

STUDY OF AGRICULTURAL SCIENCES AND EMPLOYMENT OF GRADUATES

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Abstract

The aim of the paper is to evaluate the development of the unemployment rate of graduates of agricultural sciences in the comparison with the other study programs. Through the cluster analysis we identify the districts with the largest number of these unemployed graduates. Education has a key role in the socio-economic development of the country. Human capital is the key for the development not only at national level but also at regional or local level. The result of education in the agricultural sciences is a graduate who can effectively use the theoretical knowledge gained directly in practice. In the education of the agricultural sciences, we apply knowledge triangle resulting in integrated farming knowledge. This brings about the interconnection of agricultural education with the agriculture leadership and research and consultancy in this field. Only if will be protect an effective transfer of information between these three components is ensured is it possible to talk about a successful graduate in the field of agriculture. Although the analysis of unemployed graduates within individual study's programs revealed, that such graduates constituted only 3.96 % of the total number of unemployed graduates in September 2017, this is not the result of the high labor market applicability of these graduates, but it is related to a decreasing of number of students who studying the agricultural sciences. One of the tools which currently used to improve the quality and motivation of students to

study agricultural science is the dual education. Unfortunately, even the application of this tool did not contribute for the attractiveness of this study. According to the opinion of the Slovak Agricultural and Food Chamber, the secondary schools but also universities offered attractive studies programs in the agriculture, but the students' interest of these programs is minimal. Another option is to intensify the cooperation of schools directly with business entities by creating training centers focused on lifelong learning directly arising from the needs of agricultural practice through the application of modern teaching methods. Through the successful graduates it will be possible to ensure the competitiveness of the Slovak agricultural.

Key words: *Education, agricultural sciences, graduates, unemployment*

JEL classification: *I21, E 24, Q18*

1 Introduction

Human capital is the ability of person to create new knowledge (innovation) that is inseparable from the person. It does not have a matter - of - fact and is associated with the physical form of a person. Cannot be stored and cannot be protected on the bank account. Human capital belongs to a group of relatively renewable production sources, and presents the great importance for the economy. It is not subject of personal property and it is not subject for the purchase and sale of other entities, other than the person who has these capabilities (Krajňáková and Vojtovič, 2012, Váchal and Pártlová, 2008). Creating human capital by Dobeš (2003) means working with every person and educating them. It is an area in which economics is confronted with psychology, pedagogy and other sciences dealing with the human capital. Even investments into human capital do not go as far as the investment into the physical capital. This makes it difficult to observe the relationships between human capital and other economic variables.

The impact of the state on the amount of human capital in the economy is monitored through a number of specific institutions. Primarily, these organizations present schools of all levels, further education organizations, training facilities, learning facilities, the academies of sciences and others. In this process also are active indirect institutions - libraries, internet, audio didactic tools, pedagogical programs and more. So, the state does not invest directly to the person, but in institutions that increase human capital of persons (Dobeš, 2003). The need to continuously acquire new knowledge, skills and practice however, continues even after obtaining a certain level of education. This option offers further education as a part of lifelong learning (Kolláriková, 2014, Klímová and Žitek, 2015). It also confirms Porubčinová (2011) who says that from the point of view of developing

and shaping human capital, lifelong learning encompasses, in addition to school education and in-service training, enterprise education structures and the full range of formal and non-formal education. Others authors Balážová, st. and Balážová, ml. (2006), Baková and Lešková (2015) say that is very important to learning the students on the universities not only theoretical aspects but also practical skills, so that they can bring these benefits into their first job. However, this presupposes the alignment of the requirements of practice with the offer of higher education institutions in the field of trade union structure and competency profile of students It confirm also Brožová (2003) who mention, that higher education as a prevention against unemployment in the context of greater adaptability to changing labor market demands. In addition Kolláriková (2014) note that in the current turbulent environment, it is important to offer actually the skills and knowledge, which to facilitate the transition from school to employment, or which to help to get quality employment within study programme or to apply abroad. The school system should be flexible.

