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ANALYSIS OF THE FASTEST-GROWING JOBS IN THE AGRIBUSINESS SECTOR

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Summary

Key characteristics and role of Serbia's agribusiness sector in the country's economy

Serbia has a developed tradition of agricultural production and is a prominent producer of food and beverages. Almost a fourth of Serbia's population is indirectly engaged in agricultural production, while almost **10% of the total workforce is directly engaged in the agricultural and food processing industries**. According to data from 2018, the **agribusiness sector generated up to 13% of Serbia's total GDP,** accounting for the largest sectoral share, equivalent to the combined share of the manufacturing and mining industries. This sector has a significant impact on Serbia's economic growth, owing to high soil fertility and favourable natural conditions for farming, as well as the high share of the rural population in Serbia's total population, partly as a consequence of the delay in structural reforms in other sectors of the economy. According to data of the Serbian Business Registers Agency (SORS), there were **12,823 active companies employing 150,265 people registered in the Agribusiness sector in 2017**. In terms of employment, large companies still play a leading role. Although large companies account for a mere 0.64% of active companies in the agribusiness sector, they employ a significant 45% of the total workforce in this sector. Only 12% of the workforce is employed in micro-sized companies which are by far the largest segment (87% of the total number of active companies).

Agribusiness sector employment trends

Analysis results reveal that the agribusiness sectors employs a total of 204,199 people, according to the Central Registry of Compulsory Social Insurance (CROCSI) data, (of these, around 40% are employed in Retail sale of agricultural products, around 30% in the Production of plant foods, about 11% in the field of Production of animal foods, around 9% in Crop production, while less than 5% of the total number of workers are employed in other areas of agribusiness). The analysis also reveals that **workers aged 30–54 years dominate in the age structure with a 71% share** in the total workforce. A noteworthy fact is that 6,297, i.e. **3.1% of the total number of workers** in the agribusiness sector are **over the age of 60**, with the highest share registered in the fisheries sector (9.7%). On the other hand, a more favourable age structure, with an above-average share of workers below the age of 30 years is characteristic of the retail sale of agricultural products and mixed production. Data on workers in companies whose core activity falls within the definition of agribusiness suggest that the **total number of workers in the agribusiness sector registered an increase of 2.8%** relative to 2017. This increase is primarily the **result of the growth** in the number of workers **in the retail sale of agricultural products and production of plant and animal foods**.

Workforce demand

An analysis of the number of placements from the unemployment register of the National Employment Service (NES) reveals that the **demand for occupations in the Agribusiness sector stands at around 18,000 workers**, with the total number of placements from the NES unemployment register showing a constant decline by around 500 placements annually. In addition to data on placements from the NES unemployment register, another indicator of labour demand in the agribusiness sector are information on job orders received from employers. In 2018, **employers from the Agribusiness sector reported the need for 11,283 workers**, with around **75% of notified vacancies coming from the retail sale of agricultural products and Production of plant foods**.

Workforce supply in the sector

The analysis of the potential workforce supply in the agribusiness sector is based on NES data on job seekers on the NES unemployment register. In 2018, the number of unemployed registered with the NES with occupations in the field of agribusiness stood at 30,704. It should be noted that a prominent **declining trend in the number of unemployed** was noted in the **2016–2018** period, at a rate of over 10% annually. By level of education, the structure of unemployed registered with the NES fully corresponds to the structure of placements from the NES register. In other words, **slightly over 80% of employed has secondary education** (three-year or four-year secondary education), while around 10% of employees has a higher education degree. The analysis supports the conclusion that only the

55+ cohort has registered an increase in the number of unemployed over the observed period, while the total number, as well as the number of unemployed below the age of 55 years registered a significant decline. That said, in parallel with the rise in the number of unemployed over the age of 55 years on the NES register, the number of placements from the NES register in this age group has also been on the rise. This is encouraging, in view of the fact that the 50+ cohort, specifically, is included among the vulnerable groups on the labour market, due to the difficulties that they have in accessing employment. The **unemployed with three-year and four-year secondary education profiles account for the biggest share of unemployed in the Agribusiness sector.** A prominent fact is that slightly over 60% of unemployed are in the following occupations: agricultural technician for crop production, food technician and technician for biotechnology, veterinarian technician, food and drinks manufacturer, butcher and agricultural machinery operator.

(Mis)match of labour market supply and demand

To assess the efficiency of supply and demand matching in the agribusiness sector, we calculated the average unemployment length of job seekers on the NES register. The analysis indicates that the transition rates in the agribusiness sector were relatively stable over the observed period. At the level of the entire sector the **average unemployment length** amounts to around **24 months**, with typically a somewhat shorter average unemployment length for veterinarian technicians amounting to 18 months. When it comes to length of unemployment by educational level, discernibly, **the shortest unemployment spell** is experienced by **job seekers with degrees from three-year technical colleges (around 19 months)** and four-year secondary schools as well as those with a higher education degree (around 22 months)**.** On the other hand, **non-skilled workers experience the longest unemployment spell (even more than 5 years)**. If we observe the age structure, we see that the shortest unemployment spell is typical of the youngest population group, thus, the unemployment spell for the 15-29 cohort stands at 15 months. When comparing the individual agribusiness sectors, the shortest unemployment spell is typical of the fisheries sector (around 7 months) and veterinarian sector (around 18 months), and the longest one in the tobacco processing industry (around 27 months).

For the purposes of analysing whether the current supply of skilled workforce by Serbia's educational system is able to match the market demand, as a first step, we conducted a survey of companies in the agribusiness sector, followed by interviews with companies' representatives for the purpose of collecting qualitative data on needs in the individual fields of occupation. Based on the survey results, we can conclude that the **biggest share of workers in companies in the agricultural sector (70-80%) perform simple to less complex manual jobs** (usually simple physical labour in the fields and at the production lines in manufacturing facilities). Furthermore, it is evident that, on average, around 9% of jobs in these companies require a high level of skills related to the companies' core business activity, while 11% of jobs are in support activities (human resources management, finance, legal affairs, marketing, and similar). According to the survey we conduced, the structure is somewhat more favourable in the processing of agricultural products. Survey results indicate that, once again, **simple tasks account for the biggest average share in the processing sector (around 55%)**, while machine operator jobs in production and processing, characterized by a higher level of complexity as they entail operating mechanical and automatic control systems, account for 23%.

