.md

By analysing comparatively the situation in different areas of activity, significant discrepancies are noted for the share of employees who have benefited from training in the total number of personnel. Hence, based on the data provided in Table 32, the areas with the highest level of participation in activities are: information and communications, financial activities and insurance, public administration and defence – over 30% of the number of employees benefit annually from training in these areas, while in agriculture, forestry

and fishing – only 3-4%, this being the area with the most precarious situation in relation to continuous training.

Table 32. Evolution of share of employees who have benefited from training in the total number of enterprise personnel in different areas of activity in the Republic of Moldova during 2014-2017

Indicators	**2014**	**2015**	**2016**	**2017**
Agriculture, forestry and fishing	2,0	3,3	4,0	3,4
Industry	13,5	15,4	12,6	15,1
Constructions	6,9	6,6	6,5	8,3
Wholesale and retail trade; maintenance and repairing of motor vehicles and motorcycles	7,5	7,7	10,4	11,0
Transportation and storage	15,0	17,5	13,9	14,9
Accommodation activity and food services	6,6	5,4	7,0	5,1
Information and communications	48,1	36,1	36,6	27,4
Financial and insurance activities	35,6	42,8	50,0	51,6
Real estate transactions	2,9	4,6	4,2	5,2
Professional, scientific and technical activities	15,3	9,7	12,6	13,2
Administrative services and service support activities	19,2	16,4	17,0	16,8
Public administration and defence; mandatory social insurance	30,5	28,3	31,9	33,9
Education	11,1	10,8	12,5	12,6
Health and social assistance	17,5	19,4	16,8	22,1
Art, recreation and leisure activities	2,5	3,1	3,5	4,9

Source: developed by authors based on www.statistica.md

Generalizations for Chapter V

At the current moment, the system of initial vocational training is represented in the Republic of Moldova by 45 secondary VET institutions, 41 postsecondary VET institutions and 29 higher education institutions. Under the influence of unfavourable demographic phenomena and massive emigration of population abroad, vocational training registers continuous quantitative decline, which is manifested by decreasing number of institutions, as well as decreasing number of pupils and students.

The decrease in number of pupils in gymnasiums and lyceums, as well as of pupils who passed the final exams generates similar trends in the evolution in number of pupils and students in vocational training institutions, the higher education being the most vulnerable to the problem of continuous decrease in number of students. A similar trend is registered also for the evolution in number of pupils and students of vocational training programs in the area of agriculture, forestry, fishing and hunting. An increase in number of graduates is registered during 2016-2018 for levels 3 and 4, while the number of higher education graduates for "Agricultural sciences" is drastically decreasing, at a much higher rate as compared to the medium rate registered for the country. This fact speaks for the need to undertake additional efforts so as ensure viability of vocational training programs in the respective area, taking into account the strategic importance of agriculture for the Republic of Moldova.

The comparative analysis of the trends occurring in EU tertiary education allows establishing that it is not affected so drastically by demographic phenomena, registering even a non-essential increase in number of students in 2016 as compared to 2015 (by 0,1 million persons). Most of the students were involved in Bachelors' degree programs (61.4%), while 7.3% were involved in short-cycle tertiary training programs, 27.6% - in Masters' degree programs, and 3.9% - in PhD studies. The most attractive areas for EU students are social sciences, journalism, IT, business and administration, and law which accounted in 2016 for about 32% of the total number of students. Agricultural sciences are less demanded by young people as compared to other areas. This fact is also revealed by data regarding the number of graduates, as this area is the last one in the hierarchy of graduates' number. At the same time, it should be noted that the most of graduates in the area of agriculture, forestry, fishing and veterinary medicine in 2016 was registered in: Turkey (41,7 th), Poland (35,4 th), Spain (32,6 th), France (25,9 th), Germany (14,2 th).

In spite of the fact that continuous vocational training is widely recognized as one of the main factors of organizations' performance, the real situation in the Republic of Moldova shows a very slow increasing rate for the number of persons benefiting annually from different training activities.

