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TACKLING LABOUR SHORTAGES AND BOLSTERING PERFORMANCE: A COMPREHENSIVE ANALYSIS OF AGRICULTURAL HIGH SCHOOLS IN ROMANIA

Marius Mihai MICU[1], Răzvan PANAIT[1], Ionela Monica PANDELEA[2], Dumitru Tudor JIJIE[2,3]

[1]University of Agronomic Sciences and Veterinary Medicine, Faculty of Management and Rural Development, 59 Marasti Boulevard, District 1, 011464 Bucharest, Romania, Emails: micu.marius@managusamv.ro, panait.razvan@managusamv.ro
[2]County Directorate for Agriculture Iasi, 700064 Iași, Romania, E-mail: monicapandelea@yahoo.com
[3]"Alexandru Ioan Cuza" University of Iași, Faculty of Economics and Business Administration, 700505 Iași, Romania, E-mail: tudor.jijie@feea.uaic.ro

Corresponding author: panait.razvan@managusamv.ro

Abstract

This study explores the challenges facing agricultural high schools in Romania and their impact on their overall performance, looking at how the management of these institutions responds to the dynamic demands of the labour market and combats the current labour shortage. Through a comprehensive survey of all such institutions in the country, we collected and analysed data, then used multiple linear regression to establish connections between different key factors. These factors include material and financial resources, level of teacher commitment and motivation, parental involvement, and collaboration with economic entities and farmers. Our results under-score the importance of updating the technical infrastructure and training teachers in line with modern agricultural technologies. They also highlight the need for more active involvement of parents and closer collaboration with the business environment. It is also crucial to change the public's perception of agriculture by promoting the benefits of this industry to the younger generation. By implementing these strategies, the effectiveness of agricultural high schools can be improved and the labour shortage in Romania can be addressed.

Key words: *agriculture, agricultural secondary schools, labour force, survey, Romania*

INTRODUCTION

In recent decades, the agricultural sector has experienced a number of significant changes, driven by various global and local trends and challenges. These transformations have led to an imperative need for adaptation and innovation within the agricultural industry, as well as in the field of education, which plays a crucial role in training the new generations of professionals in the sector [21].

One of the most important challenge in agriculture is the climate change, which affects natural resources, soil quality, and biodiversity [13]. These impose the need to train specialists in agricultural techniques adapted and resilient to climate change [16]. In this context, agricultural secondary schools need to reconsider their curricula and teaching methods to respond to these challenges.

Another notable trend in the agricultural sector is digitisation and the adoption of new technologies, such as precision agriculture and the use of robotics [2]. This underlines the importance of education in agricultural secondary schools, which need to train students in the use of these technologies and provide them with the necessary skills to be able to cope with the labour market demands for this sector.

The agricultural sector is also under pressure to increase food production in a sustainable way to meet the needs of a growing population [6]. In this sense, agricultural secondary schools have the role to promote sustainable agricultural practices and train professionals who will be able to address

issues related to food security and environmental sustainability.

In recent decades, the educational system and, in particular, agricultural secondary schools have been essential in training future agricultural specialists, both in the European Union and in Romania. These educational institutions have played a crucial role in the development of the agricultural sector, contributing to increasing productivity and promoting sustainable practices in agriculture [12]. However, in recent years, agricultural secondary schools have faced significant challenges, including adapting to climate, technological, and social changes influencing labour market in the agricultural sector. The history and evolution of agricultural secondary schools in Romania is part of a broader context, representing a relevant and interesting topic in European educational and agricultural research [5, 24].

Thus, in the European Union, agricultural and vocational education has proven its value through support programmes for young farmers and by adapting to European requirements and standards for sustainable agricultural practices [11, 24]. In the European Union, the history and evolution of agricultural secondary schools vary according to the traditions and particularities of each member country. However, in general, agricultural educational institutions have played an important role in the development of European agriculture, preparing the workforce needed to face the challenges and changes in the agricultural sector [17, 23]. Over time, agricultural secondary schools in the EU have steadily evolved, integrating new teaching methods and adapting to the demands of the labour market and the needs of the agricultural sector in a globalised and changing context [10].

In Romania, agricultural secondary schools have a long history, having their roots in the interwar period and evolving over the decades according to the political, social and economic context [4, 25]. A common trend in the evolution of agricultural secondary schools in Romania and the European Union has been the continuous adaptation of curricula and teaching methods to the specific needs of the agricultural sector. In this context, the focus has been on the promotion of sustainable agricultural practises, the use of modern technologies in agriculture, and the development of entrepreneurial skills among young people, but the accelerated changes that have occurred in recent years appear to have left be-hind the adaptation of Romanian agricultural secondary schools [7, 8].

A key issue is the migration of young people to other fields of study or to educational institutions abroad. This trend can be attributed to factors such as socioeconomic expectations, perceptions of career opportunities, and access to information on available educational options [22]. Furthermore, climate, technological and social changes are significantly influencing the requirements of the labour market in the agricultural sector. These changes require continuous adaptation of the workforce, infrastructure, and agricultural technologies, as well as a re-calibration of the professional skills and knowledge needed to meet current and future challenges [19]. Given this, a reevaluation of the curriculum and teaching methods in agricultural secondary schools is needed to adapt to the current needs of the agricultural sector. This includes the integration of new technologies and pedagogical approaches into the teaching process, as well as the promotion of interdisciplinary collaboration and project-based learning [9, 26].

One of the main challenges in agricultural education and the labour market is attracting and retaining young people in agriculture. Young people are a key resource to ensure continuity and innovation in the agricultural sector as the workforce ages, making succession issues a concern [20, 27]. Various authors consider that is important to develop career guidance programmes and improve the image of agriculture among young people, secondary lighting the career opportunities and benefits associated with working in the sector. Another challenge is the need to develop cross-cutting competencies and critical thinking skills in graduates to prepare

them to respond effectively to the complex and interconnected issues facing the agricultural sector. This also involves a review of the curriculum and teaching methods so that greater emphasis is placed on developing problem solving, communication, teamwork, and adaptability skills [3].