Workers with an adequate education level account for 73% of workers in the Agribusiness sector. In terms of educational mismatch, the share of overqualified workers is set at 15%, while underqualified workers account for 12%. When observing the agribusiness sector, the biggest share of overqualified workers is typically in the manufacture of mixed foods (23%), fisheries (19%) and production of plant foods (18%), while the biggest share of underqualified workers is present in animal production (28%).

Projections of future demand

The results of the survey indicate that **most new hires are in lower to intermediate complexity jobs in production (workers in production, fruit pickers, plant harvester, fish farmers, animal caretakers, farmworker, dairy farm workers, warehouse keepers, manual workers, field workers, stokers, and similar)**. It is also notable that the demand for new workers is most prevalent in simple occupations, which account for around 33%, followed by high complexity occupations (e.g. engineers in food technology, agronomy, agriculture, animal or crop

husbandry, veterinarians, microbiologists, agronomists, farm managers, chemists and similar), which account for around 28% of all occupations. Among the relatively frequent occupations, listed by the companies, are those related to shipping, storage, and maintenance of production facilities (tractor drivers, warehouse clerks, pallet and forklift operators, operators and similar). Furthermore, it is evident that the skills listed for the individual occupations in these groups correspond to the level of qualifications reported by the surveyed companies as desirable for candidates applying for the job. This indicates that **there is no significant vertical mismatch of qualifications in terms of either excessive or inadequate qualifications for the new hires in the sector**.

In addition to existing recruitment needs, we also analysed the projections of the surveyed companies with respect to the growth in the demand for specific occupations, taking into account the dominant trends in the sector and the economy at large. Survey results suggest that around 40% of the surveyed companies anticipates a significant growth in the demand for specific occupations, in particular **"Mechatronics Engineers" with a predominant high level of knowledge of automation, mechanics and electronics, and knowledge of the basic elements of food technology. In fact, 30% of surveyed companies highlighted the importance of this occupation, in the wake of the growing automation and mechanization of the production process**. Also prominently featured is the demand for technologists with a focus on food or fruit/vegetable production (depending on the company type). Other occupations that will be sought after in the forthcoming period, according to survey results, include engineers in plant protection, environmental protection and a couple of simple occupations such as butcher, driver and shift leader.

Methodological coverage of the sector and companies in the sample

With a view to gaining a better understanding of the outlook of different occupations in the agribusiness sector, as a first step, we need to define what this sector entails. When analysing different occupations, typically, the term "sector" entails an economic activity sector or a skills/education sector. Typically, economic activity sectors are defined in accordance with the ISIC or NACE international standard statistical classifications.[1] In the case of skills, "sector" entails related knowledge and qualifications acquired through formal and informal/non-formal education, trainings and experience. A typical approach to the classification of skills in corresponding sectors is by applying the UNESCO ISCED-F system.[2] The possibility of observing the sectors from two different perspectives is also the first limiting factor because there is no way to comprehensively define the sector, nor a standardized classification that takes into account both the economic dimension and the characteristics of the workers' skills that can be identified with the core activity of the sector. In July 2018, the Government of Serbia adopted a Decision on the Universal List of Codes for Entry and Coding of Data in Employment-Related Records, which includes, among other, a new list of occupation codes and list of qualification level codes.[3] With the enactment of this Decision, the method of classification of occupations in the relevant institutions has been aligned with the International Standard Classification of Occupations ISCO-08.[4] Since the new list of codes are not comparable with the previous ones, and their application started on January 1, 2019, the analysis of occupations in the agribusiness sector was carried out on the basis of available official data of the National Employment Service (NES) and the Central Registry of Compulsory Social Insurance (CROCSI) that keep records on employment/unemployment according to the Universal Occupations Nomenclature of 1990.[5]

Taking into account the aforesaid limitations as well as the fact that an official methodology has yet to be adopted to cover the sector which should clearly define the approach to the sector analysis for the needs of the Sectoral Councils in Serbia[6], we decided that, to begin with, our report will examine the economic definition of the sector and then the available data on occupation groups according to the old occupations classification methodology. The economic domain of the agribusiness sector is defined on the basis of instructions received from the EBRD. In

1 https://unstats.un.org/unsd/publication/seriesM/seriesm_4rev4e.pdf and https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF

2 http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-fields-of-education-and-training-2013-detailed-field-descriptions-2015-en.pdf

3 RS Official Gazette No 56/18

4 https://www.ilo.org/public/english/bureau/stat/isco/isco08/

5 http://www.vps.ns.ac.rs/Materijal/mat6577.pdf

6 http://noks.mpn.gov.rs/sr_lat/sektorska-veca/

line with this, the Agribusiness sector incudes all registered companies and sole proprietors in Sector A, according to the official classification of the Statistical Office of Serbia, except forestry (codes 0111-0170 and 0311-0322), partly in sector C (codes 1011-1092) and partly in sector G (codes 4611, 4617, 4721-4729).[7] On the basis of the defined domain, we looked at agribusiness sector performance indicators at the level of the economy, and also their internal structure according to different criteria.

As a source of economic indicators, we used the data of the Serbian Business Registers Agency (SORS), classifies companies by a four-digit code, down to the level of branch and group. This enabled us to disaggregate performance indicators for companies classified in the agribusiness sector according to the defined classification, so that these data could be used to analyse the economic activity trends at the sector level. The same activity codes were used to select data from the CROCSI database on the total number of employees in the observed sector, as well as the number of new hires in a given year. Unlike the NES database, the CROCSI database also includes workers who were previously not registered as unemployed. Still, we should keep in mind that the CROCSI database covers only the formally employed in the sector, thus, the resulting values will always give an underestimation of the actual number of workers. We could hypothetically overcome this shortcoming if we analysed the Labour Force Survey (LFS) data, but the LFS in itself is not designed in such a way as to be representative at the level of the individual sectors and lower levels of classification,[8] which is the reason why it was not included as a source of data on total employment.