Based on comparative analysis of the situation in different areas of activity, essential discrepancies may be noted for the share of employees who benefited from training in the total number of enterprises' personnel. Hence the areas with the highest level of participation in training activities are: information and communications, financial and insurance activities, public administration and defence, where annually over 30% of employees benefit from training. Agriculture, forestry and fishing is at the opposite extremity with only 3-4% of employees participating in such activities.

CHAPTER VI. EVALUATION OF EXTERNAL BENEFICIARIES' OPINION REGARDING THE QUALITY OF INITIAL AND CONTINUOUS VOCATIONAL TRAINING IN THE AREA OF PHYTOTECHNY, HORTICULTURE, PEDOLOGY AND SOIL PROTECTION, PRODUCTION OF AGRICULTURAL CROPS AND LIVESTOCK BREEDING, ANIMAL HUSBANDRY AND VETERINARY MEDICINE, PRODUCTS OF PLANT ORIGIN TECHNOLOGY

6.1 General description of the initial and continuous training system in the investigated areas

Currently, initial vocational training in the areas of Phytotechny, Horticulture, Pedology and soil protection, Production of agricultural crops and livestock breeding, Animal husbandry and veterinary medicine, Products of plant origin technology is carried out by 3 vocational schools, 6 colleges, 2 centres of excellence, and 5 universities.

Continuous vocational training in the investigated areas is carried out by 2 institutions through training courses ("Forester" and "Tress' cutter" programs) and reskilling courses ("Animal breeder" program). General data about the initial and continuous training programs in the investigated areas and supplying institutions are provided in Annex 1.

6.2 Evaluation of employers' satisfaction with the quality of initial and continuous training in the investigated areas

The opinion poll with employers' participation (Annexes 2-10) in the areas related to those investigated (Annex 11) allowed finding out the following: the highest appreciations – very good competences (4.6-5 points) were provided for "Agronomy" specialty (level 6). The qualifier "good" – 3.6-4.5 points were obtained by the following vocations and specialties: "Vegetables' and fruits' grower" (level 3), "Forester" (level 3), "Agronomy" (level 4), "Vegetables' and fruit-trees' growing" (level 4), "Parks' and public gardens' planning" (level 4), "Forestry and public gardens" (level 4), "Veterinary medicine" (level 4), "Horticulture" (level 6), "Forestry and public gardens" (level 6), "Ecology" (level 6), "Environmental engineering" (level 6), "Veterinary medicine" (level 7), "Food products' technology" (level 6). An average appreciation within the limits of 2.1-3.5 points, equivalent for "poor" qualifier, was obtained by the following vocations and specialties: "Beekeeper" (level 3), "Ecology and environment protection" (level 4), "Selection and genetics" (level 6), "Animal breeding" (level 6). The lowest appreciation – between 1.1 and 2 points, equivalent to "very poor" qualifier – was provided to specialties "Products of plant origin technology" (level 4) and "Agricultural bio-technologies" (level 6). As for continuous vocational training programs provided at the moment, no respondents were identified which would have benefited from them, respectively it was not possible to assess the quality of such programs' supply.

At the same time, the employers expressed their opinions regarding the skills that need priority attention to increase the quality of future specialists' training. Summarizing these opinions, most of respondents mentioned the need to develop skills for applying new and more advanced technologies in the areas of

reference. It should be implicitly mentioned that even though within a 3-5 years timeline the investigated sectors will not be able to supplement places of work, the requirements set for the future specialists get changed, as more advanced skills are requested, which would adequate to the respective sectors' development trends – this rationale is argued by the following:

- Employers from 4 analysed areas (Phytotechny, Horticulture, Animal husbandry and veterinary medicine, Products of plant origin technology) request the organization of some continuous training courses on advanced production technologies.
- Practically in every area and initial training program, requests are identified for some skills related to more advanced aspects in activities (use of conservative agricultural technologies; testing new technologies, selecting optimal versions based on economic-ecological criteria ("Agronomy", level 4); testing new technologies, selection of optimal versions based on economic-ecological criteria; use of modern production technologies for seeding material and seedling ("Vegetables and fruits' grower", level 3); carrying out agricultural marketing research; use of plants' protection means; identification and evaluation of modern tree varieties; use of modern production technologies for tree propagating material ("Vegetables' and fruit-trees' growing", level 4); processing of data taken from the field in MapSourse and MapInfo software ("Parks' and public gardens' planning", level 4) etc.

