PUBLIC HIGHER EDUCATION AND LABOUR MARKET IN THE ROMANIAN AGRO - FOOD SECTOR – WHAT IS TO BE DONE?

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Abstract

Given the strategic importance of higher education (Europe 2020 Strategy) and agro-food industry (Common Agricultural Policy) for achieving increased competitiveness of EU economy, economic growth, social welfare and sustainable development in EU member states, the present paper aims at analyzing the evolution and present state of public higher education (funding, students, graduates) in close connection with labour market evolution, in the Romanian agro-food sector. In order to examine the trends in public higher education and labour market in the agro-food sector we used data on public funding of higher education, students, graduates and employment. The research conducted led to the idea that higher education plays a key role in preparing educated and trained workforce involved in the Romanian agro-food sector which will finally lead to increase employment of higher –educated young people in the same economic sector. The paper also offers some conclusions on the way in which the evolution of higher education system affects the labour market in the Romanian agro-food sector.

Keywords

higher education, public funding, graduates, labour market, agro-food sector, Romania

Introduction

Under different sectorial, national and global changes appears the need for every society to reconsider and even to reinvent itself in order to ensure competitiveness, economic growth, social welfare and sustainable development. Thus, national authorities have an important role in providing the proper reforms and legal framework to maximize the functionality of the involved mechanisms.

Given the important role education and especially higher education plays in the construction of the European area of knowledge, in preparing individuals to face the requirements emerged on the labour market and in fostering economic growth, as well as the significant contribution brought by the agro-food sector to the economic growth, the research conducted in this paper provides an overview of the supply and demand of higher-educated workforce in the Romanian agricultural and agro-food sector.

Thus, considering the increased pressure on both natural and financial resources, together with an ageing population, the rapid expansion of higher education systems all over the world and also the growing unemployment at national and sectorial level, the present paper aims to answer the following question: what changes must be made in the public policy for agricultural and agro-food higher education in order to meet efficiently the needs of contemporary labour market in the Romanian agro-food sector?

In order to answer the research question, we analyzed on one hand the evolution and present state of public higher education in terms of funding, students and graduates, and the labour market evolution in the Romanian agricultural and agro-food sector, on the other hand. The aim is to present our findings that are relevant to the research question. Moreover, the paper will also offer some conclusions on the way in which the evolution of

higher education system impacts the labour market in the Romanian agricultural and agro-food sector.

For the scientific approach proposed in the paper, we dealt with data and technical reports, published by national and international institutions, regarding public funding of higher education, students, graduates and employment.

The first section dedicated to a presentation of the main results obtained by other researchers relevant for the research question is followed by the second section where a short incursion in the actual state of the Romanian agricultural and agro-food sector is undertaken. The third section presents the results of the investigation related to the Romanian public higher education in agriculture and affiliated sub-sectors, in terms of students enrolled, study programs, expenditure, for public higher education in agriculture and affiliated sub-sectors, and also in terms of supply of higher-educated workforce for the agricultural and agro-food sector. Section 4 looks at the trends registered in the Romanian agricultural and agro-food labour market. The last section summarises the main findings and concludes.

Though several research studies have treated the relationship between higher education and labour market, the present paper underlines the particular case of the agricultural and agro-food sector in an Easter European state, member of the European Union.

1. Literature review

Research on the field of higher education and labour market is quite broad and addresses issues related to the impact of an academic degree and field of study on short-term and long-term unemployment across Europe (Nunez and Livanos, 2010), to the increased opportunities higher educated workforce has in obtaining an adequate job (Livanos, 2010), to the link between education policy and labour market outcomes (Falish, 2008), to the way in which the organisation, funding and management of higher education helps states to achieve their economic and social objectives (Machin and McNally, 2007), to whether the investment the government and individuals do in higher education represents well spent public money and time (Purcell and Elias, 2004), to the employability of higher education graduates and their transition to the labour market, to a variety of higher education mismatches within the labour market (Korka, 2010), as well as to the development of a methodology for establishing the causal relations between higher education graduates and labour market absorption (Din and Cretan, 2014), or to the development of a tool, based on the perceptions of the beneficiaries of higher education, that decision-makers could use in fitting "education-job match" policies (Din and Cretan, 2013).