The purpose of the study is to explore the factors that may influence the development of agricultural secondary schools in the context of the challenges facing the agricultural labour market in Romania, based on the opinions of all the principals of agricultural vocational schools at national level.

MATERIALS AND METHODS

We conducted an in-depth investigation to identify the factors that may influence the development of agricultural secondary schools, from the perspective of all the directors of agricultural vocational schools in Romania. Therefore, by applying descriptive and content analysis, we evaluated the factors that can influence the development of the development of these forms of education.

Research methods and instruments

We conducted a questionnaire-based survey as the main research instrument, using the Computer-Assisted Web Interviewing (CAWI) method of data collection that facilitates the filling out the questionnaire online using a computer or other device [14]. The survey includes a total of 59 respondents, consisting of all the principals of agricultural secondary schools in Romania.

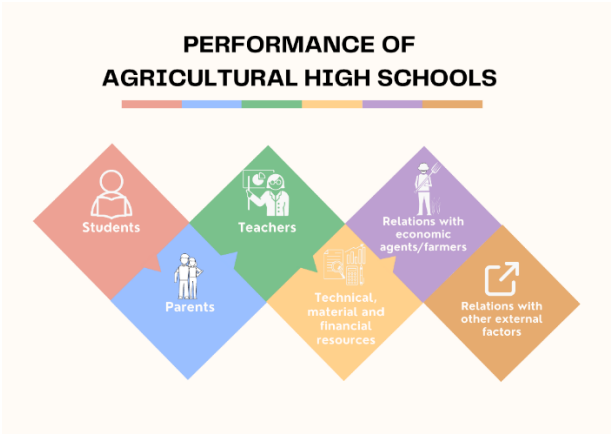

Fig. 1. Structure of the applied questions
Source: own processing.

To this end, all the educational establishments with this profile were identified by administering specific questions to them, taking into account how they evaluate the factors that can influence the performance of a secondary school, targeting: students, parents, teachers, relationship with economic agents/farmers and relationship with other external factors (Figure 1).

Each factor was composed of 3 or more questions, and the Likert scale (1 - strongly disagree to 5 - strongly agree), commonly used in opinion research to measure respondents' attitudes, perceptions or opinions, was used as a psychometric rating method.

Participants in the research and data sources

The structure of the sample analysed is as follows:

Respondent's function: director - 89.5%, deputy director - 10.5%;

Experience in the position of manager for an educational institution: < 5 years - 33.3%, 6-10 years - 35.1%, 10-20 - 22.8%, >20 years - 8.8%;

Secondary school profile: animal field - 5.3%, plant field - 21.1%, mixed field - 52.6%, food field - 8.8%, Other (economic and agricultural, agricultural mechanic, service, veterinary, etc.) - 12.3%.

In addition, the geographical representation of the respondents is shown in the figure below, where Iasi County has the highest number of agricultural high schools (6) (Figure 2).

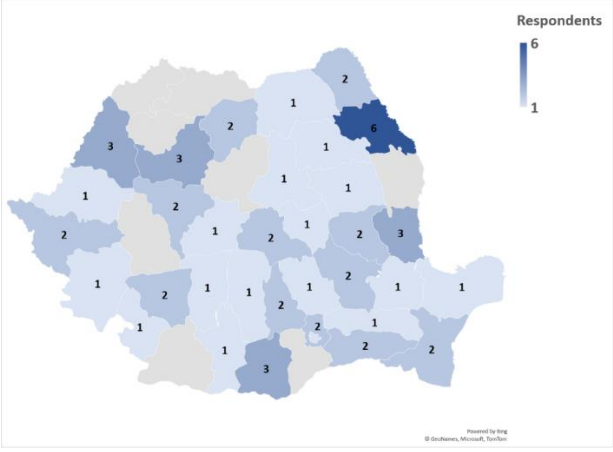

Fig. 2. Representation of respondents at the county level
Source: Questionnaire data processing.

The questionnaire was distributed to respondents between June and July 2022. Subsequently, the collected data were entered, organised, and analysed using SPSS 18. The first stage of data analysis consisted of descriptive data analysis, for which sum, mean, standard deviation, variance, Skewness, and Kurtosis were determined based on the following mathematical formulas [1]:

$$\bar{x} = \frac{x_1+x_2+\cdots+x_n}{n} \quad \text{.....(1)}$$

$$\bar{x} = \frac{\sum f_x}{N}, \quad \text{.....(2)}$$

where:

x - the mean value of the set of given data, f - frequency of the individual data, N - sum of frequencies;

$$S = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}} \quad \text{..... (3)}$$

where: S - Sample standard deviation, $\bar{x}$ - Arithmetic mean of the observations

$$\text{Skewness} = \frac{\sum_i^N (x_i-\bar{x})^3}{(N-1)\times\sigma^3} \quad \text{..... (4)}$$

where:

Xi - ith Random Variable, X - Mean of the Distribution, N - Number of Variables in the Distribution, Ơ - Standard Distribution;

$$\text{Kurtosis} = * \frac{\sum_i^n (Y_i-\bar{Y})^4}{\sum_i^n (Y_i-\bar{Y}^2)^2} \quad \text{..... (5),}$$

where:

Yi - ith Variable of the Distribution, $\bar{y}$ - Mean of the Distribution, n - Number of Variables in the Distribution.

In order to validate the hypotheses, multiple linear regression was used and the following mathematical formula was used [15]:

$$Y = a + bX \quad \text{.....(6)}$$

where:

Y is the dependent variable (that's the variable that goes on the Y axis), X is the independent variable (i.e. it is plotted on the X axis), b is the slope of the line and a is the y-intercept.

