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## Agricultural educational routes: Statistical references

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# AGRICULTURAL EDUCATIONAL ROUTES – STATISTICAL REFERENCES

VIOLETA FLORIAN<sup>1</sup>, MARIOARA RUSU<sup>2</sup>, ELISABETA ROȘU<sup>3</sup>

**Abstract:** *Human capital theories consider that education generates skills with economic efficiency because they make it possible to produce value. Generating appropriate skills in agriculture and an educational system specific for rural areas is a dynamic objective, mainly in the information-based developed economies, where technology and production methods are changing fast. The main objective of this paper is to analyse the educational training routes in agriculture, starting from pre-tertiary education, with all its forms, and ending up with tertiary education in this field. Based on the analysis of available statistical data, the paper emphasises that despite the progress that has been made in recent years, access to education, educational training levels measured in schooling years, insertion/integration opportunities throughout the educational cycle do not meet the human capital requirements specific to modern agriculture.*

**Key words:** *agricultural education, pre-tertiary and tertiary agricultural education, educational routes*

**JEL Classification:** *I21, Q19*

## INTRODUCTION

In the recent decades, many countries have put on their agenda to expand their capacity for education and technical and vocational training in agriculture. This objective is supported, in the first place, by the fact that gradually the social mechanisms for the inter-generational transfer of agricultural skills are falling apart: more and more children have attended primary, secondary and high-school education, which translated into a low participation in agricultural activities, which has implicitly led to lower opportunities to acquire basic agricultural skills (practical experience). Furthermore, in most countries with emerging economies and in developing countries, young people do not seem to be interested in learning the traditional farming practices from their parents, as these do not match their aspiration to modern lifestyles. At the same time, the very nature of farm production is changing: the young people who go into the farm business are currently facing new challenges and opportunities: climate change, market instability, new technologies, innovative marketing models, etc. (Brown, T., Majumdar, S., 2020). The main objective of this study targets the analysis of educational paradigm, mainly of agricultural educational routes, starting from pre-tertiary education, with all its forms, and ending up with tertiary education.

## MATERIAL AND METHOD

The approached topic required the use of appropriate methodology, which included documentary and statistical analysis methods. To describe the statistical model specific to the agricultural education system, secondary data were mainly analysed, from formal sources: statistical information provided by the National Institute of Statistics (NIS) and Eurostat. In this logic, the *educational paradigm* was analysed with the help of quantitative dimensions – for the high school, vocational, post-high school and higher education level – and the *socio-demographic paradigm* – focused on population employed in agriculture, educational capital of the farm head, etc.

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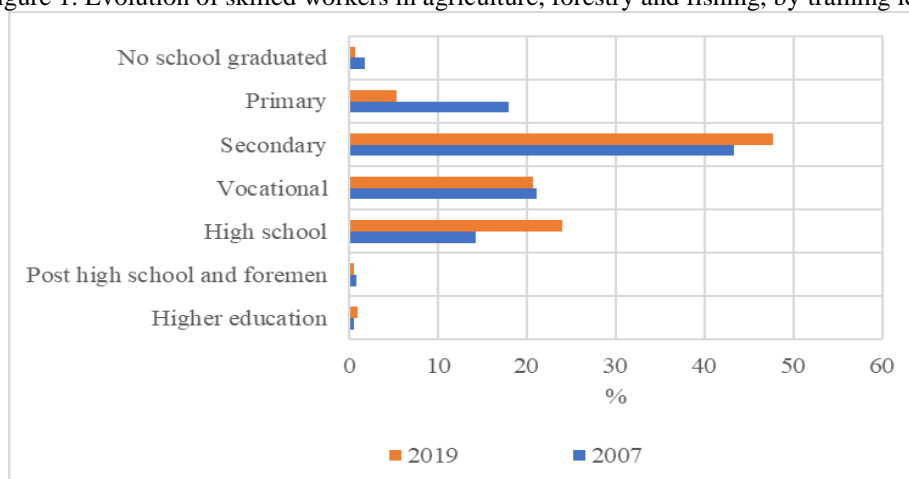
## RESULTS AND DISCUSSIONS

### 1. Human capital – need to improve education and vocational training

The professionalization of human capital in agriculture aims at transforming, both farmers and other actors in the agricultural and food system, into qualified entrepreneurs able to run their farms or business as productive and sustainable economic enterprises (Kirui, O.K., Kozicka, M., 2018).