Integral information on the level of employers' satisfaction with the skills held by graduates of investigated programs and their suggestions regarding the skills needing priority attention is provided in Annex 12.

The following is recommended based on established findings:

- To organize more active communication of educational institutions with business representatives, transforming them into active stakeholders of initial and continuous vocational training;
- For the program responsible people to review the system of skills for every vocational training program, depending on employers' suggestions;
- To review the existing teaching approaches in the initial vocational training system, to adopt some innovative approaches in teaching-learning-evaluation, so as to contribute optimally to training some specialists able not only to get adjusted to the flexible conditions of the exogenous environment, but also to trigger a qualitative change in the related sectors of activity;
- For the line ministries to assume themselves (Ministry of Education, Culture and Research, Ministry of Agriculture, Regional Development and Environment, and other) the role of mediator in the process of communication between institutions and business representatives.

6.3 Estimation of immediate and mid-term demand of employees for investigated vocations/specialties

According to the requests coming from the respondents (which were recalculated depending on the representativeness of samples), the biggest immediate employment demand is registered for "Selection and genetics" specialty (level 6) – 346 specialists. A high demand is also registered for the following vocations/specialties: "Beekeeper" (level 3), "Vegetables' and fruit-trees' growing" (level 4), "Agronomist" (level 6), "Veterinary medicine" (level 7). Integral data about correlation of offer and demand are provided in Annex 13.

Summarizing the mid-term demands for specialists, a high demand is established for the following vocations and specialties: "Vegetables' and fruits' grower" (level 3), "Beekeeper" (level 3), "Agronomist"

(level 4), “Vegetables’ and fruit-trees’ growing” (level 4), “Agronomist” (level 6), “Selection and genetics” (level 6), “Horticulture” (level 6), “Animal husbandry” (level 6), “Veterinary medicine” (level 7).

Complete data about the mid-term employment demand for the investigated vocations/specialties are provided in Annex 14.

6.4 Evaluation of employers’ opinions regarding the initiation of new initial and continuous training programs and their graduates’ employment availability

Upon experts’ request, employers provided their opinions about some new initial and continuous training programs necessary to be initiated. The data regarding their opinions are provided in Annex 15, and the availability to employ the graduates of suggested programs is provided in Annex 16. According to the information from Annex 16, employers’ opinions are diverse, and the list of suggested programs is huge. To tackle this with a high level of relevance, it was decided to identify the new programs mentioned in at least 3 respondents’ suggestions, specifying as well as availability to employ the specialists of the respective programs (Table 33).

Table 33. List of new initial and continuous training programs suggested by at least 3 respondents

Type of program	**Name of programs by related areas and by other areas**	**Requested number of specialists, considering only cases when the request was made by 3 and more respondents, persons**	**Requested number of specialists, recalculated by sample representativeness, persons**
PHYTOTECHNY area			
Short-term courses	Agricultural entrepreneur		
	Plants’ protection	4	128
	Advanced production technologies	17	544
	from other areas		
	Accounting		
Vocations (level 3)	from other areas		
	Miller	4	128
	ICT Operator		
HORTICULTURE area			
Short-term courses	Advanced technologies in horticulture	15	465
Specialties (level 4)	Plants’ protection	3	93
PEDOLOGY AND SOIL PROTECTION area			
Specialties (level 4)	Ecological beekeeping		
PRODUCTION OF AGRICULTURAL CROPS AND LIVESTOCK BREEDING area			