Supply and obstacles to employment were analysed using data on registered unemployment, employers' job orders and placements of jobseekers registered with the NES. These data include only a part of the unemployed and employed in the agribusiness sector since job seekers are not obliged to register with the NES, while those who took up employment and were not previously registered with the NES are also not included. The criterion used for selecting unemployed/placement from the NES register whose occupation codes correspond to the agribusiness sector, were the occupation codes, which in the 2016-2018 period were still kept according to the old occupation classification methodology. In addition to the list of codes kept for this period, each worker registered in the NES (and CROCSI) database is classified on the basis of a six-digit number in which the first two digits indicate the education level, the second two digits the occupation group, while the last two digits are the occupation's order number in a specific complexity category in the individual group. To select the fields of occupation corresponding to the agribusiness sector, we selected all persons from the NES register who were classified into groups according to their field of study (the second two digits of the occupation code)[9]:

- 01 - Agriculture, food production and processing;
- 02 - Livestock and poultry farmers;
- 03 - Fishermen and breeders of other animals;
- 04 - Veterinarians;
- 05 - Food and drinks processors;
- 06 - Tobacco producers.

The occupation codes used in the report for the job seekers registered with the NES were determined on the basis of the highest completed education level, which should ensure that they reflect to a great extent the most prevalent skills fields in the agribusiness sector, defined in economic terms. The limitations of such an approach are that it neglects the part of the workforce supply consisting of unemployed or employed who are classified under other sectors according to their occupation code, but who could, technically, also apply for jobs in the agribusiness sector. This is particularly prominent in the case of employees with a basic education level who, as such, have no specific qualifications in a particular field of occupation. This means that, technically, they do not fall into a specific sector and that they can apply for all jobs that entail the lowest level of qualifications.

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7 A detailed overview of activities with activity codes is provided in Annex A1.

8 This entails analysing the number of employed in a specific sector according to certain characteristics, such as the qualifications level, occupation group, and similar.

9 http://www.vps.ns.ac.rs/Materijal/mat6577.pdf

In addition, this approach focuses only on narrowly defined sectoral occupations whilst neglecting "support" occupations, such as workers in transport, maintenance, administration, lawyers, economists and similar, i.e. jobs that can often be critical for the sector's performance but are essentially non-core activities. The same approach to identifying workers in the sector, by occupation groups, was applied to the CROCSI database, where, as a first step, data on workers were defined based on the company's core business, subsequently dividing the resulting database of workers into those whose occupation codes correspond to the agribusiness sector occupations (01-06).

For analysing the qualification level of workers classified in the agribusiness sector according to one of the previously mentioned criteria, we used the data on the highest completed education level according to the National Qualifications Framework (NQF), by merging levels 6.1 and 6.2 into level 60, and levels 7.1 and 7.2 into level 70.[10] Thus, we practically obtained the same system of classification of qualifications levels applied under the European Qualifications Framework (EQF).

Sampling of companies

In addition to using secondary data on the agribusiness sector, we also conducted a survey to obtain additional information on the situation in this sector with regard to the shares of various occupations and the workers' qualifications' structure breakdown, depending on the jobs they perform in this sector. At the first stage, we defined our approach to the sampling of companies. The basic data set from which the sample was taken consisted of 15,375 companies that were classified as agribusiness sector companies according to their core activity. By size, 88% of these belonged in the category of micro-sized enterprises with an average of 2 employees per registered entity in this category. Workers in small, medium and large enterprises accounted for 87% of the total number of employed in the agribusiness sector. To determine the number of enterprises to be included in the survey sample, an individual weight was established for each of them, based on all ten broader groups, depending on the company size and number of employees. Taking into account the relatively small number of employees in the micro-sized business entities in some of the broader groups in comparison with the number of employees in large companies within those same groups, we introduced a minimum quota of one surveyed company from each of the ten broader fields and four size groups. Thus, there were 43 companies in the sample initially[11] while a weighting system was applied for sampling distribution of the remaining companies, based on the relative size of the group, depending on the number of employees. Upon establishing that the survey could be conducted on a sample of around 70 business entities in the agribusiness sector, we obtained a matrix representing the number of companies to be included in the sample, with an additional restriction. Specifically, the first weighted matrix had a relatively high share of large companies, which is a consequence of a significantly larger number of employees in these companies, and due to their high concentration in a small number of large companies. Although the initial weights distribution suggested that we include 7 companies from the large size category from the broader "Retail Sale", we introduced an additional restriction, of not more than 5 companies from the same broader group, while at the same time increasing the number of micro, small and medium enterprises to be included in the sample based on their individual weights, to offset the reduction in the number of large companies. In addition to the size of the companies, we also took into account that the individual broader groups be adequately represented according to the shares that employees in these groups have at the level of the micro, small, medium and large enterprises. Based on the foregoing two criteria, a matrix was drawn up to represent the shares of the companies from the various categories, with the assumption that 70 companies would be surveyed.

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10 Unlike the EQF, the NQF also recognizes levels 6.1, 6.2, 7.1 and 7.2, as a result of which we have a higher level of branching of Bachelor's and Master's programmes: 61 - two- to three-year higher education programmes according to the old programmes equivalent to the first university level (up to 180 ECTS) according to the new programmes, 62 - higher education with further specialization lasting up to one year according to the old programmes equivalent to basic academic studies or specialist vocational studies (up to 240 ECTS) according to the new programmes, 71 - basic academic studies according to the old programmes equivalent to master studies according to the new programmes, 72 - specialist and master's studies.

11 There are no registered companies that fall in the large category (over 250 employees) in the broader categories of Mixed agricultural production and Services in agriculture, while in the Hunting category there are no registered companies that fall in the small (11-50), medium (51-250) and large category.

Table 1. Proposal for the sampling distribution of companies by size and broader activity segment

	Micro	Small	Medium	Large
Crop production	2	2	2	1
Animal production	1	1	1	1
Mixed agricultural production	1	1	1	0
Service activities in agriculture	1	1	1	0
Hunting	1	0	0	0
Fisheries	1	1	1	1
Production of animal foods	1	1	2	3
Production of plant foods	2	3	3	3
Production of mixed foods	1	1	1	1
Retail trade	2	2	2	5

Source: FREN

Structure of sampled companies

Ultimately, 78 companies participated in the study, by means of a survey and interviews with company representatives, and due care was taken to retain the respective shares of micro, small, medium and large enterprises in the sample, based on the previously developed matrix. Thus, we ensured that all forms of complexities of the organization of production in the agribusiness sector are adequately covered. The breakdown of surveyed companies by size is presented in Table 2.

