STRENGTHENING THE SKILLS OF FUTURE SPECIALISTS IN ACCORDANCE WITH THE DEVELOPMENT TRENDS OF THE ANIMAL HUSBANDRY SECTOR IN THE REPUBLIC OF MOLDOVA

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Abstract

The main purpose of this paper was to use the analysis of the animal husbandry sector of the Republic of Moldova as a tool for predicting skills to be improved in related professional education programs. In order to achieve the proposed goal, the general trends in the evolution of the sector in the Republic of Moldova were evaluated; these trends were compared to those of the European Union level. The general problems of the sector were identified and, on this basis, the skills to be improved were deduced within the professional education programs of agricultural profile. The research resulted in the recommendations to improve skills in related professional education programs so as to create prerequisites for a higher quality educational service and, respectively, to optimize the contribution of professional education in increasing the performance of the animal husbandry sector.

Key words: *animal husbandry, education, Republic of Moldova, skills*

INTRODUCTION

Climate change, globalization, economic crises caused by various factors are challenges for all activities and fields, but especially for agriculture - a sector that has significant roles in economic and social development. One of the landmarks of the quality of the respective roles is the increase of productivity in its broadest sense, as "a measure of the rate at which we convert inputs (such as labour, land, water and energy) into outputs. It is not about how much we produce but how efficiently we produce" [1, p.3]. Achieving this goal is a process that is both necessary and difficult at the same time due to the existence of a series of factors, also called drivers of change, as shown in Figure 1.

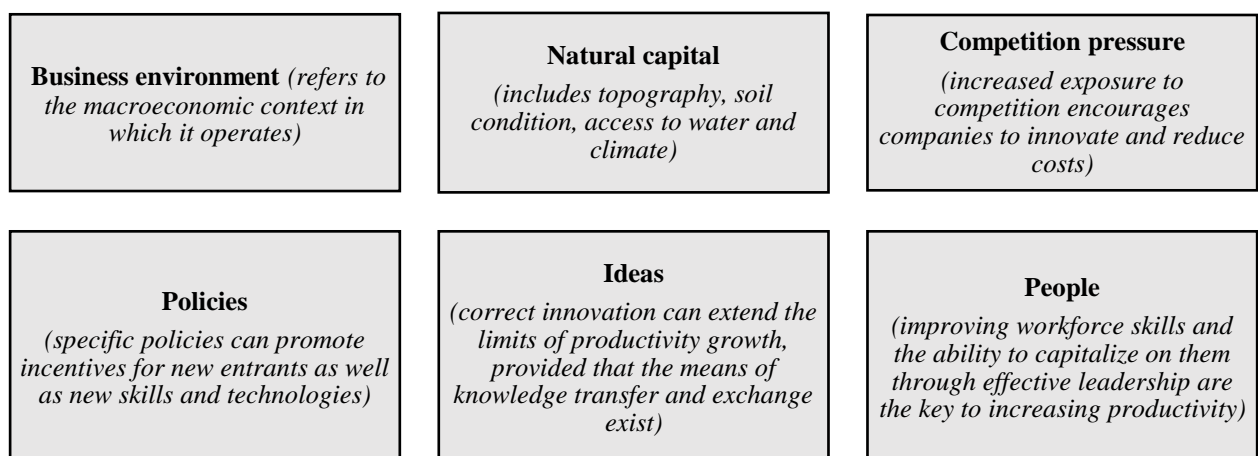|		
Business environment *(refers to the macroeconomic context in which it operates)*	**Natural capital** *(includes topography, soil condition, access to water and climate)*	**Competition pressure** *(increased exposure to competition encourages companies to innovate and reduce costs)*
Policies *(specific policies can promote incentives for new entrants as well as new skills and technologies)*	**Ideas** *(correct innovation can extend the limits of productivity growth, provided that the means of knowledge transfer and exchange exist)*	**People** *(improving workforce skills and the ability to capitalize on them through effective leadership are the key to increasing productivity)*

Fig. 1. Drivers of agricultural productivity growth
Source: Developed by the authors based on [1, p.5].