Assumptions underlying the questionnaire:

Hypothesis 1 (H1). *There is a significant relationship between technical and financial resources and the performance of agricultural secondary schools.*

Hypothesis 2 (H2). *There is a significant relationship between teacher and financial motivation and commitment and the performance of agricultural secondary schools.*

Hypothesis 3 (H3). *There is a significant relationship between student quality and agricultural secondary school performance.*

Hypothesis 4 (H4). *There is a significant relationship between parental quality and agricultural secondary school performance.*

Hypothesis 5 (H5). *There is a significant relationship between relationships with economic agents and farmers and the performance of agricultural secondary schools.*

Hypothesis 6 (H6). *There is a significant relationship between relationships with other external factors and the performance of agricultural secondary schools.*

RESULTS AND DISCUSSIONS

Descriptive statistics of the respondents are presented in the table above. This first set of 10 questions asked respondents to rank each answer, assigning it a place (1 most important, 4 least important) according to the importance they attached to it.

It can be seen that for each of the factors considered, the average scores ranged from 2.63 to 3.88, suggesting that principals consider all these factors to have an important influence on school performance.

However, it should be noted that the endowment of secondary schools is the most important factor influencing the performance of agricultural secondary schools, with an average score of 2.63 (Table 1).

Significant variation in scores can also be observed for each of the factors, with standard deviations ranging from 0.375 to 1.395. This variation suggests that principals rank the relative importance of each factor differently in terms of factors that can influence the performance of the schools they represent.

Overall, the results in Table 1 provide a complex picture of the factors that influence the performance of agricultural secondary schools, so that principals consider all of these factors of notable importance, but the weight assigned to each factor varies significantly among respondents. These results may be useful to better understand principals' concerns and to develop strategies to improve the performance of agricultural secondary schools in the context of current labour market challenges in the sector (Table 1).

Table 1. Descriptive statistics of responses on factors that can influence the performance of a secondary school

	Sum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Teaching farm/ Material base	155	2.63	1.299	1.686	-.143	.311	-1.728	.613
Motivation and involvement of teachers	186	3.15	1.127	1.269	-.910	.311	-.727	.613
Teacher training	214	3.63	.849	.721	-2.164	.311	3.442	.613
Quality/specialisation of management	225	3.81	.706	.499	-3.665	.311	12.103	.613
Quality of students	166	2.81	1.395	1.947	-.403	.311	-1.782	.613
Quality of parents	213	3.61	.695	.483	-1.525	.311	.873	.613
Relationship with business partners/farmers	202	3.42	.894	.800	-1.408	.311	.925	.613
Relationship with other external factors	229	3.88	.375	.141	-3.374	.311	11.831	.613
Location of the secondary school	228	3.86	.472	.223	-3.499	.311	11.254	.613
Secondary school prestige	202	3.42	.951	.904	-1.457	.311	.854	.613

Source: Questionnaire data processing.

According to the data presented in Table 2, a notable trend is that the majority of respondents believe that students coming to agricultural secondary schools have a poor preparation from the secondary cycle, with a mean of 4.29 and a standard deviation of 1.018.

This suggests that students are having difficulty adapting to the rigors of agricultural education and that secondary schools could benefit from closer collaboration with secondary schools to improve the preparation of these students (Table 2).

Another important finding is that 59% of respondents consider that the level of motivation of students is generally low, with a mean of 3.78 and a standard deviation of 1.161. This may be related to the perception that a significant proportion of students see admission to an agricultural college as a failure rather than a success (mean 3.47, standard deviation 1.223) (Table 2). This negative perception could be addressed through information and career guidance campaigns that emphasise the importance and opportunities offered by agricultural education.

At the same time, the respondents claim that it is necessary to test the skills and competences of pupils as early as secondary school, as the level required by agricultural education is not low, despite the contrary impression (mean 4.05, standard deviation 1.151). In this respect, counselling pupils in their career choice can be decisive in identifying those truly motivated for agricultural education (mean 4.51, standard deviation .858) (Table 2).

According to the results, the respondents state that most of the families where the students come from have a poor financial situation (mean = 4.32; standard deviation = 0.797), suggesting that access to education is quite difficult for these students. Furthermore, they reveal that parents have social problems and dependencies (mean = 3.58; standard deviation = 1.206), which could negatively affect their participation in their children's education (Table 3).

Table 2. Descriptive statistics of respondents' views on student quality

	Sum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Students who come to us usually come very poorly prepared from secondary school	253	4.29	1.018	1.036	-1.224	.311	1.077	.613
Students who come to us are often deficient in basic education, behavioral	201	3.41	1.261	1.590	-.129	.311	-1.011	.613
The level of motivation with which they go to secondary school is usually low	223	3.78	1.161	1.347	-.716	.311	.029	.613
A significant proportion of them perceive their assignment to an agricultural college as a failure rather than a success	205	3.47	1.223	1.495	-.408	.311	-.192	.613
It is necessary to test pupils' skills and abilities as early as secondary school. The level demanded by agricultural education is not low, despite the impression to the contrary	239	4.05	1.151	1.325	-.804	.311	.169	.613
Advising secondary school students on their future career path can be decisive in identifying truly motivated children for agricultural education	266	4.51	.858	.737	-1.212	.311	1.173	.613
Some students prefer to pursue less technical majors because they are easier, although they would have more to gain in the long run by doing the opposite	208	3.53	1.209	1.461	-.274	.311	-.247	.613
Some students do not register for the Baccalaureate exam because they are convinced that they cannot pass it	223	3.78	1.260	1.589	-.637	.311	-.214	.613
A significant proportion of students drop out of secondary school to go abroad	160	2.71	1.378	1.898	.379	.311	-.849	.613
After graduation, most students go abroad, avoiding university studies	186	3.15	1.257	1.580	.349	.311	-.522	.613
The labour market insertion rate in the field of graduation is very low	193	3.27	1.201	1.442	.070	.311	-.116	.613
Most of the time, our graduates end up working in fields other than the one they specialised in	206	3.49	1.265	1.599	-.219	.311	-.426	.613

Source: Questionnaire data processing.