Short-term courses	Beekeeping		
Specialties (level 4)	Beekeeping	4	276
Specialties (level 6)	Beekeeping	5	345
ANIMAL HUSBANDRY AND VETERINARY MEDICINE area			
Short-term courses	Breeding and reproduction of ovine and caprine	3	27
	New methods of treatment and new preparations	6	156
	Veterinary sanitary/Basis of veterinary		
	Food safety	4	104
	Advanced production technologies	12	312
Vocations (level 3)	Domestic animals breeder	3	27
	Milking operator		
Specialties (level 4)	Animals' selection and reproduction	4	36
PRODUCTS OF PLANT ORIGIN TECHNOLOGY area			
Short-term courses	Advanced technologies in the area	9	27

Source: developed by authors

Analysing the data included in Table 33 and consulting the people responsible for similar programs, the relevance of new programs for labour market was deduced (Table 34).

Table 34. New programs suggested to be introduced in the educational offer for subjects involved in initial and continuous vocational training

Type of program	**Name of new programs**
PHYTOTECHNY area	
Short-term courses	Plants' protection
	Advanced production technologies
HORTICULTURE area	
Short-term courses	Advanced technologies in horticulture
Specialties (level 4)	Plants' protection
PRODUCTION OF AGRICULTURAL CROPS AND LIVESTOCK BREEDING area	
Specialties (level 4)	Beekeeping
Specialties (level 6)	Beekeeping
ANIMAL HUSBANDRY AND VETERINARY MEDICINE area	
Short-term courses	Breeding and reproducing ovine and caprine
	New treatment methods and new preparations
	Food safety
	Advanced production technologies

Vocations (level 3)	Domestic animals' breeder
Specialties (level 4)	Selection and reproduction of animals
PRODUCTS OF VEGETAL ORIGIN TECHNOLOGY area	
Short-term courses	Advanced technologies in the area
FOOD PROCESSING area	
Vocations (level 3)	Miller

Source: developed by authors

Based on the above-mentioned, it is recommended to include in the educational offer a number of new initial and continuous vocational training programs in line with Table 34.

6.5 Forecasting the number of places for 2019 Admission Plan for vocations and specialties in the investigated areas

The forecasting of the number of places recommended to be included in 2019 Admission Plan for vocations and specialties from the investigated areas was developed taking into account the findings and rationale mentioned in the present study: current trends in the evolution of the agri-food, forestry, irrigation and food industry sectors cannot be considered to be benchmarks for an optimistic forecasting of creating additional jobs for future graduates of initial training programs tackled in the investigation. At the same time, based on the undeniable importance of the analysed sectors, as well as due to serious ecological problems in managing natural resources, it is concluded that it is absolute important to continue vocational training for the investigated programs and to increase their quality in line with the external beneficiaries' needs.

The quantification of the total number of specialists necessary for the real sector so as to formulate proposals for the admission plan was carried out depending on the employers' requests and representativeness of samples, the data being provided in Annex 14.

When determining the specific number of places for 2019 admission (Annex 17), the following was taken into account alongside the employers' requests:

- average graduation rate for the investigated programs;
- average forecasted rate for future graduates' employment on the labour market (about 50%, relying on the positive results in the process of implementing sector strategies);
- educational offer at the moment;
- problems existing in the vocational training system due to deficiencies in the demographic evolution and massive emigration of population abroad (mentioned in Chapter V).

