The European Proceedings of
Social and Behavioural Sciences
EpSBS

www.europeanproceedings.com
e-ISSN: 2357-1330

DOI: 10.15405/epsbs.2021.07.20

LEASECON 2020
International Conference «Land Economy and Rural Studies Essentials»

CHANGING THE ROLE OF AGRARIAN UNIVERSITIES IN AGRICULTURE STAFFING IN RUSSIA

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Abstract

In the agricultural economics of the last decade, radical changes are taking place, significantly changing the competitiveness of production both at the national level and at the level of individual farms. These changes affect agriculture from two different sides. The first is due to the emergence and increasing spread of a set of new technologies, usually combined with the term Agriculture 4.0. This complex includes the use of precision farming methods, artificial intelligence, robotics, the Internet of things (IoT) in agricultural production, and environmental requirements strengthening for cultivated products. The second is due to the increased attention of consumers to a healthy lifestyle and green purchasing. The result is a constant strengthening of certification requirements for food products. In the context of global competition in the world food markets, these changes determine the efficiency of each Russian farm. All this modifies the role and significance of agricultural universities for modern agricultural production. Agrarian universities must quickly adapt new technologies and requirements to improve their courses. This adaptation requires improving the skills of agrarian university instructors, the wide applying of the latest technologies to teach students, and constant communication with science, on the one hand, and with practice, on the other. The authors consider that the suitability of knowledge, skills and abilities of agrarian university graduates should be achieved not only through changing competencies but also through systematic interaction.

Keywords: Agrarian universities, agricultural staffing, systematic interaction

https://doi.org/10.15405/epsbs.2021.07.20
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1. Introduction

In the last decade, the external business environment of Russian agrarian universities has changed significantly. In the planned economy, regional agrarian universities trained specialists in the agricultural sector by demand of collective farms and state farms of the region (republics, districts), which allowed them to meet the needs of farms objectively. In the modern market-based economy, the demand for agricultural specialists has changed both quantitatively and qualitatively. With the emergence and active application of new agro technologies in agriculture, this process has intensified, combined with increased public attention to the environmental value of food products. The accumulation of these quantitative changes has led to a change in the role of agrarian universities in training specialists to be employed in agriculture. We identify two main changes in the external environment that make it necessary to transform the process of training specialists to be employed in agriculture: on the part of consumption and the part of the production. On the consumer part, the consumers are paying more attention to green purchasing and healthy lifestyles. Customers pay more and more attention to the composition of food products, the absence of GMOs in them, and prefer to buy organic products. The state, responding to consumer demands, toughens the certification requirements for cultivated agricultural products. Since the beginning of 2020, in particular, Federal law 280-FZ of 03.08.2018 "On Organic Products and Amendments to Certain Legal Regulatory Acts of the Russian Federation" has been in effect on the territory of Russia. In addition to the requirements of the domestic market of agricultural products, the requirements of the world food market are changing significantly. There is a gradual transition from the concept of Free Trade, which characterizes competition in international trade in terms of expenses, to the concept of Fair Trade, which pays more attention to the environmental value of food. As a result, Russia's food security system is fundamentally changing. Its quantitative stage, related to ensuring the availability of food products for Russian consumers, has already been reached. Nowadays Russia is moving to a high-quality stage of ensuring its food security, associated with a focus on strengthening environmental requirements for food (Lukichev et al., 2020). Without this, it will be impossible to export Russian agricultural products to world markets soon. Thus, the development of the agricultural sector will happen to maximize opportunities for improving the health and nutrition of consumers. This is where the next interaction will take place. On the one part, the changes in the status of nutrition or education will actively affect agricultural production. On the other part, the changes in agricultural production, storage, and processing can have a significant impact on human health and nutrition. As noted (Khalid, 2016), professionals are trained in nutrition or agricultural spheres, but very few of them will be trained in both ones. This means that Russian agrarian universities should be ahead of the curve in ensuring the quality stage of food security. We can develop the following sequence of necessary actions here. Firstly, scientific research on the cultivation, processing and promotion of organic products that create the basis for university courses. Secondly, agrarian universities train modern specialists to be employed in the spheres of cultivation, storage, processing and promotion of organic products. Thirdly, an increasing number of farms and agricultural holdings are engaged in the cultivation and sale of certified "green products".