Table 3. Descriptive statistics of respondents' views on student quality

	Sum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Most of the families our students come from are not concerned about education	221	3.75	1.060	1.124	-.454	.311	-.245	.613
Most of the families our students come from are families with a precarious financial situation	255	4.32	.797	.636	-.866	.311	.957	.613
In many situations, our students' parents have social problems and addictions	211	3.58	1.206	1.455	-.338	.311	-.400	.613
There are situations where parents require children to commute in order to use them for household/agricultural work	220	3.73	1.375	1.891	-.313	.311	-.638	.613
Parents often have a misperception of their children's level and potential, which leads to their children being steered towards academic rather than vocational secondary schools, when this would not be the case.	258	4.37	.945	.893	-.952	.311	.837	.613
Parents could play an important role in guiding their child to the right secondary school and major, but are usually absent from secondary school promotion events.	266	4.51	.751	.565	-.661	.311	1.230	.613
Many of our students' parents are abroad, with grandparents or older siblings looking after their children.	221	3.75	1.183	1.400	-.454	.311	-.600	.613

Source: Questionnaire data processing.

The respondents also reveal that parents could play an important role in guiding their child to the right secondary school and major, but are often absent from secondary school promotion

events (mean = 4.51; standard deviation = 0.751). This result highlights the importance of parents' involvement in their children's career guidance process.

Another important aspect highlighted by the study is that many of the parents work abroad, leaving their children in the care of grandparents or older siblings (mean = 3.75; standard deviation = 1.183). This phenomenon could have negative effects on the emotional and educational support of children (Table 3).

Table 4. Descriptive statistics of respondents' views on teacher motivation and involvement

	Sum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
A training programme for our teachers on new technologies used by employers/farmers is needed	234	3.97	1.050	1.102	-1.041	.311	.716	.613
It is necessary to support qualification courses for our teachers on specific topics such as pedagogy, environmental protection, etc.	208	3.53	1.331	1.771	-.511	.311	-.588	.613
There is a deficit of skilled workers, especially for the agricultural mechanic specialisation.	171	2.90	1.494	2.231	.147	.311	-1.405	.613

Source: Questionnaire data processing.

The respondents believe that a teacher training programme on new technologies used by employers and farmers (mean = 3.97; standard deviation = 1.050). This suggests that the implementation of such training programs could help improve the quality of education in agricultural secondary schools and better prepare students for the labor market (Table 4).

Respondents also mentioned the need for teacher training courses on specific topics such as pedagogy, environmental protection, and others (mean = 3.53; standard deviation = 1.331). This finding indicates the importance of continuous development of teachers' professional skills to cope with the changing demands of the agricultural field (Table 4).

With regard to the deficit of skilled workers, especially for the agricultural mechanic specialisation, respondents identified this as a problem (mean = 2.90; standard deviation = 1.494). This suggests that agricultural secondary schools face difficulties in attracting and retaining qualified workers, which could negatively affect the quality of education offered to students and their ability to integrate into the labour market (Table 4).

The equipment used in agricultural secondary schools is usually old (mean = 3.92; standard deviation = 1.317), indicating a need for investment in upgrading. Respondents are of the opinion that the use of outdated equipment is not an appropriate option for the educational process (mean = 4.44; standard deviation = 1.071), highlighting the need to improve the quality of equipment used in agricultural education (Table 5).

Upgrading IT equipment is also considered necessary (mean = 4.29; standard deviation = 1.145), suggesting that investment in information technology could help improve the quality of education in agricultural secondary schools.

Furthermore, respondents support the inclusion of IT solutions for e-learning platforms in the list of future purchases,

especially for the assessment component (mean = 4.12; standard deviation = 1.001) (Table 5).

The existence of own accommodation facilities is considered a strength for agricultural colleges in terms of increasing their attractiveness (mean = 4.61; standard deviation = 1.034).

This suggests that the development and improvement of these facilities could contribute to increasing student interest in agricultural education (Table 5).

At the same time, the respondents believe that it would be appropriate to launch a national equipment programme (mean = 4.69; standard deviation = 0.749), indicating the need for a coordinated national effort to address equipment and infrastructure issues in agricultural secondary schools (Table 5).

Table 5. Descriptive statistics on respondents' views on technical, material and financial resources

	Sum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Our equipment is usually old. Most date back to the PHARE programmes, which not all secondary schools had access to.	231	3.92	1.317	1.734	-1.152	.311	.188	.613
Equipping farms with obsolete equipment is not a suitable option for the educational process	262	4.44	1.071	1.147	-1.845	.311	2.855	.613
IT equipment upgrades needed	253	4.29	1.145	1.312	-1.522	.311	2.019	.613
The list of future purchases should also include IT solutions for an e-learning platform, mainly for the evaluation component	243	4.12	1.001	1.003	-.992	.311	.423	.613
The existence of its own accommodation and catering facilities is a strong point for the school in terms of increasing its attractiveness	272	4.61	1.034	1.070	-2.145	.311	4.623	.613
It would be appropriate to launch a national equipment programme	277	4.69	.749	.560	-2.236	.311	5.066	.613

Source: Questionnaire data processing.

The respondents claim that business agents/farmers communicate too little about the expectations they have of agricultural college graduates (mean = 3.88; standard deviation = 0.930). This indicates the need for a closer dialogue between agricultural secondary schools and economic agents/farmers to align the educational offer with labour market requirements (Table 6).

In some cases, economic agents/farmers use students in activities that are not related to their professional practise (mean = 3.36; standard deviation = 1.214), which underscores the importance of monitoring and regulating the relationship between secondary schools and economic agents / farmers that are partners in the internship activities(Table 6).