Education is an important factor in supporting employment of the population in the rural area, for the labor force flexibility and diversification activities through the form of new methodologies and techniques in education (Ferenczi Vaňová and Krajčířová and Váryová and Košovská, 2015). According to Horská and Ubřežiová and Palková, (2015) universities are searching possibilities how to attract students, how to offer high quality education and how to bring value added and differentiation to the university education. Competitive environment around us generates need of high quality, unconventional and innovative solutions in the sphere of higher education everywhere in the world. Bologna process is one of those approaches enabling harmonization and mutual cooperation of universities around the world. It confirm also Matušek and Drábeková and Országhová and Farkašová (2016) who note that the quality of higher education and the increasing competitiveness of universities are subject to continuous updating of the academic content as a result of interaction with the requirements for university graduates in the labor market. According to Polakovič and Slováková and Henyeyová (2016) modernization of educational system is a base for development of qualification of labor force of each organization on all its levels.

The application of modern trends in the training of agricultural experts and the system of lifelong learning in the agriculture is tool for ensuring the competitiveness of this sector. It confirm Kapsdorferová and Sviridová (2016) who mention that agricultural university education is one the most important instruments, which can provide economy with new specialists in agriculture on the one hand and renew specialists (in case of upgrade qualifications) on the other hand, who could face contemporary agricultural challenges. Also The Ministry of

Agriculture and Rural Development of the Slovak Republic supports the better use of material, technical and personnel capacities on the secondary agriculture schools in linking to the realization of lifelong learning in the form of educational activities, conferences, seminars, etc. (Strategy of education in the agriculture sector in Slovak republic 2007-2013, 2013).

At the present time the new economic situation in the information society opens up a discussion of changes in the nature or value of work. Work is not perceived in the information society only as an instrument of the economic process (Porubčinová, 2011). Feng and Graetz (2017) provides in their study, which suggest that employers when recruiting new employees, they trust about graduates' abilities who acquired in the universities. They find that higher education positively affect a graduate's probability of working in a high-wage industry six months after graduation. It confirm also Švarcová and Gabrhel and Cícha (2014) who mention that in the context of the research on the unemployment of graduates, the problematic interface between economic inactivity and the commencement of economic activity after graduation is the transition from a regular daily study to the first work. In the Czech Republic, according to the authors, an unemployed graduate represents the person who registered at a job office and who successfully completed school maximally not more than two years ago. Kabát, et al. (2014) note that extraordinary acute problem of unemployment and poverty incidence is linked with the young people under the age of 25 years. In some EU countries (Spain, Greece) it affects more than 50 % of population in this age group. There is no doubt, that unemployment represents currently the major social problem of the European Union. Its consequences are, however, evident in long lasting growth of social tension over various social groups and the entire society. In the Czech Republic, the unemployment rate of university graduates according to the Ministry of Labor and Social Affairs of the Czech Republic expresses the share of unemployed graduates in the difference between the total number of graduates and the number of graduates who continue to study at college (Švarcová and Gabrhel and Cícha, 2014).

2 Data and methodology

The basic data using for analysis were publicly available databases published by the Office of Labor, Social Affairs and Family of the Slovak Republic and also by the Statistical Office of the Slovak Republic. The data were analyzed in the time periods 2008-2011 and 2014-2017. Data for 2012-2013 are not available due to changes in the recording and subsequent data processing by the Office of Labor,

Social Affairs and Family of the Slovak Republic. The number of graduates and unemployed persons is reported as at 31 September of the year under review.