The fact that individuals with higher education are more successful on labour market than those with low-level or medium level education is well known (Vidovic, 2013). Furthermore, a higher education degree is more effective on reducing the short-term than long-term unemployment. Though, the situation is quite different on particular subjects. For example, a higher education degree in agriculture and veterinary can lead to long-term unemployment above average, but has a significant positive effect on reducing short-term unemployment (Nunez and Livanos, 2010). Moreover, research conducted on the field of study suggests that the risk of unemployment is higher within graduates in field of study having correspondent in the private sector of the labour market, than graduates of traditional fields of study in the public sector of the labour market, i.e sociology and humanities, in countries where the public sector is the main employer (Livanos, 2010).

In the last 20 years governments faced a massive and sustained dilation of higher education system, but even if the number of students multiplied, the public funding per student decreased. Thus, governments focused more on attracting private resources to ensure wide

access to higher education. The study conducted by Yang and McCall (2014) revealed a negative relationship between the level of public funding per student and number of students enrolled in higher education, even though GDP per capita and the share of public expenditure on education in GDP positively affects the number of students enrolled in the higher education system. Given this context, Machin and McNally (2007) investigated the impact of the expansion phenomenon of higher education on the labour market. The results do not suggest an over-supply of university graduates as the average wage gap between higher education graduates and medium-level graduates is still significant. However, the research confirms the importance of the field of study. The over-supply of higher educated workers is more likely to appear, in general as well as in different fields of study, as a consequence of widening higher education access. Also, the increasing number of enrolled students may cause over-qualification of higher education graduates. Carroll and Tani (2013) underline that the rate of over-qualified workforce varies by field of study completed are associated with the demand of higher education graduates on the labour market. However, three years after graduation, the phenomenon of over-qualification diminishes, but does not disappear. Regarding the impact of over-qualification on income level, the same study indicates that young workforce does not feel the effect of penalty, while older over-qualified workforce experiences a significant wage reduction, compared to the appropriate wage for the qualification held.

Beyond these possible effects of a massive higher education system, the rapidly increase in number of students enrolled could lead to reducing unemployment, during economic crisis, without having negative implications on public budget. However, the reduction in the level of public funding per student might damage the quality of education. Moreover, the government could direct the additional number of students to relatively cheap fields of study, like social sciences (Plumper and Schneider, 2007).
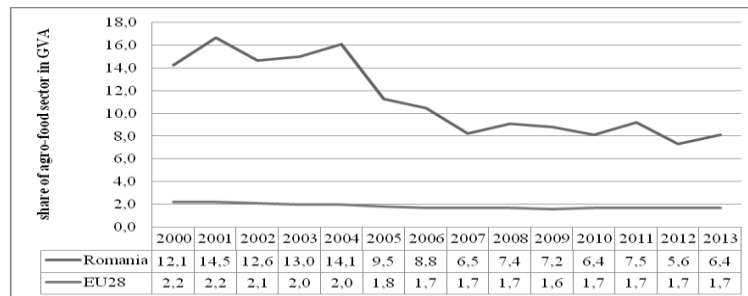
Even though higher education in particular fields of study requires a smaller effort from the public budget, the university offer in a certain field of study should be established by the government according to current and future needs of labour market within the economic sector acting as the first employer. Brooks et al. (2008) suggest that the demand for higher educated workforce is influenced by both the quantity and quality of labour demand, i.e. the estimated number of workers necessary to produce the designed demand for goods and services and the ability of higher education institutions to graduate higher educated workforce having the skills required by employers. Nowadays, skills are a necessary condition for getting a better paid job. The importance of matching higher education with jobs was also emphasized by Din and Cretan (2014). The authors determined, using Fuzzy Cognitive Map, the fact that "higher education-job match" is the most influential concept within the model of higher education-job match and also influences this dynamic and complex system. Independent of education level, employment rates fluctuate. Significant changes in the structure of the GDP could lead to a shift in employment, especially in particular economic sectors. For example, during the recent economic and financial crisis the agricultural sector acted as an employer of last resort in several countries (Vidovic, 2013).

Research related to higher education and labour market demand within the agricultural and agro-food sector is not extensive. Still, there are a few studies addressing either the need for skilled workforce claimed by the labour market in agriculture and rural development (Istudor et al., 2010), or both the workforce needs of the agribusiness industry and the ability of higher education system to meet them (Brooks et al., 2008).