Table 2. Companies' share in the sample, by size

Company size	Share
Micro	20%
Small	32%
Medium	32%
Large	16%

Source: FREN

On average, the number of years of activity of the surveyed companies stood at 23 years, which indicates a relatively high degree of experience and opportunities for reflecting and assessing market trends in workforce supply. There are differences in the distribution of dominant markets among the surveyed companies (Table 3). Participation in the broader market allows for a greater degree of interaction between companies and different market participants, which in turn increases the amount of information these companies possess. This was especially addressed in the interviews conducted with representatives of companies in this sector, to compare their experiences with regard to other market participants.

Table 3. Dominant market of sampled companies

Company size	Share
Local	28%
Regional	29%
National	27%
International	16%

Source: FREN

To gain better understanding of the sector's needs for existing or new profiles, we also took into account the views of the companies from the sample on their business performance in the previous 12 months and their projections regarding future demand. Data on past business performance can shed light on trends in the recruitment needs of companies in the previous period, while expectations about future needs are a potential indicator of future workforce demand. As can be seen in Table 4, only 11% of the sampled companies experienced a decline in demand, and they share no common traits in terms of size, length of activity or dominant market in which these companies are doing business. As regards projections of workforce demand trends in the forthcoming period, companies in the sample are

optimistic (even those that experienced a decline in demand in the previous period) and almost 60% anticipates an increase in demand which, if materialized, can also be translated into new employment demand.

Table 4. Demand in the previous 12 months and expectations for the next 12-month period for companies in the sample

	Demand in the previous 12 months	Demand in the next 12 months
Growth	45%	59%
Unchanged	44%	37%
Decline	11%	4%

Source: FREN

This correlation was additionally tested by asking companies about new hires in the previous 12-month period in positions closely related to the core activity (agribusiness), as well as in non-core positions related to support activities in the company (finance, administration, marketing, human resources management and similar). It must be noted that, to get the full picture on the actual market demand, the question not only covered the recruitment of new employees under open-ended or fixed-term contracts, temporary and occasional work contracts, but also through temporary-work agencies (staff leasing). Based on the answers to this question, which are presented in Table 5, we can see that 72% of sampled companies hired at least one worker in the past 12-month period in jobs related to the company's core activity. Two-thirds of these companies hired up to 10 new employees, and the rest hired more than that, in a couple of cases even more than 80 employees. The number of new hires is usually proportionate to the company's size and the demand trends in the previous period, while this is not necessarily the case with other non-core activities. A total of 56% of the sampled companies hired new staff in these activities, of which two-thirds hired up to ten new workers, while the rest had a higher hiring rate.

Table 5. Recruitment of new employees in agribusiness-related jobs and in other, non-core jobs

	Agribusiness-related	Non-core jobs
no new hires in these jobs	28%	44%
Up to 10 workers	49%	38%
11-20	6%	8%
21-40	7%	6%
41-80	4%	1%
Over 80 workers	7%	3%

Source: FREN

Companies were invited to answer a question concerning informal employment in "other" companies in similar business activities, considering that companies are not very likely to report their own practices of hiring workers without a contract. Regardless of the formulation of the question, only 15% of the surveyed companies reported that such practices were present, while only one third stated the types of jobs in which unreported employment commonly occurs. Unreported employment is mostly present in simple manual labour, farm field jobs, and shop-assistants in retail outlets.

To gain a better understanding of the workforce needs in the agribusiness sector, depending on the complexity of the jobs performed by these workers in these companies, the surveyed companies submitted an overview of the jobs structure divided into predefined groups. Based on the answers we can infer that most workers in the agricultural sector (70-80%) perform simple to low-complexity manual work, in most cases simple physical tasks in the field and at the production facility on the production line. On average, a mere 9% of the positions in these companies entails work that requires a high level of skills related to the core business activity, while 11% of staff is engaged in support activities (human resources management, finance, legal affairs, marketing and similar). These are average values for companies from the agricultural production sector, however, we should take into account that the share of workers in jobs of a higher level of complexity reaches and exceeds 20% at the level of the individual companies, but these are usually micro-sized or small-sized companies, which brings us to a figure ranging from 3 to 15 workers with this profile. As regards companies in the processing of agricultural products, the structure is slightly better. Again, simple jobs in processing account for the highest average share, with around 55%, while machine operator jobs in production and processing, which entail a higher level of complexity, operating mechanical and automated systems, account

for 23%. Jobs that require a higher level of complexity involve 5-9% of the company employees, while the rest are engaged in jobs that are not part of the company's core activity.

Introduction

Agriculture is one of the most important economic sectors in Serbia, due to its significant contribution to total employment, and its share in the Gross Domestic Product (GDP), as well as its contribution to the reduction of the foreign trade deficit. According to data of Serbia's Ministry of Agriculture, the agriculture, forestry and fisheries sector directly employs 10% of the total workforce and accounts for 20% of Serbia's GDP. According to the last Census, the rural population accounts for 40.6% of the country's total population, of which 628,000 are organized in family agricultural holdings.

Serbia boasts of ideal natural conditions for crops, fruit and vegetables production. The soil is still among the most pristine in Europe, which is an important prerequisite for the rapid development of organic production that yields top quality products. Serbia's diverse climate, along with its significant land resources, also create unique opportunities for the development of primary fruit and vegetable production. If we look at sector data on foreign direct investments in Serbia, the agri-food sector accounts for the second biggest share of FDI, by number of projects, after the automotive industry.[12]

According to SORS data, in 2017, there were 12,823 registered active companies, employing 150,265 people. Privately owned farms in Serbia are, on average, smaller in size than farms in comparable European countries. According to the 2002 Census, there are 778,900 agricultural holdings in Serbia owning approximately 80% of the total farming land, with an average holding size of 2.5 hectares of arable land and 3.6 hectares of farming land. Over 75% of private farms have less than 5 hectares of land, respectively, and fewer than 5% have more than 10 hectares. Owing to their small size, most of these holdings/farms produce exclusively for on-farm consumption, and sell only a small portion of their output on the market. Also in terms of land and labour, agricultural productivity in Serbia is below the EU average. One of the reasons for this is the low level of capital (technology, state-of-the-art equipment and infrastructure). The level of mechanization across most of the sector is also low, and poses one of the major structural barriers to productivity gains. The situation is most critical in small rural households.