Thus, we can say that, along with other factors, the human factor is considered an essential and inextricable driver of agricultural productivity growth to meet the challenges and play its roles. Development of workforce planning and human resource management skills in the branch is necessary to improve business performance, to increase a better equipment of the branch in order to respond and adapt to changes, and to increase its capacity to sustain productivity growth [7, p.8].

The development needs of the agricultural workforce have been dramatically affected by the global changes that have taken place in the roles of the public and private sectors, as well as the drastic advances in technology [13]. In this context, it is stated that in the ever-expanding world, human resource development must be examined and organized according to globalization, cultural differences, educational opportunities and trends and consequences of these challenges for organizations, respectively [16].

The key element of human resources interventions in agriculture is competencies, which are defined as „*knowledge, skills and know-how applied and mastered in a specific context*" [8]. Thus, we find that skills are a component of competencies, representing "*the ability to use one's knowledge effectively and readily in execution or performance*" [9]. As businesses restructure and adapt, skills also need to evolve, entrepreneurial and leadership skills becoming more important [1, p.7]. Through their more detailed examination, in the process of a sectorial study conducted in the UK in the field of agriculture, forestry and fishing, three groups of skills needed to be developed according to the degree of priority were identified, they are set out in Figure 2.

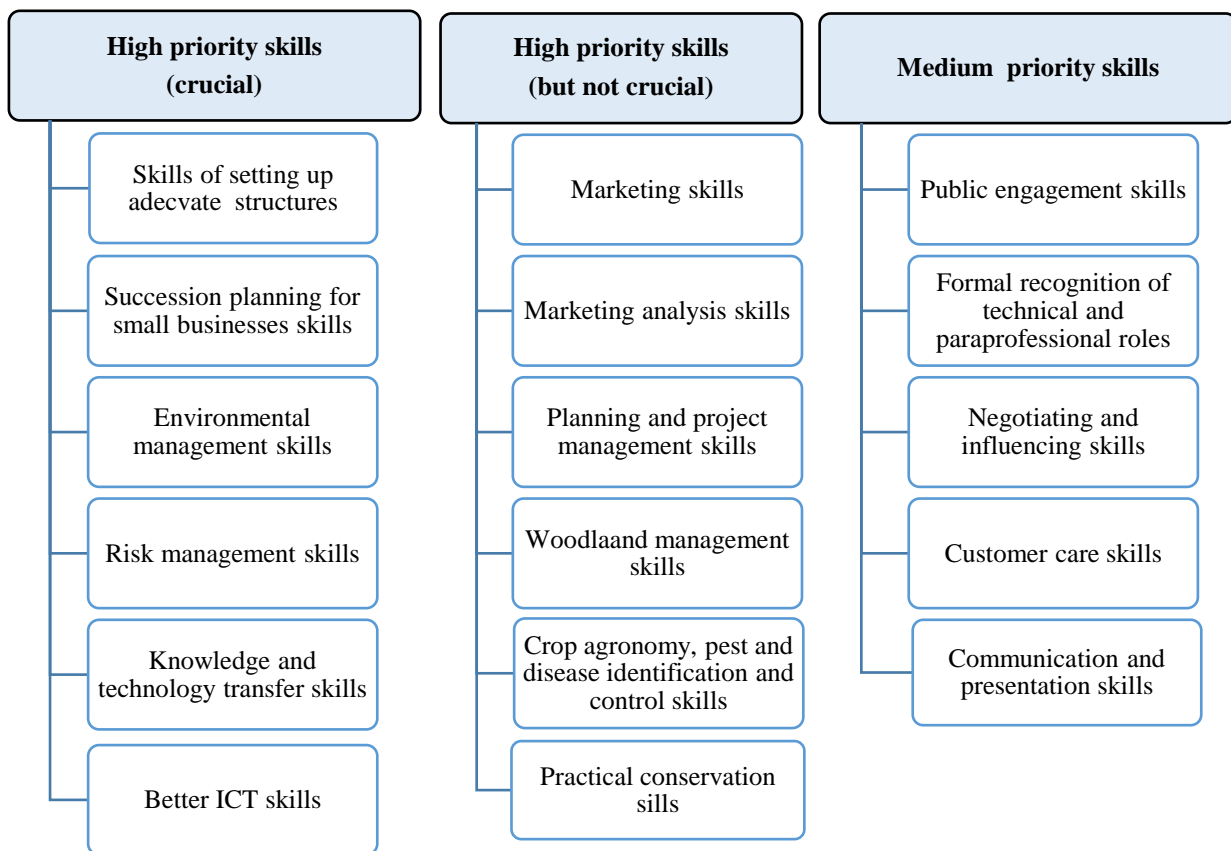| High priority skills (crucial)	High priority skills (but not crucial)	Medium priority skills
Skills of setting up adecvate structures	Marketing skills	Public engagement skills
Succession planning for small businesses skills	Marketing analysis skills	Formal recognition of technical and paraprofessional roles
Environmental management skills	Planning and project management skills	Negotiating and influencing skills
Risk management skills	Woodlaand management skills	Customer care skills
Knowledge and technology transfer skills	Crop agronomy, pest and disease identification and control skills	Communication and presentation skills
Better ICT skills	Practical conservation sills	