Romania has significant human resources in agriculture (23% of total employed population), which places it on the first position among the European Union member states. Human factor contribution to economic growth depends not only on the number of involved persons but also on the educational level: in the year 2019, almost half of the population employed in agriculture had attended secondary education (48%), while the persons with vocational training and high school education took second place (45%). Among the people working in agriculture in Romania, the share of higher education graduates was very low – less than 1%.

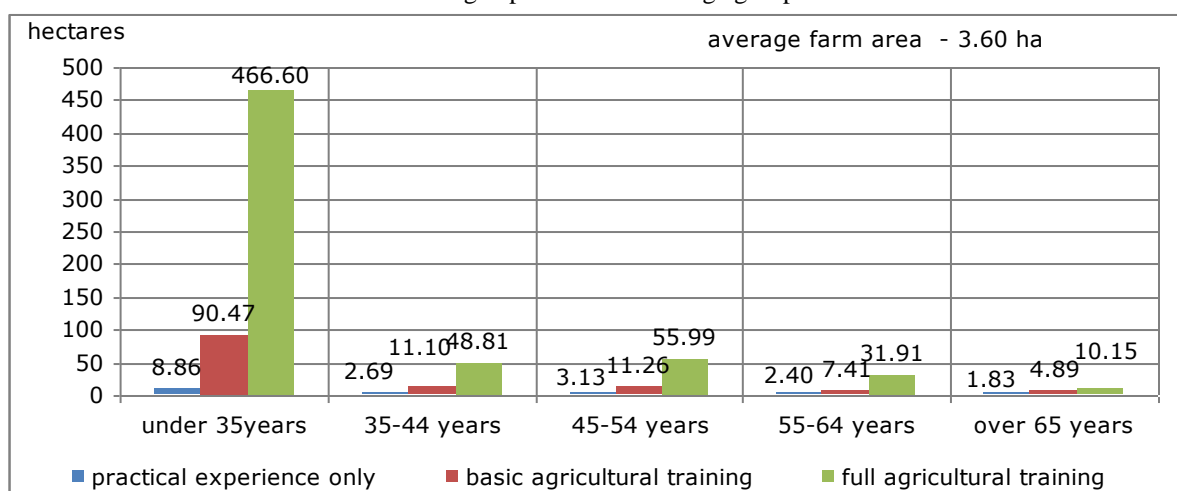
Figure 1. Evolution of skilled workers in agriculture, forestry and fishing, by training level



Source: NIS, Tempo-Online database, accessed in June 2019 (AMIGO)

In the year 2016, Romania had the most fragmented agrarian structure and had about one-third of the total number of farms (3.422 million) in the EU-28.

Figure 2. Distribution of farm heads by vocational training level, average operated area and age group