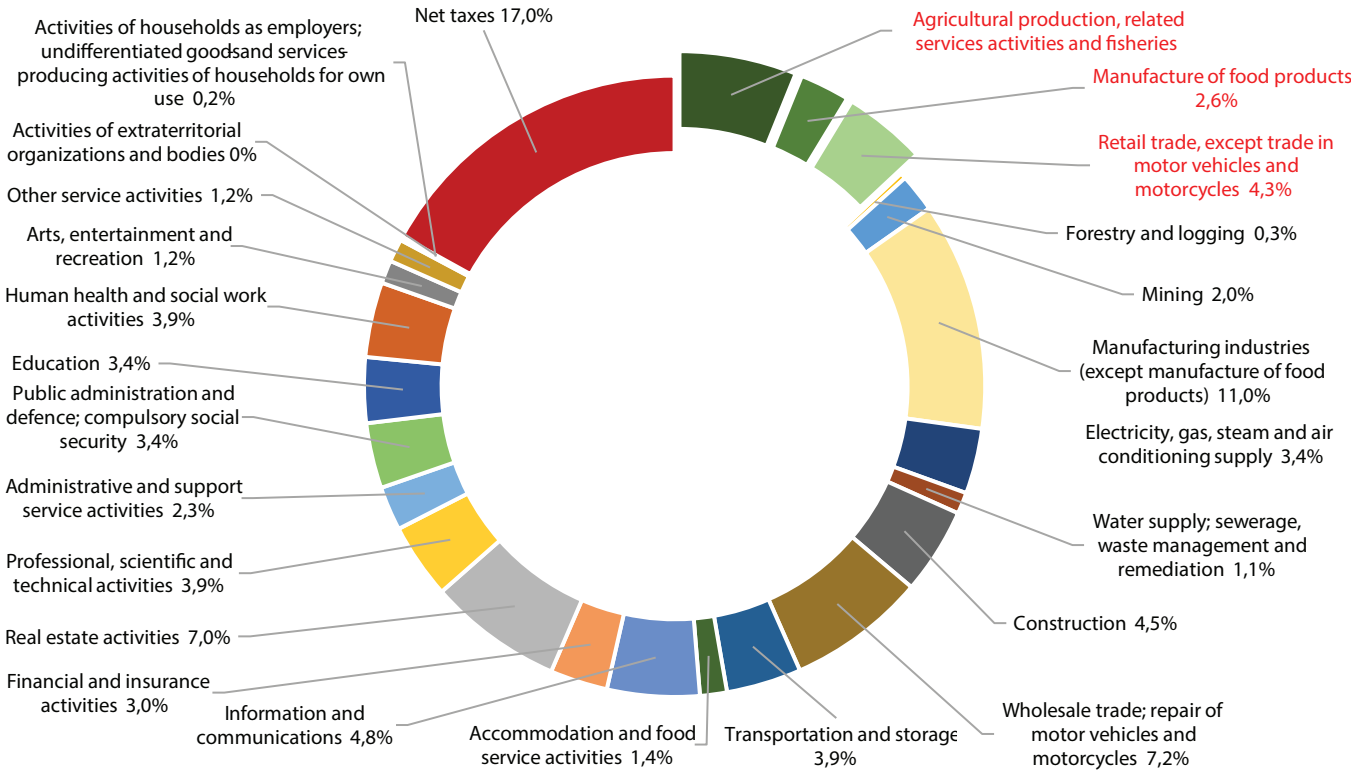
One of the key barriers to the development of agriculture in Serbia is the lack of the consistent implementation of agricultural policies and strategies. As a result, alignment with the EU Common Agricultural Policy (CAP), together with related reforms, is one of the most challenging negotiations chapters for Serbia. The dominant approach to agricultural policy can be characterized as an *ad hoc* approach to problem-solving. The lack of a clear agricultural policy strategy and priorities significantly hampers competitiveness in the agricultural sector, the long-term sustainable development, and the welfare of the rural population. One of the major characteristics of Serbia's agricultural policy is the unpredictable and unstable budget framework. As a result, the allocation of funds for individual purposes changes from year to year. The prominent variability in the breakdown and budget transfers for agriculture is caused by changes in the state budget and is a consequence of political and economic cycles. Despite its limited development, agriculture is still Serbia's key economic activity. The role of this sector is to ensure national food security, generate the raw materials base for non-agricultural activities and deliver export products. In addition, owing to its long tradition and the prevalence of rural regions, this activity is of exceptional social and demographic importance for Serbia.

12 RAS, February 2020

1. Overview of the agribusiness sector

Looking at the share of Gross Value Added (GVA) in the Gross Domestic Product (GDP), by economic activity in Serbia, we see that the manufacturing industries, without food production, accounted for the biggest share in GDP in 2018 (11%), followed by wholesale trade and repair of motor vehicles and motorcycles (7.2%), real estate (7%), agricultural production, related services and fisheries (6.1%), and retail trade, except trade in motor vehicles and motorcycles (4.3%). The GVA to GDP ratio of all other activities was 5% or less, respectively. If we look at the agribusiness sector at the level of the two-digit activity classification, it includes almost the entire Sector A. except forestry, manufacture of food products and retail trade except for trade in motor vehicles and motorcycles. Based on this, the share of the agribusiness sector's GVA in the GDP stood at 13% in 2018. Still, these data overemphasize the Agribusiness sector's share due to the fact that official data of the Statistical Office of the Republic of Serbia provide no possibility for measuring the share of GVA in GDP in the Retail trade, except for trade in motor vehicles and motorcycles segment, at the level of individual branches and groups. This also covers the share of retail sale of non-agricultural products and, as a result, the real share of this sector is probably slightly lower. Nevertheless, this sector's importance is confirmed by an approximate indicator, in the form of the share of the Agribusiness sector's turnover relative to Serbia's entire economy, which stood at 16% at the end of 2018, i.e. more than the combined shares of the turnover of the construction sector and the electricity, gas and steam supply sector, which amounted to 6.3% and 6.1%, respectively[13]. Accordingly, in view of its share, the agribusiness sector is an extremely important sector for Serbia's overall economy, considering that it is to this sector alone that it owes between 10% and 13% of the GVA in its GDP.