Fig. 2. Skills needed to be developed for the agriculture, forestry and fishing depending on the degree of priority
Source: Developed by the authors based on [14].

Given the complexity of the skills needed to be improved, and the agricultural work itself, it is clear that their development requires a strategic approach, which would integrate the

efforts of government and of the sector [7, p.7]. In this context, it is considered vital to recognize the role of education systems in the development of human resources needed by the sector [16]. Implicitly, the exercise of that role by the institutions in the professional education system is required as one of their main missions which involves a continuous adaptation of the offered skills to the current needs and, moreover, to the future needs of the sectors. A significant factor of the success of fulfilling the mentioned role is the knowledge of the needs of the sectors, this fact being possible through the analysis of their tendencies and problems.

MATERIALS AND METHODS

The carried out research had the following stages:
(1) Summary of approaches on the need and role of skills to ensure the prosperity of agriculture in the current conditions;
(2) Assessment of general trends in the evolution of the animal husbandry in the European Union;
(3) Analysis of the development of the animal husbandry in the Republic of Moldova in terms of quantitative and qualitative indicators;
(4) Identifying the factors that diminish the efficiency of the animal husbandry in the Republic of Moldova;
(5) Specifying the skills to be improved within the professional education programs of agricultural profile in the context of the problems found in the development of animal husbandry;
(6) Predicting the medium and long-term effects of the proposed interventions in professional education programs.
The assumed tasks were performed by the following methods: analysis of economic indicators reveling the development of the animal husbandry sector in the Republic of Moldova and in the European Union; assessment of trends in the Republic of Moldova compared to those from the European Union; investigation of analytical and scientific publications related to the sector development; the synthesis of the basic ideas

and the deduction of the areas to be improved and, implicitly, of the skills necessary to ensure these improvements; predicting their effects in the medium and long term by using the tree of objectives technique; formulation of reasoning and final recommendations on the necessary interventions in the programs.

The statistical databases www.statistica.md, https://ec.europa.eu/eurostat/data/database, as well as a series of analytical studies and scientific publications that reveal the evolution and problems of the sector served as sources of information.