Source: authors' processing of Eurostat data, accessed June 2019

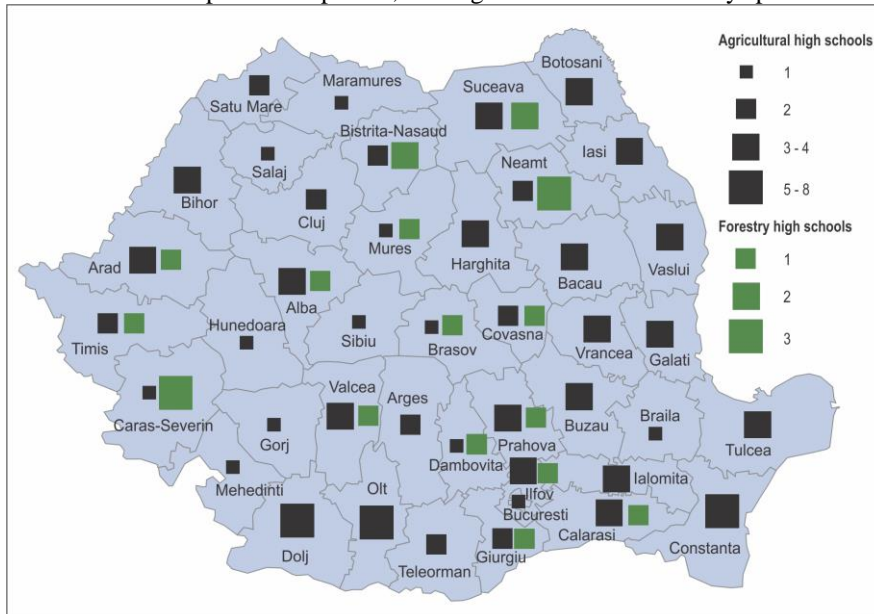
Most of these farms are run by farmers with low vocational training: 96.40% have only practical experience, 3.13% basic agricultural training and 0.47% full agricultural training.

In this context, the education system should take into consideration the following exogenous factors: *a) dual farm structure* – out of the total number of farms, 99.24% have an average size of 2.04 ha and 0.76% have an average size of 213.64 ha. This duality draws the attention on the fact the agricultural education and training system should respond to the specific needs of each group of farmers; *b) agricultural population ageing and the generational renewal implicitly* – the group of young farmers, under 35 years of age, although small in number (172 thousand persons), farm about 4 million ha, out of which 1.8 million ha are farmed by young farmers with full agricultural training. The new farmers’ access to quality education and vocational training continue to be low, as a result of various barriers, including accessibility, admission requirements, physical distance to the training centres, rural poverty, etc.

## 2. Agricultural high school, vocational and post-high school education

High school education is focused on the creation, development and diversification of skills depending on branch, profile, specialization or qualification. High school education covers the following fields and profiles: theoretical fields, with profiles: sciences and humanities; technological fields, with profiles: technical, services, natural resources and environmental protection; vocational/professional field, with profiles: military, theological, sports, arts and pedagogy. Within the technological field of high school education, and more precisely, of the profile natural resources and environmental protection, there are 4 basic training fields: ***agriculture, food industry, forestry and environmental protection***. In each county in Romania, there is at least one technological high school with natural resources and environmental protection profile, with specialization in agriculture and/or forestry.

Figure 3. Distribution of technological high schools, with natural resources and environmental protection profile, with agriculture and/or forestry specialization



Source: author’ processing based on the Ministry of Education and Research data, 2018

The high schools with technical profile prevail in total technological high schools, while those with natural resources and environmental protection profile do not exceed 18%. The number of pupils enrolled in this profile had a decreasing trend, similarly with the number of pupils enrolled in total technological high schools.

Table 1. Technological high school education  
– natural resources and environmental protection profile

Item	School year			
	2015/2016	2016/2017	2017/2018	2018/2019
Number of technological high schools, out of which with the following profile:	801	765	727	712
- natural resources and environmental protection	135	136	129	125
Pupils enrolled in technological high schools, out of which with the following profile:	299490	278141	268287	262908
- natural resources and environmental protection	49207	45679	43864	43128
Graduates from technological high school, out of which the following profile:	65290	63158	59119	...
- natural resources and environmental protection	10108	10279	9478	...

... missing data

Source: NIS, Romania's Statistical Yearbook 2019, p.330-331

At the same time, there is a very small number of technological high school graduates in the natural resources and environmental protection profile, in which agriculture and forestry are included, these representing 15% of the total number of graduates. "In the three categories of high schools, the technological high schools have the lowest graduation rates and the highest number of pupils who have to repeat the year or have been expelled from school" (GR, 2016).

The evolution of **vocational education**, mainly of agricultural education, is characterised by an increasing trend (except for the school year 2018/2019), both in the number of enrolled students and in the number of graduates.