Chart 1. Share of the agribusiness sector GVA in GDP, by activity, Serbia, 2018

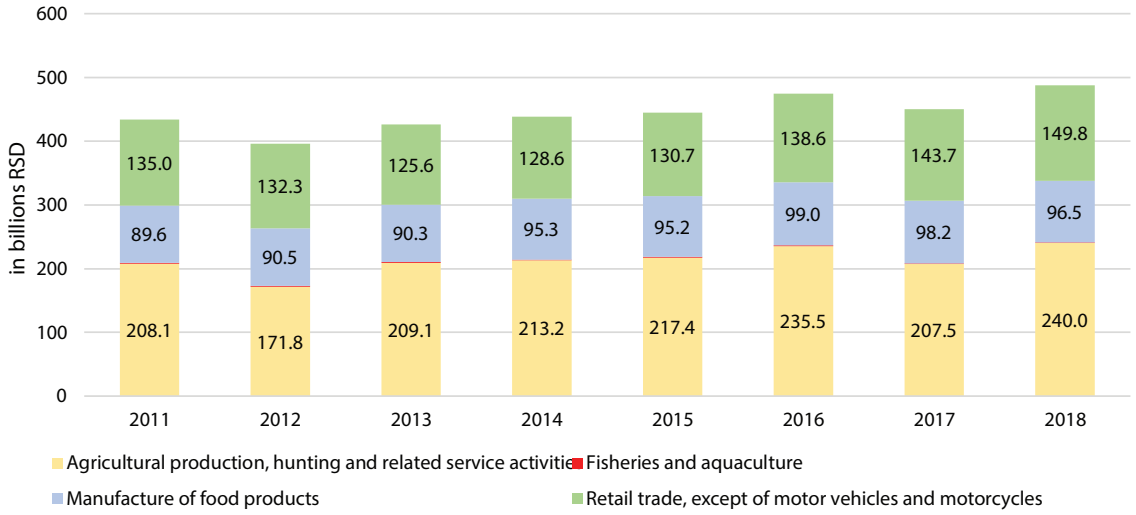


Source: Statistical Office of the Republic of Serbia

The analysis of GVA trends in the agribusiness sector from 2011 to 2018 shows visible fluctuations but that the value at the end of 2018 increased at the sector level relative to the beginning of the observation period. The agricultural production sector registered the highest growth by around RSD 32 billion, while the GVA in the food production segment increased by approximately RSD 7 billion.

13 Statistical Yearbook of Serbia - 2019, Statistical Office of the Republic of Serbia

Chart 2. Trends in the ratio of GVA to GDP in the agribusiness sector activity segments, 2011-2018



Source: Statistical Office of the Republic of Serbia

1.1. SORS data on registered businesses and employment in the agribusiness sector

In 2017, there was a total of 21,885 registered companies and sole proprietors employing 156,098 workers in Serbia's Agribusiness sector in 2017 A breakdown by status shows that almost 60% of the total number were active companies and sole traders employing 96% of the total number of workers, while the rest were either in bankruptcy, in liquidation or deleted from the register.

Table 6. Total number of registered companies and sole traders in the agribusiness sector with number of employees, by legal entity status, at the end of 2017 (%)

	Number of companies/sole proprietors		Number of employees	
Company status	Absolute	%	Absolute	%
Active	12,823	58.50	150,265	96.25
Blocked account	1,326	6.00	2,571	1.65
In bankruptcy	321	1.50	1,069	0.70
In liquidation	817	3.75	319	0.20
Deleted	6,533	29.85	1,874	1.20
Unknown	65	0.40	0	0
Total	21,885	100	156,098	100

Source: SORS

A breakdown by size shows that almost 87% of a total of 12,823 active companies and sole traders are micro companies employing around 12% of the total number of workers in the sector. The remaining 13% of the total number of active companies are small, medium and large companies, which employ the remaining 88% of workers. It is noteworthy that 0.65% of active companies in the agribusiness sector are large companies employing almost 45% of the total number of employees.

Table 7. Active business entities in the agribusiness sector with number of employees, by size, at the end of 2017 (%)

	Number of companies/sole proprietors		Number of employees	
Company size	absolute	%	absolute	%
Micro	11,142	86.90	18,077	12.10
Small	1,249	9.75	27,976	18.60
Medium	350	2.70	37,000	24.60
Large	82	0.65	67,212	44.70
Total	12,823	100	150,265	100

Source: SORS

By number of employees, retail sale of agricultural products and production of plant foods stand out very prominently relative to other areas in the agribusiness sector, In fact, 3,095 and 4,120 companies in these two segments, respectively, employ 54,799 and 45,522 workers, respectively. These two broader groups combined employ almost 66% of the total number of workers in the agribusiness sector. Such a large share in employment of these two areas combined is a result of the fact that these are retail chains that employ a considerable number of workers in their retail outlets, (Aman, Univerexport, Gomex, Štampa Sistem, Futura plus, etc.), while producers of food of plant origin employ a significant number of workers in production, owing to the nature of their core activity (Soko Štark, Swisslion, Sunoko, Pionir, Bambi, Nektar, Dijamant, and similar). In addition to these two segments, there are several other segment that stand out, specifically, meat production, crop production and animal production. Producers of animal foods are the third biggest employer, with 1,376 companies employing 18,134 workers, of which 46% in the meat processing and preserving industry (Matijević, Carnex, Neoplanta, Zlatiborac, and other). In the crop production segment, the biggest number of employees is registered in active companies in the growing of cereals (except rice), leguminous crops, and oil seeds, with 12,671 workers employed in 1,313 companies. The categories that stand out in the animal production group, by number of employees, are raising of dairy cattle with 2,197 employees in 111 companies, and raising of poultry, with 2,055 employees in 168 companies.