Table 6. Descriptive statistics of respondents' opinion on the relationship with economic agents/farmers

	Sum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Businesses/farmers communicate too little about the expectations they have of agricultural college graduates. This is also visible during institutional meetings	229	3.88	.930	.865	-.822	.311	.651	.613
In some situations, the economic agent/farmer uses the pupils in activities unrelated to their professional practice	198	3.36	1.214	1.475	-.488	.311	-.622	.613
Dual education is the optimal solution for the development of vocational and secondary agricultural education	232	3.93	1.388	1.926	-.476	.311	-.289	.613
Medium and large farmers are more willing to relate to the agricultural college than small farmers	211	3.58	1.404	1.973	-.239	.311	-.935	.613
Overall, the relationship between the agricultural college and the economic agent/farmer-employer is improving from one year to the next	217	3.68	1.008	1.015	-.980	.311	.909	.613

Source: Questionnaire data processing.

Dual education is seen as the optimal solution for the development of vocational and secondary agricultural education (mean = 3.93; standard deviation = 1.388). This suggests that the promotion of the dual education system, which combines theoretical learning with practical training in farms and enterprises, could bring significant benefits in preparing students for the labour market. It is also identified that medium and large farmers collaborate with agricultural secondary schools more than small ones (mean = 3.58; standard deviation = 1.404) (Table 6).

One of the relevant issues is the lack of skilled agricultural labour, which affects businesses and farms (mean = 4.51; standard deviation = 0.817). This underscores the need to improve the quality and attractiveness of agricultural education in order to train more specialists in the field (Table 7).

The respondents identified the need for a legislative framework to provide incentives for economic agents and farmers involved in dual training activities (mean = 4.68; standard deviation = 0.899). Such legislation could stimulate the involvement of these actors in the training of future professionals (Table 7).

Agricultural education is perceived as of poor quality and even is regarded as a denigration (mean = 4.07; standard deviation = 1.081), which could have a negative impact on the attractiveness of this type of education. In this context, efforts are needed to improve the image and quality of agricultural education (Table 7).

Another relevant aspect is the lack of communication between relevant central

actors (line ministries), business/employers, and the labour market (mean = 3.97; standard deviation = 0.946). Better communication between these actors could help to identify and address common problems in agricultural education (Table 7). Next, multiple linear regression was used to analyse the relationships between the dependent variables (Table 1) represented by the reasons influencing the good performance of agricultural secondary schools and the causes and solutions identified for each criterion, representing the independent variables.

Table 7. Descriptive statistics of respondents' views on other categories of external factors

	Sum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Businesses / farmers suffer from the lack of skilled agricultural labour	266	4.51	.817	.668	-1.597	.311	4.779	.613
There is a need to create a legislative framework to provide facilities for economic agents/farmers involved in the work experience activities of students in dual agricultural education	276	4.68	.899	.808	-2.695	.311	8.482	.613
Agricultural education is perceived to be of poor quality, even denigrated due to lack of information	240	4.07	1.081	1.168	-1.326	.311	1.488	.613
Part of the planning by specialisation and number of students coming from secondary school level does not find its equivalent in the labour market	205	3.47	1.223	1.495	-.525	.311	-.408	.613
We are expected to continue to see a decline in demographics, which will affect agricultural education enrolment figures	250	4.24	.878	.770	-.649	.311	-.195	.613
The establishment of a state-funded school for agricultural mechanics could be a solution to the problem of a lack of teaching staff with this specialisation.	233	3.95	1.345	1.808	-.786	.311	-.437	.613
Low wages and no subsidies for employers contribute to graduate migration abroad	254	4.31	.836	.698	-1.001	.311	.242	.613
Identifying solutions that allow the association of economic agents for educational purposes would increase the capacity to support scholarships and other facilities for trainees	263	4.46	.953	.908	-2.166	.311	4.830	.613
The abolition of vocational education has damaged the image in the perception of students and parents with which agricultural secondary school principals still struggle today	261	4.42	.855	.731	-1.638	.311	3.087	.613
There is a lack of communication between the relevant central actors (line ministries), business/employers and the labour market	234	3.97	.946	.895	-.816	.311	.521	.613
Migration and an ageing population have created a favourable context for agricultural and vocational secondary schools	187	3.17	1.510	2.281	.106	.311	-1.084	.613

Source: Questionnaire data processing.

Table 8. Influence of technical, material, and financial resources on the performance of agricultural secondary schools

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
				R Square Change	F Change	df1	df2	Sig. F Change	
.887	.773	.755	0.560	.077	35.610	6	52	.001	2.017

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	75.264	6	12.544	35.610	,001
Residual	22.533	52	0.433		
Total	97.797	58			

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.61	3.83	2.63	.361	59
Residual	-1.841	1.607	.000	0.658	59
Std. Predicted Value	-2.803	3.326	.000	1.000	59
Std. Residual	-1.398	1.220	.000	.947	59

Source: Questionnaire data processing.

These results suggest that technical and financial resources are important factors in determining the performance of agricultural secondary schools, and the multiple linear regression model provides a good fit to the data. The multiple correlation coefficient indicates a strong and positive relationship between technical materials and financial resources and the performance of agricultural secondary schools (R=0.887). At the same time, the coefficient of determination shows that almost 77.3% of the variation in the performance of agricultural secondary schools can be explained by the variation in technical and financial resources (R^2=0.773) (Table 8).

The small value of the standard deviation of the estimation error suggests that the models are relatively accurate and that the model estimates are close to the true values (Std. Error of the Estimate = 0.560). The significant statistic F (change F = 35.610) and small p-value suggest that the model is significant ($p<0.005$) and that the independent variables have a significant influence on the dependent variable (Table 8).

Teacher motivation and involvement are important factors in determining the performance of agricultural secondary schools. Specifically, the results show that there is a strong and positive relationship between teacher motivation and participation and financial motivation and participation and agricultural secondary school performance (R=0.824). Approximately 68% of the variation in agricultural secondary school performance can be explained by the variation in teacher and financial motivation and participation, suggesting that these factors are important to improve agricultural secondary school performance (R^2=0.680) (Table 9).