2. Short incursion in the actual state of the Romanian agro-food sector

Due to geographical reasons, particular climate conditions favorable to agricultural production, easy access to global markets through the opening at the Black Sea, the increasing demand for food and agricultural products while supply is relatively the same, the agricultural sector holds a significant position in the Romanian economy.

Thus, the Romanian agro-food sector has a relatively high share in gross value added (GVA), above the average share recorded in the EU28 member countries, for the period 2000- 2013 (Figure 1).

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Romania	12,1	14,5	12,6	13,0	14,1	9,5	8,8	6,5	7,4	7,2	6,4	7,5	5,6	6,4
EU28	2,2	2,2	2,1	2,0	2,0	1,8	1,7	1,7	1,7	1,6	1,7	1,7	1,7	1,7

Source: processed by the author, using data from Eurostat, august 2014
Fig. 1 Descriptive statistics for the share of agro-food sector in total Gross Value Added, in Romania and EU 28 member states, between 2000 and 2013, NACE Rev. 2

Examining the levels of the analyzed variable, though Romanian agro-food sector faced dramatic shifts starting from 2004 (14,1%), its share in GVA is still an important one (6,4% in 2013), compared to the average share in EU28 member states (1,7 % since 2010).
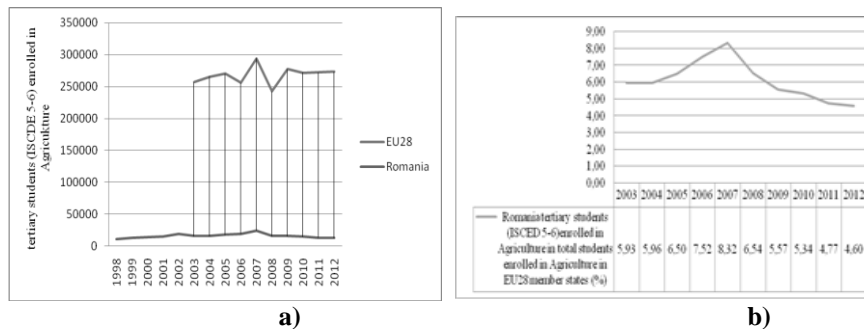
3. Romanian public higher education in agriculture and affiliated sub-sectors

Since late 1990s, the Romanian public system of higher education experienced a significant development, in terms of students enrolled, public funding, fields of study and study programs.

3.1 Tendencies regarding students enrolled, study programs and public funding in agricultural and agro-food higher education

The number of students enrolled in the field of Agriculture, forestry and fishery, in Romanian higher education system had a sustained increase from 1998 until 2007, when it reached its maximum of 24.465 students, followed by one third reduction in 2008, finally reaching the value of 12.555 students in 2012 (figure 2a).

As shown in the same figure, the total number of enrolled students in Agriculture, in EU 28 member states, fluctuated in the analyzed period reaching its peak of almost 295.000 students in 2007, followed by a 17% decrease in 2008 and levelling off around 272.000 students in the next years. Over the analyzed period, the universities within the Romanian higher education system enrolled between 4.6% and 8.32% of the total numer of students enrolled in EU 28 member states in the field of Agriculture, forestry and fischery (figure 2b).

tertiary students (ISCED 5-6) enrolled in Agriculture

350000
300000
250000
200000
150000
100000
50000
0

1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

— EU28
— Romania

a)

9,00
8,00
7,00
6,00
5,00
4,00
3,00
2,00
1,00
0,00

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Romania tertiary students (ISCED 5-6) enrolled in Agriculture in total students enrolled in Agriculture in EU28 member states (%)	5,93	5,96	6,50	7,52	8,32	6,54	5,57	5,34	4,77	4,60

b)

Source: processed by the author, using data from Eurostat, august 2014

Fig. 2 a, b Number of tertiary students (ISCED 5-6) enrolled in Agriculture, forestry and fishery, in Romania (1998-2012) and in EU28 member states (2003- 2012) and the share of tertiary students (ISCED 5-6) enrolled in Agriculture, forestry and fishery in Romania, in total number of tertiary students (ISCED 5-6) enrolled in Agriculture, forestry and fishery in EU28 member states (2003- 2012)

In the academic year 2013/2014, Romanian public universities offered 31 types of Bachelor's degree study programs in agriculture and allied disciplines (table 1).