The acquired data were primary calculated in the programme Excel and subsequently analysed in the programme SAS. The method of average linkage was utilized for the individual cluster creation which use according to Stankovičová and Vojtková (2007) leads to the similar results as the method of furthest neighbour. Its principle is inherited in the aggregating of two clusters to one new cluster if there is an average minimal distance between them. The distance between clusters (1) is defined as the average from inter cluster distances of objects d_{ij} , i.e.:

$$D_{C_h, C'_h} = \frac{1}{n_h n'_h} \sum_i \sum_j d_{ij}(1),$$

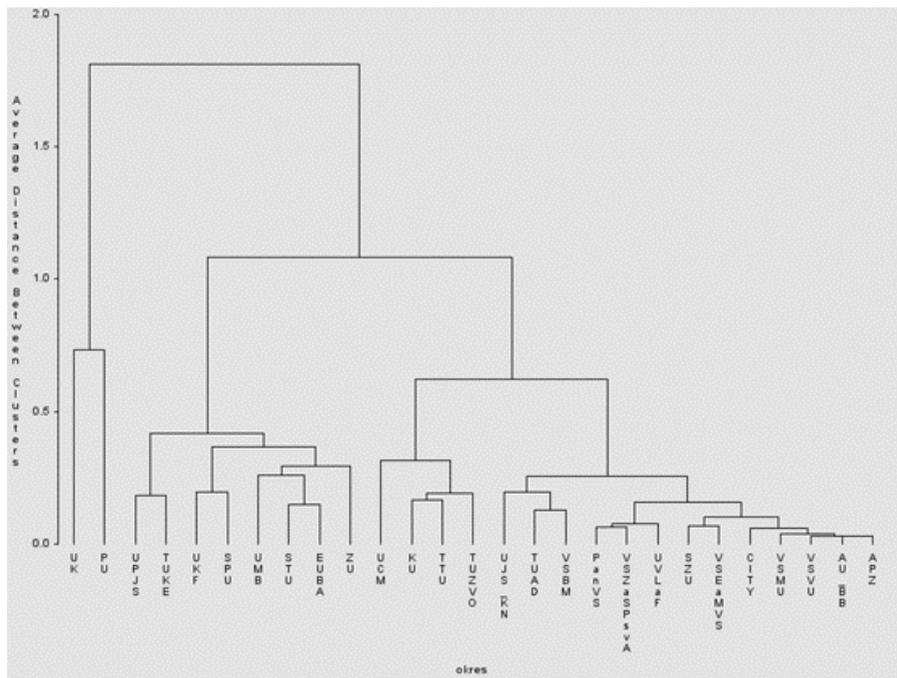
where n_h and n'_h are the numbers of objects in the cluster C_h and C'_h .

The cluster analysis and its outputs are simultaneously the input elements for the expression of levels and developments of interregional differences in Slovakia. It is indispensable as well as for the reveal of mutual and differentiated reasons of lags respectively progress of particular regions. The higher number of indicators is used (as regards their availability in time and in regional dimension), the regional status and the development in Slovakia are more complexly described (Chomjaková and Suchý and Kožiak, Daxnerová, 2016).

3 Results and discussion

Unemployment among graduates is, in our view, to be examined not only by length of registry at the employment office but also by the territorial structure. The dendrogram (Picture 1) shows the process of aggregation of universities in the Slovak Republic, which were reported at least 10 job seekers in the analyzed period. This condition was fulfilled by 27 universities, which were classified into 6 clusters on the basis of the classification characteristics of clustering.

Picture 1 **Dendrogram of universities in the Slovak Republic according to the district of unemployed graduates in 2017**



Source: Own processing.

The first and most numerous cluster is made up of 13 universities characterized by the fact that their graduates have a highly specific profile (all art schools), but also all private and state universities are included in this cluster. The second most frequent cluster is made up of 6 universities whose graduates come from the whole territory of the Slovak Republic. Similarly, graduates of Comenius University in Bratislava come from the whole Slovak Republic, but with the highest number of 561 (10.71%) of all registered unemployed graduates, it belongs to cluster 6. The University of Presov had 451 unemployed graduates, who present 9.36% of the total number of university graduates, but as many as 96.01% of all graduates are from the closest regions - Prešov and Košice so belongs into separate cluster 5. This trend is similar to Pavol Jozef Šafárik University in Košice and Technical University of Košice, but the number of graduates registered as job seekers is lower (280 or 311), so they form a separate cluster 4 (Table 1).