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On the production part, there is an increase in the use of new agro technologies related to the use of precision farming, the Internet of things, robotics, and increasing environmental requirements for grown products, which is usually combined in Agriculture 4.0. In particular, the Internet of things (IoT) is rapidly spreading, creating unprecedented opportunities in industries such as agriculture, healthcare, and home automation. Its use dramatically reduces the labour intensity of agricultural production. Agricultural education requires the training of specialists who can take advantage of these opportunities presented by the IoT. To achieve this goal, it is necessary to create an IoT infrastructure to support university education in agriculture and science. The final goal here is to make an infrastructure that allows quickly creating a variety of IoT applications with minimal technical skills (Gunasekera et al., 2018). There are many examples of the beneficial use of the IoT in the sphere of agricultural production, both in developed and developing countries. For example, Thailand has developed a sensor system, its components – a device and a web application – have been made to measure temperature and humidity using the Internet of things (IoT) to be part of an automatic water monitoring system. The system was tested and implemented effectively on a rice farm. The results showed that the system was useful for Agricultural 4.0, in which the technology can help farmers increase their productivity and at the same time significantly reduce expenses (Suanpang & Jamjuntr, 2019). Other authors (Symeonaki et al., 2020) also highlighted that the adoption of precision farming (PF) methods, which include universal computational advances and conceptual innovations of "smart" farming in Agriculture 4.0, is an important factor for the benefit of sustainable growth. However, today, in their opinion, the dynamic integration of PF object systems into the Internet of things (IoT) is an excessive problem, given the large amount of heterogeneous untreated data obtained in agricultural environments by the wireless sensor and actuator networks (WSAN). Thus, all the challenges we have noted require changes in the training of specialists and managers to be employed in modern agriculture.

2. Problem Statement

For stable staffing of agriculture in all regions of Russia, it is necessary to strengthen the coordinating role of agrarian universities. They must provide a balance between the supply and demand of highly skilled specialists in the region. For making this, regional agrarian universities should unite with researchers, practitioners and employers. Overcoming the limitations imposed by the level of social infrastructure development is also an important task.

3. Research Questions

To achieve this research goal, it is necessary to answer the following questions:

- What is the current role of agrarian universities in the staffing of agriculture in Russia? What regional differences exist here?

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- How should agrarian universities respond to the challenges posed by the changes in agro technologies, the consumers' desire for green purchasing, and the transformation of the external business environment?

4. Purpose of the Study

The study aims to identify the changing role of agrarian universities in the staffing of agriculture in Russia. A special aspect of the study is to identify the reasons that do not allow for decades to balance supply and demand in the regional labour markets of highly qualified specialists. And also it is necessary to offer recommendations on the becoming of agrarian universities as centres for obtaining knowledge, skills and abilities needed for the agricultural sector in the region.

5. Research Methods

The scientific validity of the results obtained is determined by the use of information resources of the Federal State Statistics Service using trend analysis, the method of relative differences, horizontal (time) analysis, and comparative analysis of providing agrarian universities with the needs of regions for highly qualified specialists to be employed in agricultural enterprises.

6. Findings

The answers to all the challenges faced by the personnel support of agriculture in Russia are to increase the role of regional agrarian universities and maximize the change in the business environment of the agricultural sector, which restricts the flow of graduates to agricultural enterprises.

The training of highly qualified personnel for agriculture has its specificity in the Russian Federation. This specificity is related to the external business environment and is manifested in the fact that not all graduates of agrarian universities are employed in the speciality. If we analyze the data on graduations from Russian agrarian universities and actual professional activity, we get a disturbing pattern. The number of graduates of agrarian universities and their academic staff allows almost every region of Russia to meet the demand for highly qualified agricultural specialists. However, since 2007, only 12% of graduates of the Kursk Agrarian Academy have found employment in their speciality, and the rest settle in the regional centre or leave the region, where they are not employed in their speciality (Levchenko, 2009). In the Omsk region, according to the Regional Ministry of Agriculture, only four to six per cent of graduates of Omsk Universities and Colleges start practice in their speciality. The data given in the article by Gorbunova (2018), related to the graduation of the Ural State University in 2017 allow making the following assessment. The authors, taking the total number of graduates for 100%, calculated that they were employed in agricultural, water management, meliorative, land management organizations (JSC, LLC, the association of farm household (AFH), state unitary enterprise (SUE), municipal unitary enterprise (MUE), collective farms, state farms, agricultural cooperatives, etc. − 91 people (13%); − in the Executive Authorities of the subjects of the Russian

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Federation for Agriculture − 10 people (1.3%); − to scientific-research and design organizations in the field of agriculture – 2 people (0.3%); – to other organizations in the sphere of agriculture and processing industry – 8 people (1.04%). Thus, 15.64% of graduates were employed in agriculture and directly related fields of activity. In the Oryol region, similar trends are observed, which leads to a deficiency of qualified specialists (Kravchenko & Volchenkova 2018), especially in the most employable age of 25-39 years.