Table 1 Bachelor's degree programs by field of study, in agriculture and allied disciplines, as of 2013/2014

Field of study	Study program
Agronomics	Agriculture
	Soil Sciences
	Montanology
	Plant Protection
	Exploitation of machinery and equipment for agriculture and food industry
Horticulture	Horticulture
	Landscaping
Forestry Engineering	Wood processing Engineering
	Engineering and design of wooden finished goods
Forestry	Forestry
	Forest harvesting
	Hunting
Engineering and Management in Agriculture and Rural Development	Economic Engineering in Agriculture
	Engineering and management within public catering and agrotourism
Food Engineering	Food Engineering
	Agricultural Products Processing Technology
	Food Control and Expertise
	Fishing and Fish processing
	Consumer and Environmental Protection
	Natural extracts and food additives
Animal Sciences	Animal Sciences
	Fish Farming and Aquaculture
Environmental Engineering	Engineering and Environmental Protection in Agriculture
	Environmental Engineering
Economics	Agro-food economy
	Environmental Economics
	Agro-food and environmental economy
Civil Engineering	Civil, Industrial and Agricultural Engineering
Environmental Science	Ecology and Environmental protection
Chemical Engineering	Food Chemistry and Biochemical technology
	Control and food security

Source: processed by the author, using data from the national legal framework, for the academic year 2013/2014

Regarding the level of public funding allocated for higher education in Romania, as percentage of GDP, after a relative stagnation between 2002 and 2005, the share of public

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expenditure on higher education in GDP increased from 0.7% in 2002 to 1.2% in 2009 (figure 3).
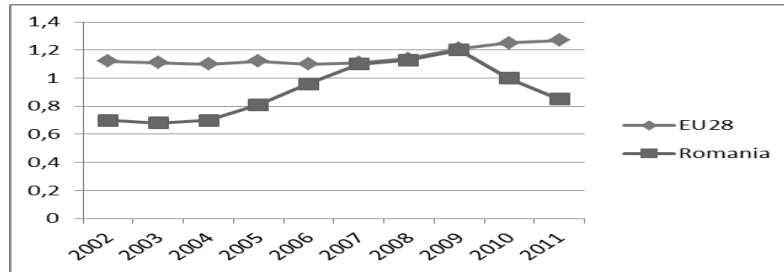
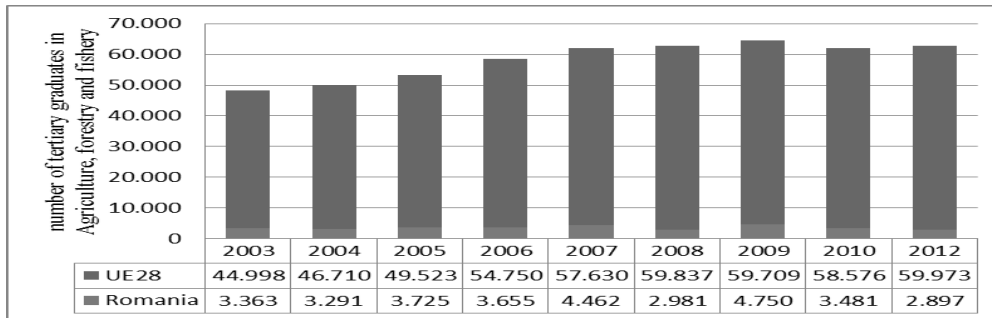Source: processed by the author, using data from Eurostat, august 2014

Fig. 3 Descriptive statistics for the total public expenditure on education as % of GDP, at tertiary level of education (ISCED 5-6), in Romania and in EU28 member states (2002- 2011)

In the following years the share of public funds allocated to higher education registered a sharp downward trend reaching the value of 1% of GDP in 2010 and 0.85% of GDP in 2011. Compared to the average value recorded for EU 28 member states, Romania allocated, with the exception of 2009, a much smaller proportion of GDP to funding higher education. According to the legal framework, Romanian public higher education institutions receive funds from the state budget. These funds are allocated, to each university, under a contract, using a funding methodology and a funding formula to assess the appropriate level of funding. Thus, according to this methodology universities receive funds also according to the fields of study they have in portfolio. In this respect, the funding authority establishes the average cost per equivalent student, by educational level and field of study, using different cost coefficients.