As a result of simultaneous analysis of mentioned circumstances, the decision was formulated regarding the *recommendation for the number of places in 2019 Admission Plan (Table 35).*

Table 35. Number of places recommended to be included in 2019 Admission Plan

Name of vocational training program	**No. of places suggested for 2019 Admission Plan**
PHYTOTECHNY area	
Agronomy (level 4)	**35**

Agronomy (level 6)	**40**
Selection and genetics (level 6)	**10**
HORTICULTURE area	
Vegetables' and fruits' grower (level 3)	**15**
Vegetables and fruit-trees' growing (level 4)	**15**
Horticulture (level 6)	**25**
PEDOLOGY AND SOIL PROTECTION area	
Forester (level 3)	**10**
Parks' and public gardens' planning (level 4)	**24**
Forestry and public gardens (level 4)	**15**
Forestry and public gardens (level 6)	**40**
Ecology and environment protection (level 4)	**0**
Ecology (level 6)	**60**
Environmental engineering (level 6)	**15**
PRODUCTION OF AGRICULTURAL CROPS AND LIVESTOCK BREEDING area	
Beekeeper (level 3)	**40**
ANIMAL HUSBANDRY AND VETERINARY MEDICINE area	
Animal husbandry (level 6)	**10**
Agricultural bio-technology (level 6)	**10**
Veterinary medicine (level 4)	**50**
Veterinary medicine (level 7)	**60**
PRODUCTS OF PLANT ORIGIN TECHNOLOGY area	
Products of plant origin technology (level 4)	**15**
Animal products technology (level 6)	**57**

Source: developed by authors

6.6 Evaluation of Classifier of Occupations in the Republic of Moldova

To evaluate the correlation between the investigated vocational training programs and the provisions of the Classifier of Occupations in the Republic of Moldova, an analysis was carried out for occupations included in CORM in relation to the Nomenclature of vocational training areas and specialties in higher education, Nomenclature of vocational training areas, specialties and qualifications for postsecondary VET and postsecondary non-tertiary education, and Nomenclature of areas of vocational training and vocations/professions (Annex 18).

Analysing the content of Annex 18 and based on the recommendations regarding the new programs suggested to be included in the educational offer (Table 34), it is concluded that the current version of CORM covers occupations which are in line with the existing educational offer, as well as the new specialties and vocations suggested by employers.

Generalizations for Chapter VI

Initial vocational training in the areas of Phytotechny, Horticulture, Pedology and soil protection, Production of agricultural crops and livestock breeding, Animal husbandry and veterinary medicine,

Products of plant origin technology is carried out by 3 vocational schools, 6 colleges, 2 centres of excellence and 5 universities. Continuous vocational training in the investigated areas is carried out through training courses ("Forester" and "Trees' cutter" programs) and reskilling courses ("Animal breeder" program).

The opinion poll with the employers' participation revealed the following: the highest appreciation was registered for "Agronomy" (level 6) specialty, denoting very good skills (4.6-5 points). The following vocations and specialties obtained 3.6-4.5 points – equivalent for "good" qualifier: "Vegetables' and fruits' grower" (level 3), "Forester" (level 3), "Agronomy" (level 4), "Vegetables' and fruit trees' growing" (level 4), "Parks' and public gardens' planning" (level 4), "Forestry and public gardens" (level 4), "Veterinary medicine" (level 4), "Horticulture" (level 6), "Forestry and public gardens" (level 6), "Ecology" (level 6), "Environmental engineering" (level 6), "Veterinary medicine" (level 7), "Food products' technology" (level 6). An average appreciation, within the limits of 2.1-3.5 points, equivalent of "poor" qualifier, was obtained by the following vocations and specialties: "Beekeeper" (level 3), "Ecology and environment protection" (level 4), "Selections and genetics" (level 6), "Animal husbandry" (level 6). The lowest appreciation – between 1.1 and 2 points, equivalent of "very poor" qualifier – was obtained by "Products of plant origin technology" (level 4) and "Agricultural bio-technology" (level 6). No respondents were identified to benefit from any current continuous vocational training programs, hence it was not possible to assess the quality of such training provision.

Most of employers mentioned among the skills needing prioritized attention the skills of applying new and more advanced technologies in the areas of reference. Implicitly, even though the analysed sectors will not be able to create jobs within the timeframe of 3-5 years, the requirements set for the future specialists get changed, with a demand for more advanced skills, which would be in line with the development trends in the areas. The educational institutions should investigate much deeper every sector and based on established findings to improve the vocational training programs so as to meet the exigencies of external environment.