Table 9. Influence of teacher motivation and participation on the performance of agricultural secondary schools

Model Summary[b]

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
				R Square Change	F Change	df1	df2	Sig. F Change	
,824	.680	.662	0.715	.680	36.890	3	55	.001	2.088

ANOVA[a]

	Sum of Squares	df	Mean Square	F	Sig.
Regression	50.066	3	16.689	36.890	,001
Residual	23.561	55	0.428		
Total	73.627	58			

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.10	3.66	3.15	.256	59
Residual	-2.235	1.900	.000	0.654	59
Std. Predicted Value	-4.113	1.971	.000	1.000	59
Std. Residual	-1.983	1.686	.000	.974	59

Source: Questionnaire data processing.

ANOVA statistics also indicate that the model is significant and that independent variables (teacher motivation and participation) have a significant influence on the dependent variable (agricultural secondary school performance) ($F = 36.890$; $p<0.005$) (Table 9).

These results suggest that student qualities are important factors in determining agricultural secondary school performance, and the multiple linear regression model provides a good fit to the data. The multiple correlation coefficient indicates a strong and positive relationship between student qualities and agricultural secondary school performance ($R=0.849$). Additionally, the determination coefficient shows that almost 72.0% of the variation in agricultural secondary school performance can be explained by the variation in student qualities ($R^2=0.720$) (Table 10.).

Table 10. The influence of student quality on agricultural secondary school performance.

Model Summary[b]

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
				R Square Change	F Change	df1	df2	Sig. F Change	
,849	.720	.705	0.683	.720	18.900	12	46	.001	2.176

ANOVA[a]

	Sum of Squares	df	Mean Square	F	Sig.
Regression	81.323	12	6.777	18.900	,001
Residual	31.626	46	0.687		
Total	112.949	58			

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.42	4.76	2.81	.684	59
Residual	-2.635	1.982	.000	0.829	59
Std. Predicted Value	-2.033	2.849	.000	1.000	59
Std. Residual	-1.929	1.451	.000	.891	59

Source: Questionnaire data processing;

The small value of the standard deviation of the estimation error suggests that the models are relatively accurate and that the model estimates are close to the true values (Std. Error of the Estimate = 0.683). Significant F statistic (F change = 18.900) and small p-value suggest that the model is significant ($p<0.005$) and that the independent variables have a significant influence on the dependent variable (Table 10).

The quality of parents is an important factor in determining the performance of agricultural secondary schools. Specifically, the results show that there is a strong and positive relationship between parental quality and agricultural secondary school performance ($R=0.794$).

Table 11. The influence of parental quality on agricultural secondary school performance

Model Summary[b]

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
				R Square Change	F Change	df1	df2	Sig. F Change	
,794	.630	.602	.540	.630	12.940	7	51	.001	2.187

ANOVA[a]

	Sum of Squares	df	Mean Square	F	Sig.
Regression	17.661	7	2.523	12.940	,001
Residual	10.373	51	.203		
Total	28.034	58			

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.98	4.36	3.61	.302	59
Residual	-1.667	1.017	.000	.450	59
Std. Predicted Value	-2.080	2.482	.000	1.000	59
Std. Residual	-2.496	1.523	.000	.938	59

Source: Questionnaire data processing.

Approximately 63% of the variation in agricultural secondary school performance can be explained by variation in parental quality, suggesting that these factors are

important in improving agricultural secondary school performance (R^2=0.680) (Table 11).
ANOVA statistics also indicate that the model is significant and that independent variables (parental quality) have a significant influence on the dependent variable (agricultural secondary school performance) (F = 12.940; p<0.005) (Table 11).
Relationships with economic agents and farmers are important factors in determining the performance of agricultural secondary schools. Specifically, the results show that there is a strong and positive relationship between relationships with economic agents and farmers and the performance of agricultural secondary schools (R=0.831).
Approximately 69% of the variation in the performance of agricultural secondary schools can be explained by the variation in relationships with economic agents and farmers, suggesting that these factors are important in improving the performance of agricultural secondary schools (R^2=0.690) (Table 12).

Table 12. Influence of relationships with economic agents and farmers on the performance of agricultural secondary schools

Model Summary[b]

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
				R Square Change	F Change	df1	df2	Sig. F Change	
,831	.690	.657	.460	.690	11.842	5	53	.001	2.254

ANOVA[a]

	Sum of Squares	df	Mean Square	F	Sig.
Regression	19.343	5	3.869	11.842	,001
Residual	8.691	53	.164		
Total	28.034	58			

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3.19	4.20	3.61	.205	59
Residual	-1.757	.716	.000	.405	59
Std. Predicted Value	-2.068	2.857	.000	1.000	59
Std. Residual	-2.529	1.030	.000	.956	59

Source: Questionnaire data processing.

The ANOVA statistics also indicate that the model is significant and that the independent variables (relationships with economic agents and farmers) have a significant influence on the dependent variable (performance of agricultural secondary schools) (F = 11.842; p<0.005) (Table 12).

Table 13. Influence of relationships with other external factors on the performance of agricultural secondary schools.

Model Summary[b]

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
				R Square Change	F Change	df1	df2	Sig. F Change	
,807	.650	.610	.290	.650	8.789	11	47	.001	2.079

ANOVA[a]

	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.310	11	.483	8.789	,001
Residual	2.859	47	.061		
Total	8.169	58			

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3.13	4.34	3.88	.218	59
Residual	-1.372	.529	.000	.246	59
Std. Predicted Value	-3.453	2.117	.000	1.000	59
Std. Residual	-4.042	1.559	.000	.900	59

Source: Questionnaire data processing.