Table 1 Clusters of universities in the Slovak Republic according to the place of registration of their graduates as job seekers in 2017

Cluster	Number	Name of universities
1	13	Academy of Arts, Academy of the Police Force, Academy of Fine arts and Design
		College of Music Arts, The School of Management in Trenčín, Pan-European University
		Slovak medical university, School of Economics and Management of Public Administration in Bratislava
		St. Elisabeth University of Health Care and Social Work, University of Security Management in Košice
		Alexander Dubček University of Trenčín
J. Selye University, University of Veterinary Medicine and Pharmacy in Košice		
2	6	University of Economics, Slovak Agriculture University, Slovak University of Technology in Bratislava
		Constantine the Philosopher University in Nitra, Matej Bel University, University of Žilina
3	4	Catholic University in Ružomberok, University of Imava, Technical University in Nitra
		The University of St. Cyril and Methodus
4	2	Technical University of Košice, Pavol Jozef Šafárik University in Košice
5	1	Comenius University in Bratislava
6	1	University of Prešov

Source: Own processing.

These factors also influenced the formation of clusters of the registers of unemployed graduates of universities. In this case, 79 districts were divided into 8 clusters as the most appropriate possibility of dividing. From the point of view of the aggregation process as well as the previous findings, the result can be considered as expected (Table 2).

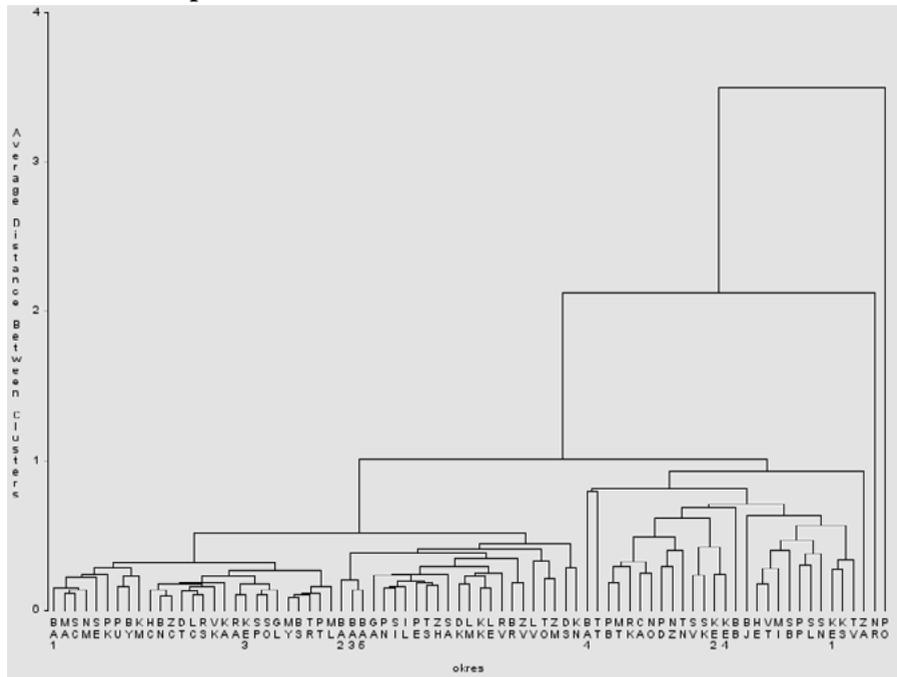
Table 2 Clusters of districts of the registry of graduates as job seekers in the Slovak Republic in 2017

Cluster	Number	Districts forming a cluster
1	50	MY BS BN ZC RA KE3 TR SP SO LC RS MA SC PT
		DT HC GL NM BA3 BA5 BA1 PN SI KK LE VK IL ML
		PU BY IS ZH DK LM BR ZV PE KA BA2 TO ZM SE
3	11	KM GA PK SA RV DS KN LV
3	11	HE VT KE1 KS MI PP SL TV SN SD DJ
3	13	PB MT SV SK KE2 KE4 CA NO PD NZ RK TN BB
4	1	BA4
5	1	TT
6	1	ZA
7	1	NR
8	1	PO

Source: Own processing.