The authors identified the causes and consequences of this trend for the market of highly qualified agricultural labour. Among the reasons, we highlight three main ones: 1) lower wages than in other sectors of the Russian economy; 2) worse working conditions in comparison with other sectors of the economy; 3) significantly worse living conditions for specialists and their families, poor social infrastructure in rural areas compared to living conditions in the city. We can try to give numerical confirmation of the first reason. The official data from the Federal Service of State Statistics show a steady trend of lagging wages in agricultural production from the average wage in the Russian Federation (Table 01).

Table 1. Average monthly nominal accrued salary of employees for all organizations by type of economic activity (by OKVED2 - Russian National Classifier of Types of Economic Activity) in the Russian Federation in 2017-2018, rubles

Years	Agriculture, forestry, hunting, fishing and fish farming	Total	Agriculture, forestry, hunting, fishing and fish farming as a percentage of the average*
2017	25,671	39,167	65.54%
2018	28,699	43,724	65.64%

*Source: authors based on official data of the Federal State Statistic Service (2018)

In addition to the average wage gap, regional competition for highly qualified agricultural specialists should be highlighted. It is based on differences in the level of salaries by region and different levels of social infrastructure. According to official data, it can be seen that in the Metropolitan areas, where there is more competition for attracting labour, it is possible to achieve higher wages relative to the average in the region in crop and livestock production, hunting and the provision of related services in these areas (OKVED1) (Table 02).

Table 2. Average monthly salary per employee in the Leningrad region and Omsk region (data on average salary according to official data of Rosstat (according to the new classification of OKVED2 industries), rubles

Years	Crop and livestock production, hunting and related services in these areas (OKVED 1)	In average for all industries	Crop and animal husbandry, hunting and provision of related services in these areas to the average one*
Average monthly salary per employee in the Leningrad region			
2018	38,764.8	43,631.0	88.85%
2019	40,010.0	46,386.5	86.25%
Average monthly salary per employee in the Omsk region			
2018	21,720.3	32,613.2	66.60
2019	24,340.3	35,368.1	68.82

*Source: authors based on official data of the Federal State Statistic Service (2019)

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The authors, of course, take into account that the amount of demand for high-quality specialists is "overstated" due to those inefficient agricultural enterprises that are not able to create modern working conditions for employees and pay them a decent salary, but, in general, the highlighted trend is correct. Its consequence is the deepening of the regional "gap" in the provision of high-quality personnel for agricultural enterprises. This is not a purely industrial phenomenon. We are talking about general economic changes in the structure of employment in Russia. As Dudyrev et al. (2018) note, in 2000-2017, there was an increase in "white-collar" employment and the redistribution of labour in favour of the service sector, which led to a drop in output from educational institutions for agriculture (universities and colleges) by almost 2 times and an increase in output to the service sector. This can be seen in the example of agricultural organizations in the Oryol region. During the period from 2005 to 2016, the number of employees directly employed in the sector of agricultural production decreased by 17.5 thousand people (18.5%), and the share of managers for this period increased from 18.1 to 20.4% (Kravchenko & Volchenkova 2018). We can also note the positive part of this trend. The agricultural enterprise uses modern agro technologies → there is less demand for low-skilled workers and higher demand for highly qualified specialists. This again increases the requirements for training personnel in agrarian universities and continuous retraining of active specialists of agricultural enterprises.

Another negative consequence is the replacement of specialists with higher agricultural education with workers who do not have special education. For example, in the Oryol region, the production process is on average handled by personnel who either do not have special skills or need to improve their skills (Sukhocheva & Lovchikova 2016). It is not a Russian trend, but a global one. The surveys conducted in Poland showed that in both 2002 and 2010, less than 50% of Polish farm managers received some form of nominal training in agriculture (Gwiazdzinska-Goraj & Rudnicki, 2016). In Ireland, by contrast, the level of agricultural education has steadily improved over time, and this increase in human capital in the agricultural sector is a key aspect of the fact that in most sectors of Irish agriculture we find positive returns on agricultural education and, in particular, positive attitudes towards technical efficiency in terms of increasing yields (O'Donoghue & Heanue, 2018).