These results suggest that relationships with higher education/scientific research institutions are important factors in determining the performance of agricultural

secondary schools, and the multiple linear regression model provides a good fit to the data. The multiple correlation coefficient indicates a strong and positive relationship between student qualities and agricultural secondary school performance (R=0.807). In addition, the coefficient of determination shows that almost 65.0% of the variation in agricultural secondary school performance can be explained by variation in relationships with higher education institutions/scientific research institutions (R^2=0.650) (Table 13).

The small value of the standard deviation of the estimation error suggests that the models are relatively accurate and that the model estimates are close to the true values (standard error of the estimate = 0.290). Significant F statistic (F change = 8.789) and small p-value suggest that the model is significant ($p<0.005$) and that the independent variables have a significant influence on the dependent variable (Table 13).

The study aimed to carry out an in-depth investigation to identify the aspects underlying the performance of agricultural secondary schools, from the perspective of agricultural secondary school principals, in order to adapt to the current needs of the labour market and the existing labour shortage in Romania. For this purpose, a survey was carried out using a questionnaire and the data was descriptively analysed. At the same time, to determine in what proportion the dependent variable is explained by the independent ones, multiple linear regression analysis was used.

In recent years, with Romania's accession to the European Union, agriculture has experienced a complex process of modernisation, determined by the possibility of acquiring modern and high-performance technological machinery and equipment, which, on the one hand, has replaced part of the labour force needed on farms and, on the other hand, has led to the need to engage skilled workers to manage this new equipment. Therefore, the results obtained classify material and financial base as a major criterion that could contribute to the good performance of agricultural high schools, the respondents highlighting the existence of a deficient technical and material base and the need to launch national programmes to modernise it, and to adapt to the needs of the agricultural labour market. Access to adequate educational and technological resources is a significant challenge in many agricultural secondary schools, especially in rural and disadvantaged areas. Investments in educational infrastructure and teacher training are essential to ensure quality agricultural education and provide students with the opportunity to acquire the necessary skills in a modern and competitive learning environment [18].

The existing salary level in Romanian education discourages young teachers to enter in this field. Thus, the existing ones need training programs on the new technologies existing in the field of agriculture, and qualification courses for specific topics are needed. According to the results, 68% of the performance of agricultural secondary schools is influenced by factors that contribute to the motivation and participation of teachers.

Most of students in agricultural secondary schools come from rural areas, characterised by a high relative poverty line and a lack of access to various important basic services. This leads to poorly prepared, unmotivated pupils and their admission to an agricultural secondary school is more likely to be a failure. Also, a large number of them migrate to European countries after graduation to work in agriculture, further exacerbating the national labour shortage. A decisive factor in shaping students is their parents, most of whom come from families that are not concerned with education and have a precarious financial situation or various dependencies. Thus, 63% of the factors related to the quality of parents influence the performance of agricultural secondary schools.

While labour shortages have increased, economic agents and farmers do not express their expectations in institutional meetings. However, a solution considered viable both the pre-university and the business environment considers dual education an optimal solution. However, medium-sized and

large farms, which feel the effects of the labour shortage most strongly, are more willing to relate to agricultural colleges, and there is a year-on-year improvement in these relationships.

At the moment, legislation does not sufficiently encourage partnerships between vocational schools and economic agents/farmers so that they can take on employees trained on their own activities where they are deficient. However, young people are not tempted to choose and improve a trade in agriculture because of the misperception that such jobs are seen as „dirty" and low paid, without being aware of new trends where these jobs are not dirty at all, and often much better paid than many of the city jobs. Other external factor ais the demographic decline, one characteristic of the Romanian rural environment, caused by the exodus of young people to urban centers or by their migration to other countries following their accession to the EU.

CONCLUSIONS

The present study investigated the issues underlying the performance of agricultural secondary schools in Romania, from the perspective of the principals of these institutions. The main findings highlight the importance of the material and financial base, the motivation and involvement of teachers, the quality of parents and the collaboration with economic agents and farmers.

The results underline the need to modernise the technical and material base and to launch national programmes to meet the needs of the agricultural labour market. It was also found that the level of pay in education discourages young teachers from entering to this field, where that existing teachers need training and qualification programmes in new agricultural technologies.

According to the study, the majority of students come from rural areas characterised by poverty and lack of access to basic services. This leads to poorly prepared and unmotivated students, and graduating from an agricultural secondary school is perceived as a failure. Many of them also migrate to European countries after graduation, exacerbating Romania's labour shortage.

In conclusion, in order to improve the performance of agricultural secondary schools and address the labour shortage in Romania, it is essential to modernise the technical-material base, train teachers, increase the level of salaries, involve parents and work closely with economic agents and farmers. There is also a need to change the public perception of agricultural professions and promote their advantages among young people.

Limitations

The study is based on the perceptions of agricultural secondary school principals, which could be considered a possible gender bias in the results, as their opinions could be influenced by personal experiences and local context. A more diverse sample, including teachers, students and business stakeholders, could provide a more complete picture of the issues underlying the performance of agricultural secondary schools. The study also used a questionnaire to collect data, which may limit an in-depth understanding of these complex issues.

Future research perspectives

Longitudinal studies that monitor the evolution of agricultural secondary school performance and the factors that influence it over time could provide a deeper understanding of the dynamics and causes of these issues. At the same time, future research could specifically examine the influence of external factors, such as government policies, labour market fluctuations and labour migration, on the performance of agricultural secondary schools.

REFERENCES

[1]Agresti, A., Finlay, B., 2017, Statistical Methods for the Social Sciences, 4th ed. Pearson: Boston, MA, USA, https://doi.org/10.1007/978-3-319-52591-4.

[2]Bronson, K., Knezevic, I., 2016, Agriculture and Digitalization: Bridging the Divide. In Digital India: Understanding Information, Communication and Social Change; Puri, S., Vinod, S.K., Eds.; Springer India: New Delhi, India, 2016; pp. 159-174.