The last 3 clusters - 8, 7 and 5 are made up of only one district (Picture 2) where at least 2 universities have their headquarters included into the survey. The cluster 6 is similarly created only for one district, namely the district of Žilina, in this district located only one university in town Žilina.

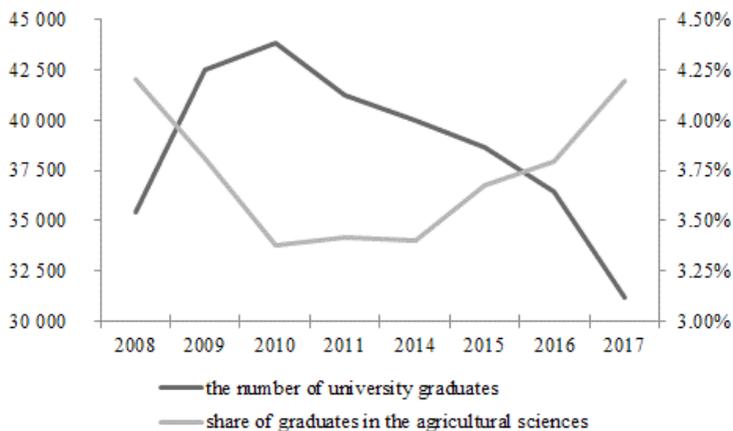
Picture 2 Dendrogram of districts of registry of unemployed graduates in Slovak Republic in 2017



Source: Own processing.

The number of graduates of the first and second level of study reached a maximum in the analyzed period in 2011 - 43,872 graduates, which is 40% more than in the last academic year 2017 - 31,164 graduates (Picture 3). The picture 1 also show that the share of graduates in the field of agricultural sciences has increased, when their long-term average share was 3.70% but in 2017 the share increased on the 4.20%

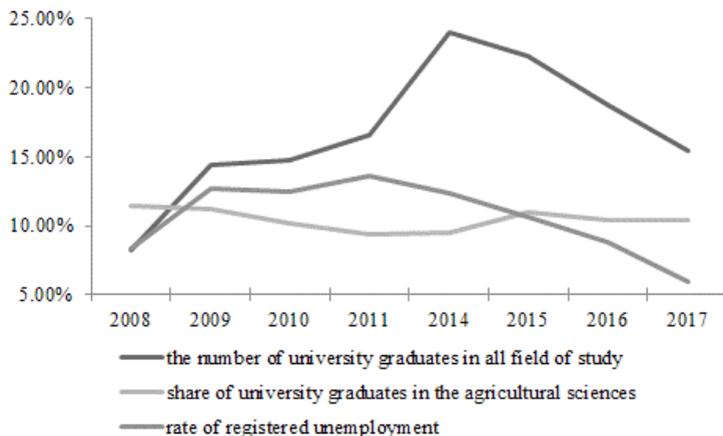
Picture 3 **Development of the number of university graduates and the share of graduates in the agricultural sciences in Slovak Republic**



Source: Statistical Office of the Slovak Republic, Office of Labor, Social Affairs and Family of the Slovak Republic, own processing.

Of the total number of university graduates, on average 16.79% of them were registered on a yearly basis as applicants for employment. University graduates in the agricultural sciences form long term about 10.43% of applicants for employment (Picture 4). These rates of registered unemployment of both groups of university graduates are predominantly higher than the overall registered unemployment rate in the Slovak Republic. For this reason, we also need to analyze the structure of unemployment according to the length of the period of unemployment.

Picture 4 Development of the share of university graduates registered as job seekers in the Slovak Republic



Source: Statistical Office of the Slovak Republic, Office of Labor, Social Affairs and Family of the Slovak Republic, own processing.