3.2. Supply of higher-educated workforce for the agricultural and agro-food sector
Between 2003 and 2012, EU28 member states higher education institutions awarded an average of 54.000 degrees in Agriculture, forestry and fishery. Moreover, the number of tertiary graduates within the field of agriculture followed an upward trend from 2003 (44.998 graduates) to 2012 (59.973 graduates) (figure 4).
In Romania, the ascending trend registered at the EU level lasted until 2008, when there has been registered a 33% decrease in the number of graduates Though, the maximum number of Romanian tertiary gradutes in Agriculture, forestry and fishery was recorded in 2009. In Romania, after 2009, the number of higher education graduates decreased and continues this trend as the number of enrolements in Agriculture, forestry and fishery declined, as shown in figure 2a.

Source: processed by the author, using data from Eurostat, august 2014

Fig. 4 Descriptive statistics for the number of tertiary graduates (ISCED 5-6) in Agriculture, forestry and fishery, in Romania and in EU28 member states (2003-2012)

The available data at national level on the number of higher education graduates in three major agricultural fileds, for the period between 1990 and 2012, reveal that until 2007 the number of tertiary graduates in Agriculture was far higher than that of graduates within the fields of Food industry or Forestry.
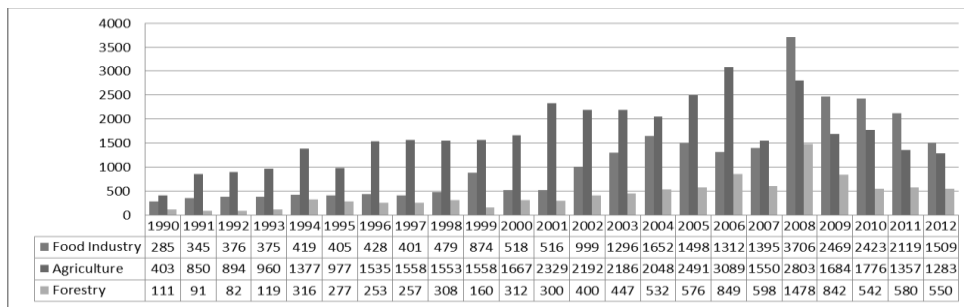
Source: processed by the author, using data from Ministry of National Education, august 2014

Fig. 5 Descriptive statistics for the number of tertiary graduates (ISCED 5-6) in Agriculture Environmental Science, Forestry and Food Industry, in Romania (1990-2012)
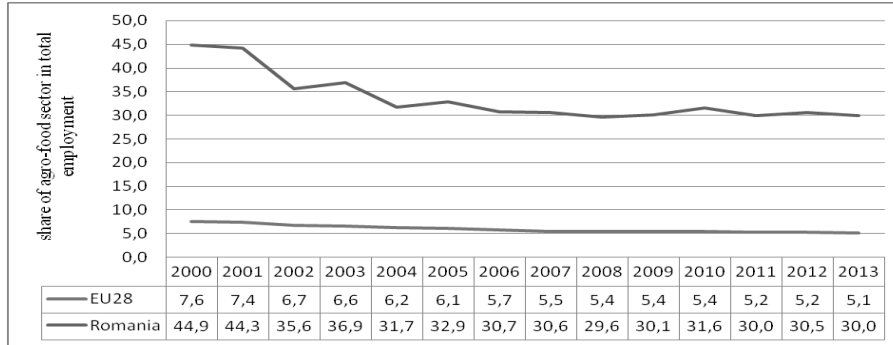
But, in 2008 the hierarchy changed and the number of graduates in Food Industry almost tripled. Between 2009 and 2012 the trend in number of tertiary graduates within the three major fields of study analyzed was descendent. Even though, judging after the number of graduates, the Food industry holds the first position, followed by Agriculture and Forestry.

4. Trends in the agricultural and agro-food labour market
The share of the Romanian agro-food sector employment in national employment is quiet high (30% in 2013), compared to the average registered in EU 28 member countries (5,1% in 2013) (figure 6).
The comparative analysis of the share the agro-food sector holds in total gross value added with the share the same sector has in total employment reveals that, in Romania, the workforce employed in the agro-food sector brings less value added than the labour

employed in other sectors of the economy, with high implications on labour productivity (Figure 7).