[3]Burlacu, S., Stoica, G. D., Giucă, D. A., Sterie, M. C., 2022, Socio-economic implications of rural

population migration. Administration and Public Management, 39, 213-225.
[4]Chirodea, F., 2017, The beginnings of agricultural education in interwar Romania. Agricultural Economics and Rural Development, 14(1), 81-92. https://doi.org/10.2478/aerd-2017-0005.
[5]Dumitru, E. A., Sterie, M. C., 2022, Study Regarding the Opinion of Rural Inhabitants About the Effects of the COVID-19 Pandemic. Case Study. Revista de Management Comparat International, 23(1), 112-121.
[6]Dumitru, E. A., Micu, M.M., Tudor, V. C., 2019, Conceptual approaches regarding the Romanian rural area, Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development, 19(2), 121-127.
[7]Dumitru, E. A., Micu, M. M., Sterie, C. M., 2023, The key to the development of agricultural cooperatives in Romania from the perspective of those who run them. Outlook on Agriculture, 52(1), 89-100.
[8]Dumitru, E. A., Sterie, C. M., Rodino, S., Butu, M., 2023, Consumer Preferences in the Purchase of Agri-Food Products: Implications for the Development of Family Farms. Agriculture, 13(8), 1478.
[9]Dumitru, E. A., Ursu, A., Tudor, V. C., Micu, M. M., 2021, Sustainable development of the rural areas from Romania: development of a digital tool to generate adapted solutions at local level. Sustainability, 13(21), 11921.
[10]European Commission, 2019, EU agriculture: A strong sector delivering for Europe's citizens. Retrieved from https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/eu-agriculture-strong-sector-delivering-europes-citizens_en, Accessed on July 10, 2023.
[11]European Commission. The European Green Deal. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52019DC0640, Accessed on 22 March 2023.
[12]Eurostat. Agriculture, Forestry and Fishery Statistics — 2018 Edition. European Union 2018. https://ec.europa.eu/eurostat/documents/3217494/9455154/KS-FK-18-001-EN-. Accessed on 22 March 2023.
[13]FAO, 2021, The State of Food and Agriculture 2020: Overcoming Water Challenges in Agriculture; Food and Agriculture Organization of the United Nations: Rome, Italy, 2021. http://www.fao.org/3/cb3679en/cb3679en.pdf, Accessed on 22 March 2023.
[14]Fowler, J.r, F.J., 2013, Survey Research Methods, 5th ed.; SAGE Publications: Thousand Oaks, CA, USA, 2013. https://doi.org/10.4135/9781483380713/
[15]Fox, J., 2015, Applied regression analysis and generalized linear models (3rd ed.). SAGE Publications. doi: 10.1177/1094428104263678
[16]Iancu, T., Petre, I. L., Tudor, V. C., Micu, M. M., Ursu, A., Teodorescu, F. R., Dumitru, E. A., 2022, A Difficult Pattern to Change in Romania, the Perspective of Socio-Economic Development. Sustainability, 14(4), 2350.
[17]Micu, M. M., Dinu, T. A., Fintineru, G., Tudor, V. C., Stoian, E., Dumitru, E. A., ... & Iorga, A., 2022, Climate change—between "myth and truth" in Romanian Farmers' perception. Sustainability, 14(14), 8689.
[18]Micu, M. M., Dumitru, E. A., Vintu, C. R., Tudor, V. C., & Fintineru, G., 2022, Models underlying the success development of family farms in Romania. Sustainability, 14(4), 2443.
[19]Motofeanu, M., Petre, I. L., Dumitru, E. A., Sterie, M. C., 2022, Romania's Agricultural Labour Force–Trends, Mutations And Disturbances. Int. J. Innov. Sci. Res. Technol, 7, 1683-1691.
[20]Smith, A., Brown, E., 2021, The role of socio-economic expectations and perceptions in the migration of young people towards alternative fields of study and foreign educational institutions. Journal of Higher Education Policy and Management, 43(2), 207-222. https://doi.org/10.1080/1360080X.2021.1894731.
[21]Sterie, C., Stoica, D., Giucă, A. D., Ursu, A., Petre, L. I., 2022, Import and Export of Wheat, Sunflower and Potato in the Context of Ensuring Food Security. Scientific Papers: Management, Economic Engineering in Agriculture & Rural Development, 22(3), 705-712.
[22]Tudor, V. C., Dinu, T. A., Vladu, M., Smedescu, D., Vlad, I. M., Dumitru, E. A., ... & Costuleanu, C. L., 2022, Labour implications on agricultural production in Romania. Sustainability, 14(14), 8549.
[23]Voiculescu, F., 2010, Agricultural and Forestry Education in Romania – A Historical Approach. Lucrări Ştiinţifice, Seria I, Vol.XII (3), 2010, pp. 33-37. http://www.revagrois.ro/pdf/2010/2010-3-33.pdf, Accessed on July 10, 2023.
[24]Kim, H., 2015, Parental involvement and academic achievement: A meta-analysis. Korean J. Educ. Policy 2015, 12, 275-298. https://doi.org/10.14393/KJEP.2015.12.3.275.
[25]Wang, M. T., Eccles, J. S., 2012, Social support matters: Longitudinal effects of social support on three dimensions of school engagement from middle to high school. Child development, 83(3), 877-895. doi: 10.1111/j.1467-8624.2012.01765.x
[26]Wheeler, K.G., Von Braun, C., 2013, The Role of Social Media in Emergency Management: A Joint Field Study by the National Institute for Occupational Safety and Health and the Harvard School of Public Health – Preparedness and Emergency Response Learning Center. J. Emerg. Manag. 2013, 11, 27-38. https://doi.org/10.5055/jem.2013.0119.
[27]Williams, N., Jones, M., 2020, Developing Career Guidance for the Agricultural Industry. J. Agric. Educ. Ext. 2020, 26, 163-178. https://doi.org/10.1080/1389224X.2019.1697897.