From a time perspective, the length of the period of unemployment is definitely the biggest group of graduates whose length of unemployment lasts 3-6 months, as graduate examinations are carried out in May - June and data from graduates' register are annually at 31 September. Share of unemployed graduates who have been registered for more than 6 months are falling sharply, with the exception of unemployed persons registered for more than 12 months who reaching values below 0.5%. Since 2014, the share of unemployed graduates registered for more than 12 months risen sharply (Table 3).

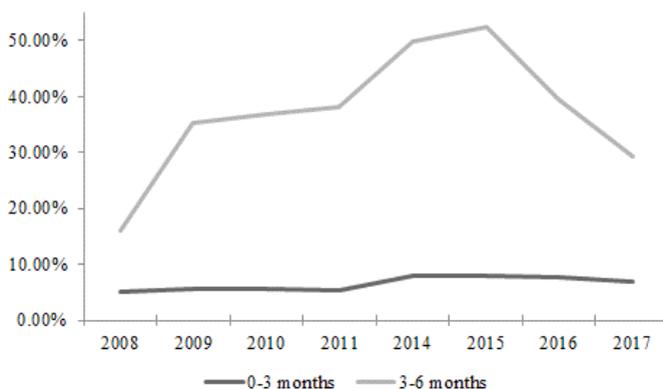
Table 3 Number of graduates registered as unemployed by length of registry in Slovak Republic

Year		2008	2009	2010	2011	2014	2015	2016	2017
N u m b e r	Graduates	35 400	42 508	43 872	41 245	39 953	38 649	36 427	31 164
	total	8.20%	14.44%	14.72%	16.51%	24.01%	22.28%	18.72%	15.46%
	0-3 month	2.73%	3.80%	3.44%	3.44%	4.31%	4.71%	4.43%	4.58%
	3-6 month	5.15%	10.14%	10.44%	11.94%	16.61%	15.18%	12.61%	9.96%
	6-9 month	0.08%	0.16%	0.19%	0.25%	0.48%	0.41%	0.27%	0.21%
	9-12 month	0.05%	0.09%	0.13%	0.12%	0.28%	0.23%	0.17%	0.10%
	13-15 month	0.06%	0.13%	0.25%	0.34%	2.30%	1.72%	1.22%	0.60%

Source: Social Affairs and Family of the Slovak Republic, own processing.

These trends apply to the group of graduates in general but are more pronounced in the group of graduates of agricultural sciences. The share of unemployed graduates of the agricultural sciences who are registered at the Labor Office represented 5.17% of the total number of unemployed graduates in 2008. In 2017, the share has increased to 6.89%. Changes within this category of unemployed graduates of agricultural sciences were only minimal in the analyzed period. Different development can be observed in the case of unemployed graduates of agricultural sciences who are registered at the employment office for 3-6 months. While in 2008 these graduates accounted 16.06% of the total number of unemployed graduates, in 2017 their share represented 29.3% of the graduates. The annually increasing of the share of these graduates we can see in the 2009-2015 (picture 3).

Picture 5 **Share of graduates of agricultural sciences registered as job seekers in the Slovak Republic according to the length of registry**



Source: Statistical Office of the Slovak Republic, Office of Labor, Social Affairs and Family of the Slovak Republic, own processing.

4 Conclusion

Analyses show that the unemployment of graduates with higher education in Slovak Republic can be considered as short-term and from the point of view of economic theory as frictional unemployment. In 2008-2017, only a minimum share of university graduates (0.83%), in the case of agricultural sciences only 2.30% of graduates, are registered as jobseekers for more than 12 months. Universities which providing education primarily in the field of agriculture do not create

a separate cluster when examining the structure of job seekers, that creation of which would indicate the existence of a factor causing an increase of the number of unemployed graduates from this field of study. On the contrary, the results of the cluster analysis showed that in the conditions of Slovak Republic it is possible to monitor, in the condition of universities from the perspective of structure of graduates that some of universities obtaining the status "local" universities.

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