According to the requests coming from the respondents (being recalculated depending on samples' representativeness), it was determined that the highest immediate demand for employees is registered for the specialty "Selection and genetics" (level 6) – 346 specialists; high demands are also registered for the following vocations/specialties: "Beekeeper" (level 3), "Vegetables' and fruit trees' growing" (level 4), "Agronomist" (level 6), "Veterinary medicine" (level 7). All the data on correlation between offer and demand are provided in Annex 13.

By generalizing the mid-term demand of specialists, it may be established that increased demand is registered for the following vocations and specialists: "Vegetables' and fruits' grower" (level 3), "Beekeeper" (level 3), "Agronomist" (level 4), "Vegetables' and fruit trees' growing" (level 4), "Agronomist" (level 6), "Selection and genetics" (level 6), "Horticulture" (level 6), "Animal husbandry" (level 6), "Veterinary medicine" (level 7).

After assessing the demand of employees separately per every program as related to the forecasted rates of graduation and employment on the labour market, as well as taking into consideration the existing problems in the vocational training system (as a result of deficiencies in demographic evolution and massive emigration of population abroad), a decision was formulated to **recommend the number of places for 2019 Admission Plan as follows:**

g) Phytotechny area:

- "Agronomy" (level 4) – 35 places;
- "Agronomy" (level 6) – 40 places;
- "Selection and genetics" (level 6) – 10 places;

h) Horticulture area:

- "Vegetables' and fruits' grower" (level 3) – 15 places;
- "Vegetables' and fruit trees' growing" (level 4) – 15 places;
- "Horticulture" (level 6) – 25 places;

i) Pedology and soil protection area

- "Forester" (level 3) – 10 places;
- "Parks' and public gardens' planning" (level 4) – 24 places;
- "Forestry and public gardens" (level 4) – 15 places;
- "Ecology and environment protection" (level 4) – 0 places;
- "Ecology" (level 6) – 60 places;
- "Forestry and public gardens" (level 6) – 40 places;
- "Environmental engineering" (level 6) – 15 places;

j) Production of agricultural crops and livestock breeding area:

- "Beekeeper" (level 3) – 40 places;

k) Animal husbandry and veterinary medicine area:

- "Veterinary medicine" (level 4) – 50 places;
- "Animal husbandry" (level 6) – 10 places;
- "Agricultural bio-technology" (level 6) – 10 places;
- "Veterinary medicine" (level 7) – 60 places;

l) Products of plant origin technology area:

- "Products of plant origin technology" (level 4) – 15 places;
- "Food products technology" (level 6) – 57 places.

12 programs for short-term courses, 4 programs for level 4 and 1 program for level 6 were identified after analysing the respondents' proposals for new vocational training programs. The analysis of new programs' proposals in correlation with the availability to employ the graduates of such programs allowed us identifying the following programs to be **included in the educational offer:**

g) Phytotechny area:

- *Short-term program:* "Plants' protection"; "Advanced production technologies";

h) Horticulture area:

- *Short-term program:* "Advanced technologies in horticulture";
- *Specialty (level 4):* "Plants' protection";

i) Production of agricultural crops and livestock breeding area:

- *Specialty (level 4):* "Beekeeping";
- *Specialty (level 6):* "Beekeeping";

j) Animal husbandry and veterinary medicine area:

- *Short-term programs:* "Breeding and reproducing ovine and caprine"; "New treatment methods and new preparations"; "Food safety"; "Advanced production technologies";
- *Vocation (level 3):* "Domestic animals' breeder";
- *Specialty (level 4): "*Selection and reproduction of animals";

k) Products of plant origin technology area:

- *Short-term program:* "Advanced technologies in the area";

l) Food processing area

- *Vocation (level 3):* "Miller".