RESULTS AND DISCUSSIONS

In the context of the concern to achieve the sustainable development objectives, increased attention is paid to animal husbandry, which is the sector responsible for balanced and healthy nutrition of the population, also having other particularly important roles, as shown in Figure 3.
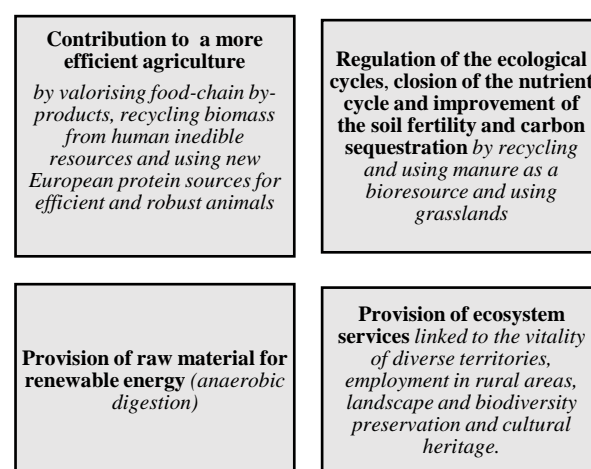

Fig. 3. The roles of the animal husbandry in the global economy
Source: Developed by the authors based on [2, p.1].

According to the available statistical data, at the European Union level in 2018 the livestock population consisted of 148 million pigs, 87 million cattle, 98 million sheep and goats. The data on the evolution of the livestock in the EU, revealed by the livestock population growth index, are shown in Figure 4.
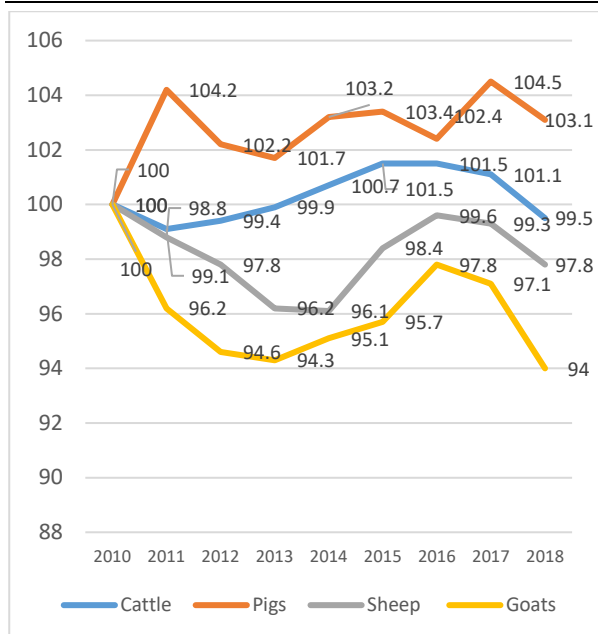
Fig. 4. Livestock population growth index in the EU countries in 2010-2018
Source : [4].

Almost half of the total volume of meat produced in 2018 was pork (23.8 million tonnes). Also, 15.2 million tonnes of poultry, 7.9 million tonnes of beef, 0.8 million tonnes of sheep and goat meat were produced. The total quantity of milk produced at the EU level in 2018 amounted to 172.2 million tonnes.

Even if in the period 2010-2018 there were no stable increasing trends of animal products volume, the year 2018 imposed itself by higher indicators compared to 2017 due to the growing concerns for the sector`s development. Thus, the production of pork

increased by 2.1% in 2018 compared to the previous year, being exceeded the level of 2010 by 2.1 million tonnes. The production of beef increased by 1.7% in 2018 compared to the previous year; the volume of sheep and goat meat in 2018 was the same as in the previous year, and poultry meat production increased by 4.8%, being 3.2 million tonnes above the level of 2010 [4].

Animal husbandry has a key contribution to the European Union economy: of the total value of agricultural production of €434.3 billion in 2018, €172 billion (39.6%) was provided by animal husbandry [4]. Increased attention to animal husbandry is justified, as it is considered a key element of the vitality of many European territories [2, p.2], including its contribution to economic growth and poverty reduction [6, 15].

In the context of the above mentioned, the significance of the sector is obvious for the economic and social prosperity of the Republic of Moldova. However, the data that reflect the level of development of animal husbandry in the Republic of Moldova show more than modest trends. Thus, if we examine the livestock evolution by comparing the data of 2018 with those of 2010 (Table 1), we find out that the livestock population increased only in three groups of animals: rabbits, donkeys and bees. At the same time, the number of cattle, pigs, sheep, goats and horses substantially reduced.