Table 2. Evolution of the number of enrolled pupils and of graduates in vocational education  
– profiles: agriculture and forestry

Education level	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Vocational schools						
- enrolled pupils	25673	49479	65221	79735	84852	84966
- graduates	11403	10942	9752	18620	22404	...
out of which the following profiles:						
Agriculture						
- enrolled pupils	1748	4044	5253	6522	7100	6639
- graduates	697	757	718	1590	1766	...
Forestry						
- enrolled pupils	140	180	304	385	406	332
- graduates	61	59	31	71	143	...

... missing data

Source: NIS, Romania's Statistical Yearbook 2019, p.331-332

**Post-high school education** is part of vocational education and lasts 1-3 years, depending on the complexity of qualification and the number of credits required for vocational training. Post-high school education takes the form of post-high schools and foremen schools. The beneficiaries of this education form are the pupils who completed their high school studies, with or without high school graduation diploma. Agriculture and forestry are among the main domains of post-high school education.

Table 3. Evolution of the number of enrolled pupils and of graduates in the post-high school and foremen education – agriculture and forestry profiles

Education level	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Post-high school education, out of which:						
1. Agricultural						
- enrolled pupils	754	768	845	736	703	756
- graduates	218	315	334	290	308	...
2. Forestry						
- enrolled pupils	1011	961	1138	1040	907	949
- graduates	441	409	440	461	333	...
Foremen schools – agricultural profile						
- enrolled students	201	285	161	102	64	96
- graduates	51	124	69	57	16	...

... missing data

Source: NIS, Romania's Statistical Yearbook 2019, p.334-335

A characteristic of the post-high school and foremen education in agriculture and forestry is the oscillating dynamics of the number of enrolled pupils and of graduates.

### 3. Tertiary agricultural education

The statistical picture of tertiary education is that of a declining system generated by the contraction of demand. The demographic supply for 2022 is ensured by the young people who were born after 1999, substantiating a potentially limited demand: "As a result, the segment of potential students in the period 2017-2022 are the young people born in the period 1999-2004. In this sense, starting from the number of children born in the period 1999-2004 and then following their educational path/their number in the education system at 8 years, at 14 years, assigning the pass rate of the high school graduation exam and other indicators previously mentioned, ... the estimated number of students in the 1<sup>st</sup> year, from high school graduates, in the academic year 2020/2021 is 66,304, in 2021/2022 is 66,321, while in the year 2022/2023 is 67,792." (Petrescu, I., Gogu, E., Anghelache, C., Anghel M-G., 2018)

In the education system, there are four state tertiary education institutes only with agricultural and veterinary medicine profile and 13 tertiary education institutions, out of which 9 state institutions and 4 private institutions, with different profiles, among which agricultural faculties. The educational routes provided by the agricultural education structures have an increasingly lower attractiveness, the number of students steadily diminishing. It is worth noting, from statistical perspective, that the absolute diminution of the number of students has a selective character, depending on the levels of academic training (bachelor degree, master degree and Ph.D.); we also mention the fact that slow diminutions are mainly found in the number of students enrolled for bachelor degrees.

*The University of Agricultural Sciences and Veterinary Medicine from Bucharest* (USAMV Bucharest offered for the academic year 2019-2020, programmes for: bachelor degree (30 study programmes – full-time learning and distance/part-time learning); master degree (33 study programmes – full-time learning and part-time learning); Ph.D. (6 Ph.D. fields – agronomy, horticulture, animal science, veterinary medicine, biotechnologies, engineering and management in agriculture and rural development). However, the number of participants in educational activities is on a downward curve. For instance, if we compare the number of participants in the educational activity, in the academic year 2017/2018, we can notice that it decreased by 337 students compared to the previous year. In the case of master and Ph.D. programmes, the values indicate an increase, by 119 and 19 students respectively.