Based on a correlative analysis of the CORM and provisions of the respective classifiers of vocational training areas and specialties/vocations and deriving from the recommendations related to the new programs

suggested to be introduced in the educational offer, it may be concluded that the current version of CORM covers occupations which comply with the existing educational offer, as well as the new specialties and vocations suggested by employers.

Final conclusions and recommendations

As no major increasing trends are identified in the development of sectors related to the investigated areas (agri-food production, forestry and irrigation), as well as taking into account the multiple ecological problems persisting in the natural resources' management in the Republic of Moldova, there is an obvious need for specialists who would be able to contribute optimally to solving the existing problems. It is difficult to achieve the respective objective, even though the existing educational offer for the investigated vocations and specialties is sufficient to cover the labour market needs for qualified specialists, the lack of attractiveness for the respective areas decreases substantially the employability level according to acquired qualifications. As a result there is a high demand (immediate and for mid-term) for the majority of investigated vocations and specialties.

On the other hand, a deficit of necessary skills for good work performance was identified in relation to the graduates who already work on the labour market.

Another problem which becomes more visible over the last years would be the reduced attractiveness of the educational offer in the agricultural area, thus creating additional impediments for attracting the candidates to study the respective vocations/specialties in the context of a rapidly decreasing number of gymnasium and lyceum graduates (as they are the potential candidate for these studies). In the existing conditions, VET and higher education holding in their education offer vocations/specialties from the analysed areas are faced with a series of ***challenges***, as follows:

- *Lack of vocations' and specialties' attractiveness* implies the need for more efficient actions focused on promoting the respective vocations and specialties in conditions of continuous aggravation of competitiveness on educational services' market. At the same time, one of the strengths of vocational training in the related areas should become the quality of vocational training, including its conformation by employers;
- *Active communication with external beneficiaries* of vocational training programs – employers – should become one of the most efficient tools for efforts' operationalization for quality increase purpose. Employers should become active stakeholders in the training process at all stages, starting with programs' design. At the same time, consideration should be given to the fact if the educational institutions are motivated for such a dialogue by the immediate need to solve the problems of vocational training quality (this also being the factor contributing to institution's sustainability in competition conditions); the motivation for employers to get involved in the respective activities is much lower, relying mostly on their civic spirit and, in some cases, on the interest to obtain directly a specialist of requested qualification. In these circumstances, there is an obvious need to involve line ministries in monitoring communication with beneficiaries. The organization of stakeholders for dialogue and commitment for a moderator role would contribute substantially to making this process much more efficient;
- A new qualitative level of *efforts focused on internal beneficiaries – pupils/students* is necessary for achieving the goal of continuous increasing quality of the educational offer, and implicitly, of the institutions' sustainability. As good as it might be, the communication with employers would not have the expected results if maximum efforts are not taken so as to streamline the teaching-learning-evaluation process. One of the main factors for this purpose would be the adoption of an

innovative teaching approach, which would be able to actively engage the trainees and to motivate them achieving high academic results;

- Based on the wide demand for *continuous vocational training* and the insufficient offer, there is an obvious need for the educational institutions to initiate the procedure of including the requested programs in the educational offer and to monitor continuously the quality of such programs' provision, relying as well on active communication with their potential beneficiaries;
- A *more efficient mechanism is necessary for keeping the records about graduates' employability on the labour market.* The efforts of the educational institutions would end with higher results in this respect, if a state mechanism is established to oblige the employers to report in a centralized way the data on qualified young specialists' employment on labour market, while for graduates of budget-based studies – information of place of work and professional path (at least during the first five years after graduation).