Table 1. Livestock evolution in the Republic of Moldova within the period 2010-2018

Indicators	2010	2011	2012	2013	2014	2015	2016	2017	2018
Cattle, thousands of heads	216	203.9	191.2	188.9	191.2	186.1	182.3	167.4	144.8
Pigs, thousands of heads	478.5	438.6	410.4	420	472.8	453.2	439	406.4	397.3
Sheep and goats, thousands of heads	905.5	832.4	824	849.2	874.7	868.4	869.8	841.7	768.7
Horses, thousands of heads	52.2	49.6	46.4	45	41.9	39.4	36.8	33.6	29.9
Donkeys, thousands of heads	2.8	2.5	2.4	2.1	2.2	2	3.1	5	3.8
Rabbits, thousands of heads	277	277.4	267	296.2	326.1	350.2	366.7	376.5	351.5
Bee families, thousands of units	105.2	111.7	110.6	115.9	124.3	135.9	148.1	163.6	178.7

Source: Developed by the authors based on [10].
Note: There have not been identified complete official data on the poultry evolution.

A deeper investigation of the situation is possible by highlighting the trends in the evolution of the managed livestock,

separately, by enterprises and owned by the individual sector (Tables 2 and 3).

Table 2. Livestock evolution managed by the enterprises from the Republic of Moldova within the period 2010-2018

Indicators	2010	2011	2012	2013	2014	2015	2016	2017	2018
Cattle, thousands of heads	11.6	12.1	11.6	12.3	13.7	15.1	18.3	19.1	18.2
Pigs, thousands of heads	139.4	120.6	142	158.7	196.8	185.7	191.4	184.5	206.2
Sheep and goats, thousands of heads	20	20.8	17.6	19.7	23.9	27.5	25.1	25	20.4
Horses, thousands of heads	1.1	0.9	0.8	0.6	0.5	0.4	0.4	0.3	0.2
Domestic rabbits, thousands of heads	1.3	0.7	0.7	1	0.6	15.1	11.4	13.2	11.6
Bee families, thousands of units	4.6	3.6	3.8	3.7	3.2	2.9	3.1	2.6	2.2

Source: Developed by the authors based on [10].

Table 3. Livestock evolution of the individual households from the Republic of Moldova within the period 2010-2018

Indicators	2010	2011	2012	2013	2014	2015	2016	2017	2018
Cattle, thousands of heads	204.4	191.8	179.6	176.6	177.5	171.0	164.1	148.3	126.6
Pigs, thousands of heads	339.1	318.0	268.4	261.3	276.0	267.4	247.6	221.9	191.1
Sheep and goats, thousands of heads	885.5	811.6	806.4	829.5	850.8	840.9	844.7	816.7	748.3
Horses, thousands of heads	51.1	48.7	45.6	44.4	41.4	39.0	36.4	33.3	29.7
Donkeys, thousands of heads	2.8	2.5	2.4	2.1	2.2	2.0	3.1	5.0	3.8
Domestic rabbits, thousands of heads	275.7	276.7	266.3	295.2	325.5	335.1	355.3	363.3	339.9
Bee families, thousands of units	100.6	108.1	106.8	112.2	121.1	133.0	145.0	161,0	176,5

Source: Developed by the authors based on [10].

By generalizing the data on the evolution of the herds shown in Tables 2 and 3, we can positively assess the growth trends on some groups of animals that have been modeled in enterprises, because enterprises are able to ensure a higher efficiency of sector (ensuring better animal maintenance conditions, applying more advanced production technologies, etc.). However, the reduction of the livestock of the individual sector, on some groups of animals being particularly substantial, diminishes the potential of the sector to exercise its attributions to ensure the food needs of the population.

The quality of livestock management can be estimated through economic indicators. The first step in this regard is to assess the animal and poultry yield (Table 4).