Based on the previous arguments, it becomes obvious that the urgent requirements for modern agricultural education are the following:

- enhanced interdisciplinarity of training programs to be mastered by students, when, for example, an agronomist must master the basics of animal science, mechanization, ecology, and other related activities. A zootechnician should be familiar with crop production (especially feed production), automation of production processes, and be able to work with automated information collection and management systems.

- the need to expand the range of training programs necessary for the development of the Agriculture 4.0 industry. Here are just a few new professions that are potentially in demand in modern agriculture: agroinformatician, agrokibernetik, agroecologist, specialists in organic and precision agriculture, city farmer, breeder-biotechnologist, operator of automated and robotic agricultural machinery.

- increasing the requirements for graduates' competencies related to improving the quality and safety of agricultural production;

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- acquiring by students the skills to work in rapidly changing conditions of economic activity, readiness to acquire new knowledge and skills, new professions throughout the entire period of employment.

The speed of innovation in agriculture, as well as in the economy as a whole, creates a need for specialists who can effectively master new technologies, have the skills of continuous training and critical evaluation of proposed innovations. Graduates coming to work in modern agriculture should have an optimal combination of "soft" and "hard" skills (Lukichev, 2020). This increases the requirements for the level of knowledge, skills and abilities that students receive at agrarian universities. As the scientist Gwiazdzinska-Goraj and Rudnicki (2016) notes, the assessment of the educational status of farm managers showed that there is a link between the level of agricultural education achieved by managers of farms engaged in agricultural activities and the structure of education. The achievement of the modern structure of education depends on how intensively agrarian universities and professors (instructors) change the forms and methods of teaching, concerning science, on the one part, and with practice, on the other part. To do this, instructors of agrarian universities must undergo retraining at least once every three years (Petryakova & Radionova, 2013). These changes must not be formal in nature, but help to overcome all the difficulties faced by professors (instructors) of agrarian universities today. It is no accident, as noted by Shoulders (2018), that one of the potential factors influencing the speed of overcoming these difficulties is the professional identity of the instructor, which determines how instructors interpret and respond to the knowledge gained as a result of professional development.

Today, Russian agrarian universities are trying to meet modern conditions through changes in competencies. But this is precisely what characterizes the one-sided approach, as noted Kania and Kramer (2011). The authors believe that it is necessary to apply what is called "system interaction". In addition to the system thinking, which includes changes in policy and the environment, the system interaction involves collaborative research, support for continuous learning (Fitzgerald & Zientek, 2015), new developments rather than pre-defined fixed approaches to changes, multiple research directions (parallel to multiple knowledge), and transdisciplinarity.

Today, in the agricultural industry, it is not the actual amount of knowledge obtained during the training period that comes to the fore, but the acquired skills. To ensure the competitiveness of agrarian university graduates in the modern labour market, it is necessary to have not only the "hard" (technological) skills, but also the "soft" skills. This is exactly what our graduates often lack: leadership, adaptability, communication skills, creative skills, and the ability to work in a team. To ensure this, the role of agrarian universities as centres for obtaining knowledge, skills and abilities in their region must change. A model for Russian universities is the Dutch University of Wageningen, which, by analogy with Silicon valley, was named "Food Valley" and united about 200 companies, investors and researchers with their start-ups in a single cluster within 10 km of the university.

7. Conclusion

All parties, including researchers, practitioners and employers, should contribute to the improvement of the educational process and the use of educational innovations. The fewer employers,

scientists, and practitioners participate in the educational process, the less prepared graduates of agrarian universities are ready for the challenges that modern agriculture is preparing for them, and the less competitive they are in the labour market. To solve the problem of balancing supply and demand in the market of skilled agricultural labour, changes are needed, both in agrarian universities and in the external business environment. For the latter, it is necessary to ensure sustainable development of rural areas, and, above all, to improve social infrastructure. For the first, it is necessary to transform agrarian universities through deep integration with science and with employers into a coordinating link of training for modern agriculture. Specific means of production and technologies used in agriculture create a demand for specialists with special competencies in the field of digitalization, economics, organization, marketing, and law, which are often fundamentally different from the competencies required in other sectors of economic activity. That is why agrarian universities should become centres of economic development in their regions.

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