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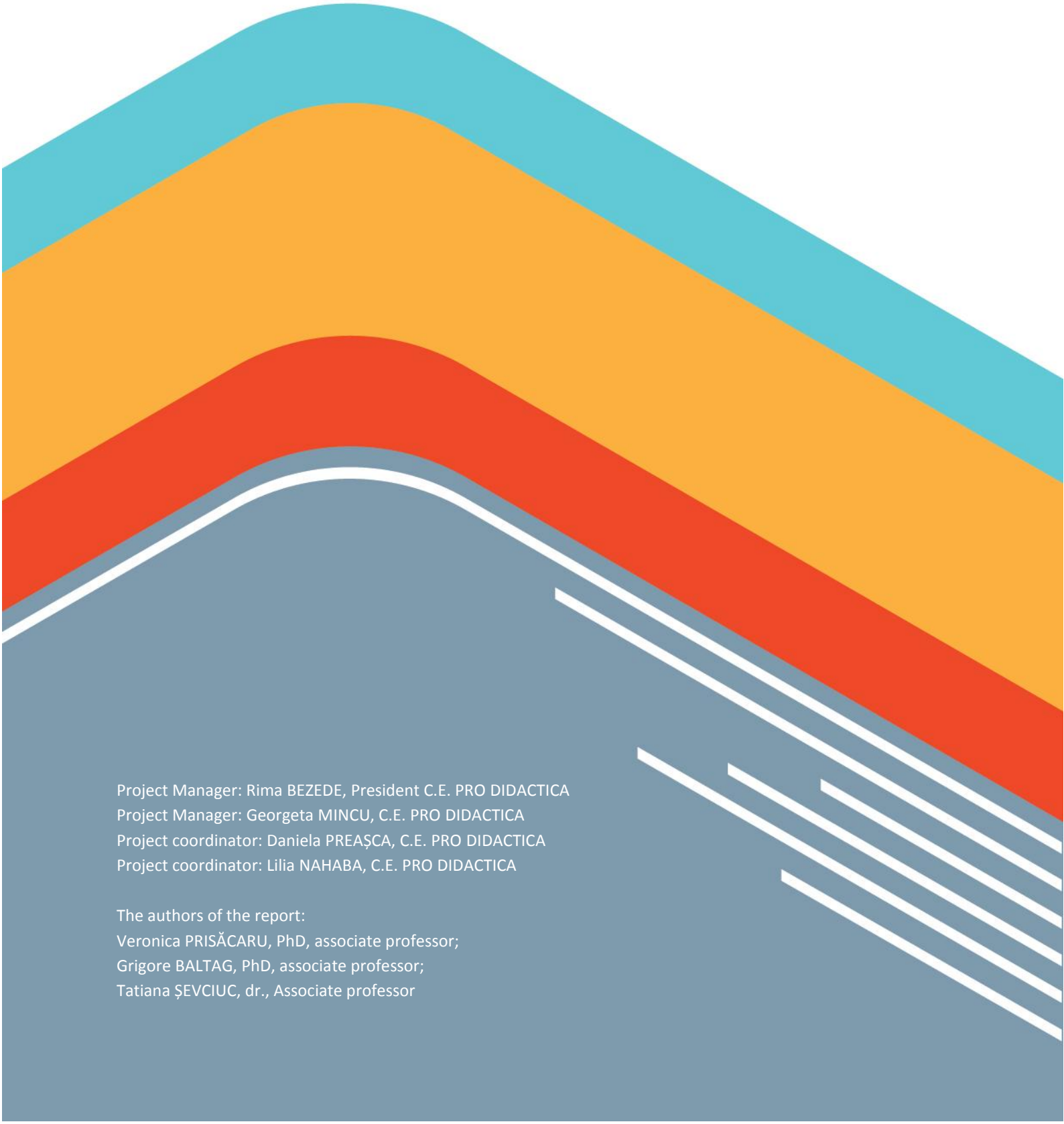
"The views expressed in the report report are famous authorities and are not engaged in any care institutions that exist, however how to reflect the position of the care institution for financing the development or care of an insured project.

The development of Rural Zones could work in a process elaborated within the project of the European Union. Part I: Increasing the competitiveness of the agri-food sector by integrating in internal and global value chains, in a special sector of soybean culture, implemented the Austrian Development Cooperation / ADC in partnership with the PRO DIDACTICA Educational Center and the Donau Soja International Association (Austria).



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