Table 8. Active business entities registered in the agribusiness sector, with number of employees by activity branch and broader activity category, at the end of 2017

Activity group	Number of companies/ sole proprietors	Number of employees	Activity segment
Growing of beverage crops	11	6	Crop production
Growing of beverage crops	6	7	
Growing of grapes	47	159	
Growing of pome fruits and stone fruits	158	849	
Growing of non-perennial crops	54	1,067	
Growing of perennial crops	7	10	
Growing of other tree and bush fruits and nuts	210	481	
Growing of rice	1	0	
Growing of vegetables, and melons, roots and tubers	204	713	
Growing of seedlings	108	311	
Growing of spices, aromatic and pharmaceutical crops	19	13	
Growing of cereals (except rice), leguminous crops and oil seeds	1,313	12,671	
Raising of other cattle and buffalo	22	35	Animal production
Raising of horses and other equines	28	71	
Raising of dairy cattle	111	2.197	
Raising of other animals	95	120	
Raising of sheep and goats	25	39	
Raising of swine/pigs	65	1,219	
Raising of poultry	168	2,055	
Mixed farming	265	996	Mixed farming
Hunting, trapping and related service activities	26	19	Hunting
Services in crop and plant farming	184	1,058	Service activities in agriculture
Post-harvest activities	5	10	
Seed processing	6	121	
Support activities for animal production	121	357	
Agents involved in the sale of food, beverages and tobacco	70	348	
Agents involved in the sale of agricultural raw materials	105	230	

Marine aquaculture	1	0	Fisheries
Freshwater aquaculture	88	1,133	
Freshwater fisheries	19	77	
Processing and preserving of meat	420	8,346	Production of animal source foods
Processing and preserving of poultry meat	85	993	
Production of meat products	348	2,343	
Processing and preserving of fish, crustaceans and molluscs	41	238	
Operation of dairies and cheese making	314	5,016	
Manufacture of ice cream	145	1,197	
Processing and preserving of potatoes	17	128	Production of plant foods
Manufacture of fruit and vegetable juice	130	1,624	
Other processing and preserving of fruit and vegetables	787	7,250	
Manufacture of oils and fats	70	2,244	
Manufacture of margarine and similar edible oils	0	0	
Manufacture of grain mill products	352	3,585	
Manufacture of starch and starches products	7	201	
Manufacture of bread, fresh pastry goods and cakes	983	13,922	
Manufacture of rusks, biscuits, preserved pastry goods and cakes	246	3,175	
Manufacture of macaroni, noodles and similar farinaceous products	327	656	
Manufacture of sugar	22	1,716	
Manufacture of cocoa, chocolate and sugar confectionery	340	6,688	
Processing of tea and coffee	715	3,256	
Manufacture of condiments and seasonings	149	1,078	
Manufacture of prepared meals and dishes	37	234	Manufacture of mixed food products
Manufacture of homogenized food preparations and dietetic food	182	920	
Manufacture of other food products	191	3,004	
Manufacture of prepared feeds for farm animals	232	3,083	
Manufacture of prepared pet foods	44	217	
Retail sale of bread, pasta, cakes and sugar confectionery in specialized stores	76	571	Retail sale of agricultural products
Retail sale of meat and meat products in specialized stores	175	926	
Retail sale of beverages in specialized stores	69	732	
Retail sale of tobacco products in specialized stores	32	60	
Retail sale of fish, crustaceans and molluscs in specialized stores	55	133	
Retail sale in non-specialized stores, with food predominating	2,354	48,352	
Retail sale of fruit and vegetables in specialized stores	96	246	
Other retail sale of food in specialized stores	240	1,759	

Source: SORS

An analysis of active companies and sole proprietors in the agribusiness sector, by broader categories, as well as by size, shows that companies and sole proprietors in the Production of plant foods, Retail trade, Crop production and Production of animal foods account for the biggest share. To be precise, out of a total of 12,823 registered active companies and sole proprietors, almost 84% operates in these four groups. The hunting and fisheries groups have the fewest registered active companies and sole proprietors, with only 1% active companies and sole traders operating in these two groups. A breakdown by size shows that of the total number of active companies, 11,142 are micro companies, while the rest are small, medium and large companies. Notably, there are no large companies in mixed agricultural production, support services in agriculture and hunting. In the remaining groups, the number of

large companies is usually in the single-digit range, except in the case of Production of animal foods, Production of plant foods and Retail sale, in which there are 69 large companies of a total of 82 at the sector level. A breakdown of companies from the first four groups by number of employees[14] shows the following pattern: micro companies and sole proprietors account for the dominant share in all four groups, between 80 and 90%, and this is characteristic of the Agribusiness sector at large.

Table 9. Number of active business entities in the agribusiness sector by broader activity category, and by size, at the end of 2017

ACTIVE COMPANIES/SOLE PROPRIETORS BY NARROWER GROUPS AND BY SIZE						
	Micro	Small	Medium	Large	Total	
Crop production	1,849	222	62	5	2,138	
Animal production	457	40	14	3	514	
Mixed agricultural production	247	15	5	0	267	
Hunting	24	0	0	0	24	
Support services in agriculture	438	50	3	0	491	
Fisheries	85	19	3	1	108	
Production of animal foods	1,178	115	43	17	1,376	
Production of plant foods	3,498	475	146	26	4,122	
Production of mixed foods	580	76	26	4	686	
Retail trade	2.786	237	48	26	3,095	
Total	11,142	1,249	350	82	12,823	

Source: SORS

Taking into account the objective of the project, the analysis includes all companies, regardless of their size. It should be noted that, in terms of the share size, micro companies account for a dominant share, but in terms of number of employees, their share in total employment in the Agribusiness sector stands at around 12%, which is less than 2 employees (1.62) per registered company/sole trader in this category. However, for the purposes of comprehensiveness and usefulness of results derived from the survey, micro-sized enterprises were included in the survey, despite the small percentage of employees in this group of companies.

A breakdown of companies in the agribusiness sector by company type reveals that limited liability companies account for the biggest share. Specifically, 49.5% of the total number of registered active companies are limited liability companies. Furthermore, limited liability companies employ 114,729 persons, which is 68% of total sector employment. It is noteworthy that sole proprietors account for around 38% of the observed legal entities, with an 8% share in total employment, approximately, cooperatives around 9% and 2.6%, respectively, and joint stock companies less than 1% and almost 10%, respectively.