Table 4. Evolution of participants in the educational activity

Level of studies	2016-2017	2017-2018
Bachelor degree	9727	9252
Master degree	2011	2130
Ph.D.	310	329
Total general	12048	11711

Source: USAMV Bucharest, 2018, p. 20

The contracting number of students can be also noticed in the *University of Agricultural Sciences and Veterinary Medicine from Cluj-Napoca*. In the year 2019, there were 23 full-time bachelor degree programmes, and 5 part-time and distance learning bachelor degree programmes; there were 26 master degree programmes; the doctoral studies are performed in the Doctoral School of Agricultural Engineering Sciences and the Doctoral School of Veterinary Medicine (Rector's Yearly Report, 2019). The academic offer is focused on training experts in agriculture, horticulture, biotechnology, animal science, veterinary medicine, food science and technology.

Table 5. Situation of the total number of students

	Bachelor degree students		Master degree students		Ph.D. students	
	2015	2019	2016	2019	2015	2019
Total students	4652	4020	953	988	264	331
Students-state budget funded	3563	3035	803	822	258	292
Students -fee payers	1089	985	150	166	6	39

Source: USAMV Cluj-Napoca, 2019, p. 14-15

In the *University of Agricultural Sciences and Veterinary Medicine "Ion Ionescu de la Brad" from Iași*, the evolution of the number of students in recent years has revealed a tendency to stabilise the number of enrolled students at about 4500 students. The university offers educational routes focusing on: "training engineers specialised in agriculture, science of mountain agriculture, horticulture, animal husbandry, economic engineering, environmental engineering, agro-processing, control and expertise of food products, engineering and management in public food service and agro-tourism, bachelor degree in biology and veterinary medicine" (USAMV Iași, 2018).

The *University of Agricultural Sciences and Veterinary Medicine Banat from Timișoara* has experienced fluctuations in the number of students; in the year 2017, there was a contraction in the demand of part-time or distance learning: "The analysis of the number of students by education forms reveals a slight decrease of the number of students who attend distance learning or part-time courses, while the number of students who attend full-time courses increased (by 3.08%)" (USAMV Timișoara, 2018). Two years later, it was noticed that: "In the university, the total number of students (cycle 1 Bachelor degree), at the beginning and at the end of the year 2019, had a positive evolution ... thus, the number of students increased from 3,908 to 4,139 ... while the number of students (cycle 2 Master degree) increased by 9.2%" (USAMV Timișoara, 2019)

Table 6. Number of enrolled students for Bachelor and Master degree, by fundamental fields, in the academic year 2017-2018

	Engineering sciences		Biological and biomedical sciences		Total	
	Bachelor	Master	Bachelor	Master	Bachelor	Master
USAMV Bucharest	7659	2132	1553	...	9212	2132
USAMV Cluj-Napoca	2954	890	1397	40	4351	930
USAMV Iași	2536	728	909	...	3445	728
USAMV Timișoara	2836	956	988	45	3824	1001

Source: Petrescu, I, Gogu, E., Anghelache C., Anghel M-G., 2018, p. 515-517, 538-539

The agricultural universities are trying to ensure complex educational routes, structurally and functionally, to create the necessary premises for professional qualification and specialization

in an academic framework. The creation of academic competencies is a process that is institutionally completed through doctoral studies; each university has doctoral schools. The doctoral fields are diverse and in significant number (USAMV Bucharest - 6 fields, the other universities 5 fields each) (Petrescu, I., Gogu, E., Anghelache, C., Anghel M-G., 2018).

## CONCLUSIONS

The agricultural education system dynamics is generated by exogenous factors – demographic, economic and social – as well as by internal factors, coming from its own structures and functionalities. Its social adaptability to the requirements of a society in transformation, in permanent evolution, should confer it both continuity and consistence for ensuring an efficient human capital for a vital field of activity, such as the agricultural sector. The educational routes provided by the agricultural education structures have an increasingly lower attractiveness, as the number of enrolled pupils and students is steadily diminishing, facing significant problems in terms of efficiency, quality and relevance.

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