Table 4. Animals and poultry yield in agricultural enterprises in the Republic of Moldova within the period 2010-2018

Indicators	2010	2011	2012	2013	2014	2015	2016	2017	2018
The average milk yield per cow, kg	2,993	3,224	3,380	3,225	3,742	3,468	3,939	4,363	3,626
Egg yield per laying hen, pieces	224	210	177	196	213	193	196	206	206
Wool yield per sheep, kg	2	2	1	2	2	2	2	1	2

Source: Developed by the authors based on [10].

By examining the evolution of animal and poultry yield during the research period, we find out a more beneficial situation, noting a stable growth rate of the average milk yield per cow, as well as a stable level of the average amount of wool per sheep with the exception of 2012 and 2017. The average number of eggs per laying hen had fluctuating trends during the considered period. At the same time, we can notice the absence of stable growth trends of the animal and poultry yield in the analyzed period. By comparative examination of the indicators obtained in 2018 and 2010, we find out that only the cattle yield

has increased, while the sheep yield is the same, and the poultry yield in 2018 is lower than the basis of comparison.

The data reflecting the evolution of the main types of animal products are presented in Table 5 and show an increase in the volume of production in the analyzed period (2010-2019), with the exception of the volume of wool.

Table 5. Obtaining the main types of animal products in the Republic of Moldova within the period 2010-2019

Indicators	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Livestock and poultry in live weight, q	417,386	439,726	459,553	564,133	620,026	690,985	763,885	750,694	862,529	849,463
Cow milk, q	144,814	147,126	155,727	157,586	213,111	225,079	246,755	242,455	218,348	234,743
Eggs, thousand pieces	276,192	241,918	242,162	242,049	246,498	253,491	292,665	316,191	317,980	297,754
Wool, q	417	333	276	289	363	343	404	337	411	322

Source: Developed by the authors based on [10].
Note: Data refer to agricultural enterprises of all types.

However, the increasing trends of the analyzed indicators are not sufficient for relaunching the animal husbandry in the Republic of Moldova and for returning to the production level registered before the privatization process. Thus, by the comparative analysis of the data concerning the volume of production marketed in 2019 compared to 1980 (Table 6), a positive situation is registered only in poultry, while the sales of cattle, pigs, sheep and goats in live weight, as well as milk have decreased considerably.

Table 6. The comparative analysis of the volume of animal production sold in the Republic of Moldova in 2019 compared to 1980

Indicators	1980, thousand tonnes	2019, thousand tonnes	The growth index
Cattle in live weight	143.0	12.7	8.88
Pigs in live weight	182.0	82.7	45.44
Sheep and goats in live weight	9.0	4.2	46.67
Poultry in live weight	55.0	57.6	104.73
Cow milk	1187.0	331.7	27.94

Source: Developed by the authors based on [10].

The slow pace of the sector`s development is also confirmed by the data regarding the evolution of animals and animal products` imports and exports in the period 2010-2018 (Fig.5), which shows a visible prevalence of imports over exports.
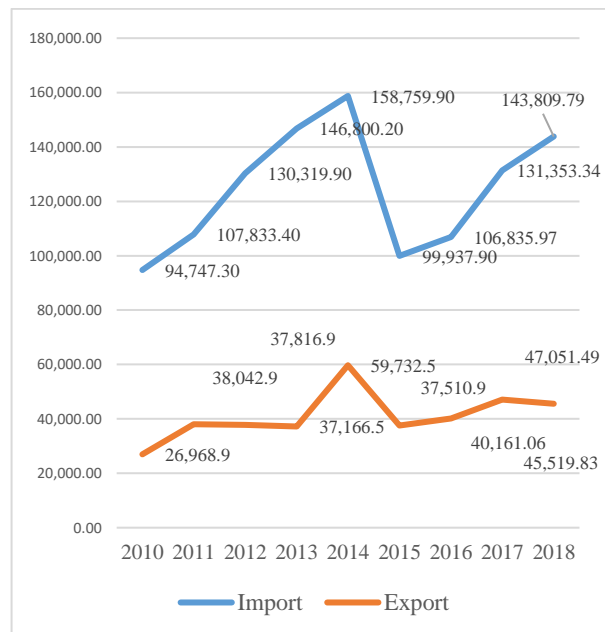

Fig. 5. Comparative analysis of the evolution of the animals and animal products` imports and exports in the period 2010-2018, thousand dollars
Source: Developed by the authors based on [10].