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
EU28	7,6	7,4	6,7	6,6	6,2	6,1	5,7	5,5	5,4	5,4	5,4	5,2	5,2	5,1
Romania	44,9	44,3	35,6	36,9	31,7	32,9	30,7	30,6	29,6	30,1	31,6	30,0	30,5	30,0

Source: processed by the author, using data from Eurostat, august 2014

Fig. 6 Descriptive statistics for the share of agro-food sector in total employment, in Romania and EU 28 member states, between 2000 and 2013, NACE Rev. 2
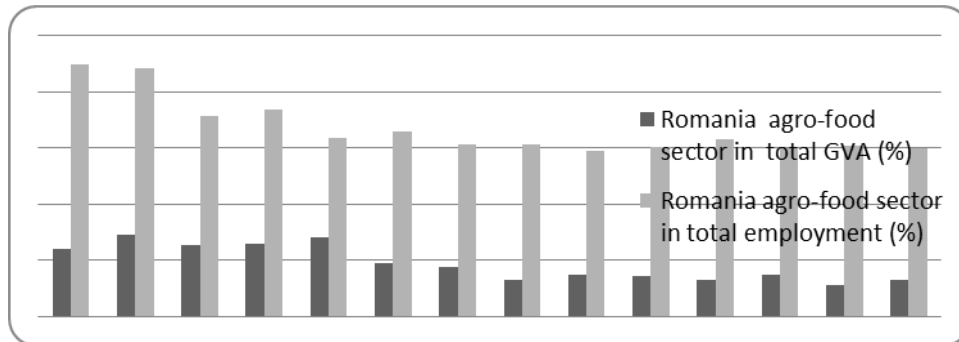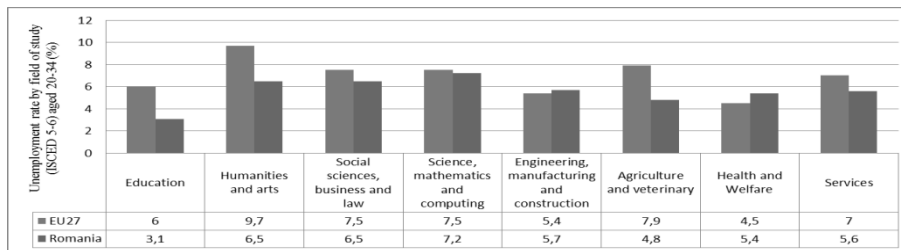

Source: processed by the author, using data from Eurostat, august 2014

Fig. 7 Descriptive statistics for the share of agro-food sector in total GVA and total employment, in Romania, between 2000 and 2013, NACE Rev. 2

Regarding the unemployment of young persons (aged 20-34), tertiary education graduates (ISCED 5-6), while the average unemployment rate for 2003-2007 was 7.1% at the EU27 member states level, Romania registered a lower value for this indicator (6.4%).

Moreover, Romanian unemployment rate of young people (ISCED 5-6) is lower than the average value recorded at UE 27 member states level, for almost all fields of study, except the field of Engineering, manufacturing and construction (figure 8).

However, focusing on the fields of study we notice that in Romania, from all fields of study that of Agriculture and veterinary holds the lowest level of the unemployment rate within higher education graduates, after the field of Education. This fact could be a direct consequence of the fact that the Romanian agricultural sector still has a greater availability to encompass Agriculture and veterinary higher education graduates than graduates from other fields of study.

Source: processed by the author, using data from Eurostat, august 2014

Fig. 8 Descriptive statistics for unemployment rate by field of study (ISCED 5-6), age 20-34 years, in Romania and EU 27 member states, 2007

Even in terms of education/occupation mismatch (ISCED 5-6) for young people, within the field of Agriculture and veterinary, the value of the indicator is lower in Romania than in EU27 member states (figure 9). Though, in Romania, the mismatch indicator for the field of Agriculture and veterinary has quite an important value compared to other fields of study, except that of Services. This feature could be due to the fact that jobs in other activity sectors might be more attractive for young workers as they guarantee a higher level of income than the agricultural sector.
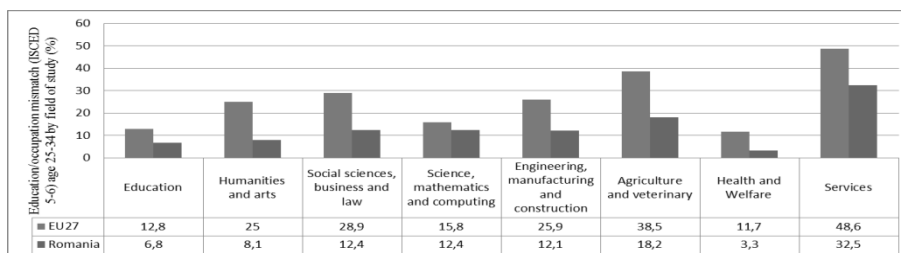
Source: processed by the author, using data from Eurostat, august 2014