By generalizing the above mentioned we can deduce that the process of revitalization of the animal husbandry sector in the Republic of Moldova, after the decline that occurred with the privatization of agricultural enterprises at the end of the last century, is still very slow and with modest results, the last statement being justified by low production efficiency [3, 5, 11, 12], which substantially diminishes the competitiveness of the sector. Implicitly,

several groups of factors could be identified that condition the low efficiency of the animal production, they are set out in Table 7.

Table 7. Factors conditioning the low profitability of animal husbandry sector in the Republic of Moldova

Groups of factors according to their nature	The factors` content
Technological factors	• Constraints caused by the internal resources (especially limited feed); • Insufficient good quality pastures caused by unfavorable weather conditions and insufficient irrigation capacities; • Harnessing non-competitive breeds.
Managerial factors	• Poorly developed risk management tools; • Lack of knowledge in product promotion.
Economic and financial factors	• Relatively high local production costs; • Low animal productivity; • Limited share of investments; • Limited share of foreign capital in long-term active investments; • High interest rates on bank loans and the short period of time for which loans are offered; • Lack of the necessary resources to carry out at least partial production processing.
Factors regarding the state mechanisms for managing the sector	• Instability of legislation, which increases business costs and creates difficulties in making forecasts for longer periods of time; • Instability of the country's policy in the field of international cooperation.
Market factors	• Tough pressures caused by cheaper animal imports; • Difficulties in penetrating the markets (including external ones) due to the inability to compete with cheaper, subsidized meat and dairy products coming from the EU and other markets; • Underdevelopment of the land market.
Natural factors	• Unfavorable weather conditions.

Source: Developed by the authors based on [3, 5, 11, 12].

Through the synthetic evaluation of the data presented in Table 7 we conclude that the animal husbandry`s efficiency can be increased through a system of complex and varied measures in terms of content (technological, economic-financial, organizational, managerial, legislative-normative, etc.).

The quality of their implementation depends on the degree of involvement of different actors, but also on their ability to ensure a synergy of efforts.

Increasing the quality of skills offered within the related professional education programs is one of the factors capable of generating multiple effects on different time horizons, these being systematized in Figure 6 developed by applying the tree of objectives` technique.

Thus, as shown in Figure 6, two basic objectives of grade I are identified that must be assumed by the professional education system in the field of animal husbandry with reference to improving skills related to applied technologies, as well as entrepreneurial and managerial. Implicitly, specific objectives are set for the improvement of concrete skills within the course units.

The immediate expected effects are to increase animal yield, product quality, to streamline supply and sales processes, to provide the necessary financial resources and, consequently, increase the efficiency of the production factors` management.

In the long term, the sector is expected to increase its performance and its contribution to GDP.
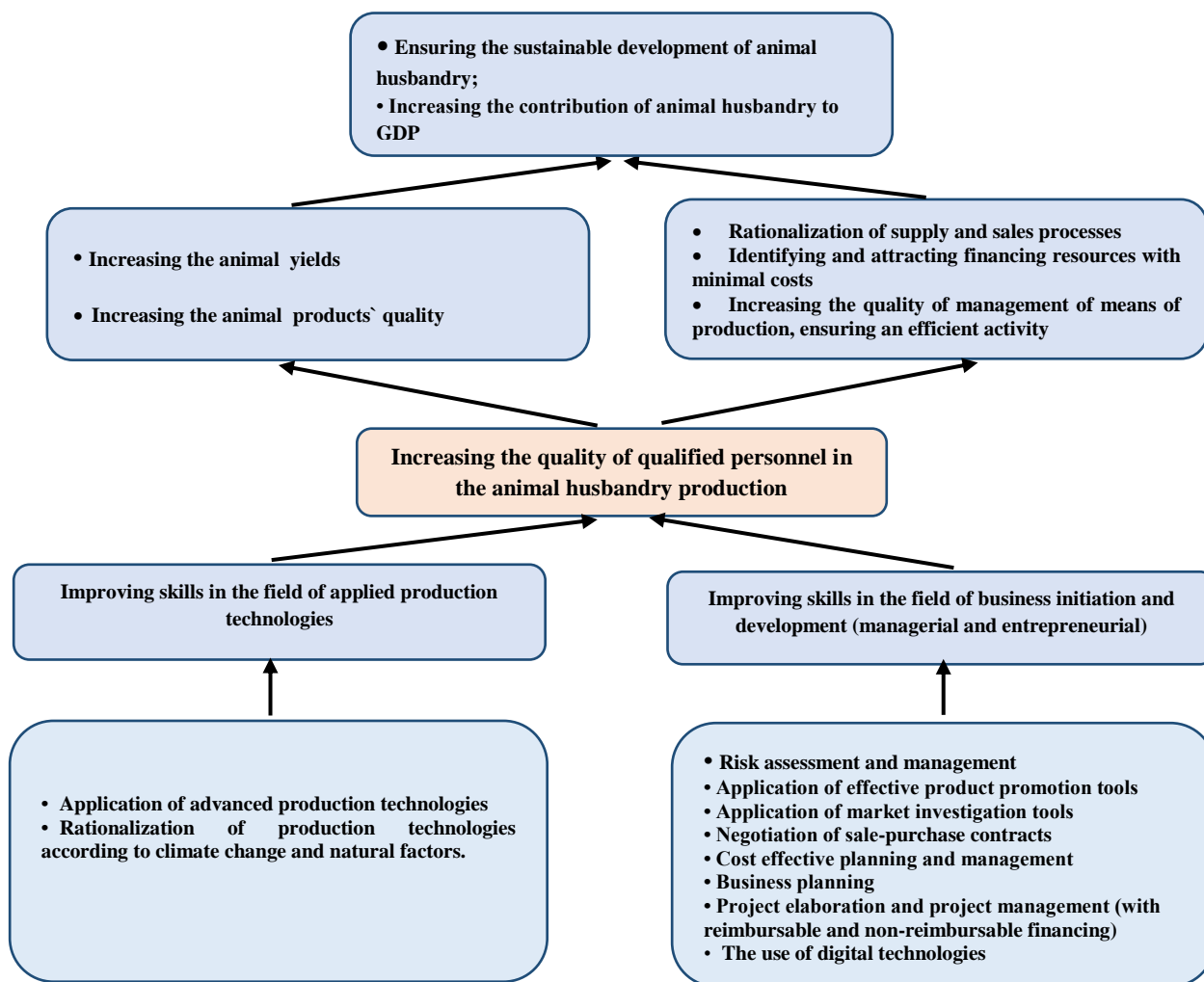
Fig. 6. The tree of agricultural education objectives regarding the improvement of skills in the field of animal husbandry
Source: Developed by the authors.

CONCLUSIONS

The analysis of the animal husbandry sector in the Republic of Moldova shows modest development trends, unable to contribute to its revitalization and the optimal exercise of the roles assumed in achieving the objectives of sustainable development and poverty reduction. The relaunch of the sector, the achievement of higher performance indicators is possible by combining the efforts of several actors, agricultural professional education institutions having an active role, as providers of skilled labor.

By investigating the problems related to the sector, the areas where the respective educational institutions can be involved were identified, as well as the competencies that need to be improved, namely:

I. *In the field of applied production technologies*:
-Application of high performance production technologies;
-Application of advanced production technologies;
-Rationalization of production technologies according to climate change and natural factors.

II. *In the field of business initiation and development*:
-Risk assessment and management;
-Application of effective product promotion tools;
-Application of market investigation tools;
-Negotiation of sale-purchase contracts;
-Cost effective planning and management;
-Business planning;

-Project elaboration and project management (with reimbursable and non-reimbursable financing);
-The use of digital technologies.

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