Fig. 9 Descriptive statistics for education/occupation mismatch by field of study (ISCED 5-6), age 25-34 years, in Romania and EU 27 member states, 2007
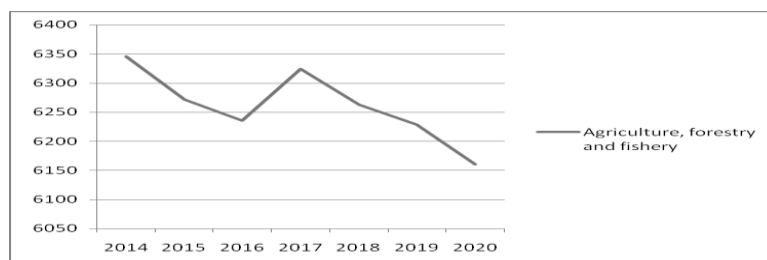
Source: processed by the author, using data from http://prevedu.ro/wp-content/uploads/2012/07/Raport_cercetare_etapa3.pdft, august 2014

Fig. 10 The forecast of the estimated workforce demand for the higher education graduates within the field of Agriculture, forestry and fishery (ISCED 5-6), in Romania, for 2014-2020

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However, as the results of the research conducted in Romania by the National Scientific Research Institute for Labour and Social Protection show, the forecast of the estimated labour demand reveals a decrease in the level of the workforce demand for the higher education graduates within the field of Agriculture, forestry and fishery until 2016, followed by a slight increase in 2017 (figure 10).

For the period of 2017-2020, the forecast shows that the labour demand for tertiary graduates in the analyzed field of study will register a continuous reduction.

Conclusions

Given the strategic importance of agro-food industry in EU national economies for achieving increased competitiveness of EU economy, economic growth, social welfare and sustainable development in EU member states, as well as the particular geographical advantages Romania has, the Romanian agricultural, but especially the agro-food sector has a high potential for increasing both its performance and competitiveness. But, increasing performance and competitiveness in the agricultural and especially agro-food industry is strongly related to the level of education workers within the field have.

Currently, as the analysis conducted by the Romanian Ministry of Agriculture and Rural Development (Strategy for agro-food sector development on medium and long term for 2020-2030, 2014) shows, Romania needs knowledge based agricultural administration. From the same study we note that the "majority of Romanian farmers, especially small (semi-)subsistence farms managers suffer from the lack of a clearly defined professional status, with negative or ambiguous implications for taxation, social security and health insurance." In this context, considering the results of the research conducted showing that: the Romanian agricultural and especially the agro-food sector have a great development potential as well as a relatively high share in gross value added; the unemployment rate for higher educated young people within the field of Agriculture, forestry and fishery is much more reduced than the unemployment rate for other fields of study; the number of students enrolled in public universities within the analyzed field is oversized compared to the forecasted labour market demand; the completion rate of the enrolled students within the field is quite reduced; public universities offer a great diversity of Bachelor's degree study programs in agriculture and allied disciplines, state intervention in higher education policy in the analyzed field should be focused on the adjustment of the number of publicly funded students within each major field of study with the medium and long term needs and trends within the national and European labour market, correlated with the cyclical evolution of the economic sectors taking over the graduates as well as with the development potential of each economic sector within the national economy. The same analysis could be applied for each major field of study in order to get a diagnosis of the previous, current and future supply and demand of labour force.

However, the research conducted should be continued with a more refined analysis based on input data (financial and non-financial) as well as on output data (graduates and skills) for the higher education system, within each study program that delivers workforce for the analyzed economic sector. At this moment such an analysis could not be performed due to the lack of data required according to the needs imposed by this type of analysis.

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