Table 10. Number of active business entities with number of employees, by company type, at the end of 2017

	Number of companies/sole proprietors	Percentage	Number of employees
Joint stock company	113	0.88%	16,525
Limited liability company	6,352	49.53%	114,729
Public enterprise	2	0.02%	30
Partnership	88	0.69%	332
Public joint-stock company	3	0.02%	18
Limited partnership	20	0.16%	392
Sole proprietor	4,901	38.22%	13,496
Cooperative	1,137	8.87%	4,399
Bankruptcy estate	2	0.02%	0
Social enterprise	1	0.01%	3
Other	204	1.59%	342
Total	12,823	100.00%	169,555

Source: SORS

14 Production of plant foods, retail sale, wholesale and crop production.

1.2. SORS data on financial performance indicators for business entities in the agribusiness sector

The analysis of financial performance indicators of all active business entities in the agribusiness sector, by broader categories, indicates as follows. At the end of 2017, total agribusiness sector assets were valued at RSD 1.62 billion, and business revenues slightly less, at around RSD 1.52 billion. As expected, the manufacturing of plant foods, crop production and retail sale segments account for the largest share in total assets and business revenues, which does not come as a surprise, as the biggest share of companies (of 12,823 in total), in particular the large ones, operate in these three segments. These three segments combined account for 73% of total assets and generated around 75% of business revenues in the agribusiness sector at the end of 2017. The lowest share of total assets and business revenues at the end of 2017 was registered in mixed agricultural production, fisheries, support services in agriculture and production of mixed foods.

Table 11. Financial performance indicators of active business entities in the agribusiness sector, by broader activity category, at the end of 2017

	Number of companies/sole proprietors	Number of employees	Total assets (expressed in millions of RSD)	Business revenues (in millions of RSD)
Crop production	2,138	16,287	417,578.75	242,411.22
Animal production	514	5,736	100,933.99	42,057.37
Mixed agricultural production	267	996	13,131.95	8,320.08
Hunting	24	19	140.01	48.87
Services in agriculture	491	2,124	24,221.73	21,740.50
Fisheries	108	1,210	15,759.52	7,039.64
Production of animal foods	1,376	18,134	193,293.67	199,316.50
Production of plant foods	4,122	45,522	495,124.80	455,259.42
Production of mixed food	686	7,458	92,044.27	103,109.26
Retail sale	3,095	52,779	266,899.67	440,650.08
Total	12,821	149,176	1,619,128.36	1,519,952.94

Source: SORS

If we look at the profitability of active business entities in the agribusiness sector, by broader categories at the end of 2017, we see that 6,888 of a total of 12,821 businesses yielded profit (around 80% of companies in crop production, production of plant foods, wholesale and retail trade)[15]. Production of plant foods accounts for the biggest net profit at the group level, amounting to RSD 17.34 billion. According to the profitability indicator, the other two groups achieved similar net profit levels. The Production of animal foods and Production of plant foods segments achieved a net profit of RSD 7.80 billion, and RSD 9.52 billion, respectively. The biggest net loss, amounting to RSD -1.66 billion was recorded in support services in agriculture, while a slightly smaller net loss was recorded in the retail sale and animal production segments, where the net loss amounted to RSD -1.48 billion and RSD -1.34 billion, respectively. [16][17]

Table 12. Profitability of active business entities in the agribusiness sector, by broader activity category, at the end of 2017

	Number of companies operating with a profit	Profit in millions RSD	Number of companies operating with a loss	Loss in millions RSD	Number of companies operating at the break-even point	Net loss	Net profit rate[16]	ROA[17]
Crop production	1,195	14,800.42	539	5,278.04	404	9,522.38	2.28%	3.93%
Animal production	264	1,325.72	119	2,666.16	131	-1,340.44	-1.33%	-3.19%
Mixed agricultural production	119	571.48	65	180.63	81	390.85	2.98%	4.70%
Hunting	13	1.20	9	1.79	4	-0.59	-0.41%	-1.21%
Support services to agriculture	280	816.67	133	2,478.35	78	-1,661.68	-6.86%	-7.64%
Fisheries	61	457.56	23	94.29	24	363.27	2.31%	5.16%
Production of animal foods	395	9,041.88	92	1,239.54	29	7,802.34	4.04%	3.91%
Production of plant foods	1,928	27,288.65	380	9,951.95	169	17,336.70	3.50%	3.81%
Production of mixed foods	312	5,016.84	76	3,239.62	38	1,777.22	1.93%	1.72%
Retail sale	2,322	9,521.14	522	11,001.39	253	-1,480.25	-0.55%	-0.34%

Source: SORS

15 Data on net profit and loss were not available for 2,746 companies, which is why these are not included in this table.

16 Net profit/business revenues

17 Net profit/assets

The net profit margin rate, which shows the ratio of net profits to revenues, is set at 2.15% at the level of the entire sector, and is the highest in Production of plant foods, at 4.04% at the group level. The net profit margin rates for the other groups were closer to the average value at the group level, except in the four broader categories which had a negative net profit margin rate. The return on assets (ROA), which is the percentage of profit a company earns relative to its overall assets, is set at 2.02% at the sector level, with the Fisheries group having the highest ROA. The Mixed agricultural production, Crop production, Production of animal foods and Production of plant foods groups all have relatively high ROA values.

2. Agribusiness sector labour market

2.1. CROCSI data on formal employment

Data on new formally employed persons in companies whose core business is related to the agribusiness sector are shown in Table 1.3, by level of education. The first figure is the number of workers with a maximum of one entry in the CROCSI database related to the start of employment with one of the sector companies in the observed year, while the other figure is the total number of entries in the CROCSI database related to the start of employment relationship in the observed companies. The total number of entries is technically always higher because it includes workers who were either promoted several times in the course of the year, or changed position within the company for technical reasons, or were hired several times under short-term contracts due to the specific nature of the job. Still, the number of all new hires in the records also contains information on workers who were transferred from one job to another due to the objective need for that particular job, which provides us with an insight into the demand trends in the given sector. Because of that, the data on the number of newly employed workers with one entry, and in total, represent the lower and upper threshold, respectively, of the new demand for workers in the Agribusiness sector. In 2018, the number of new hires with single entries increased by 13% relative to the previous year, while by total number of entries the growth rate stood at 4%. A breakdown by level of education shows that around 95% of new hires is engaged in jobs requiring the first four qualification levels (10-40). A relatively prominent increase in new employment, set at 15%, was registered in jobs requiring the qualification level seven, in 2018, but the share of these jobs at the sector level is relatively small, so that these new hires account for a mere 3% of total new employment in the agribusiness sector.

Table 13. New hires in the agribusiness sector, by education level, 2016-2018

Education level	2016		2017		2018	
	single	total	single	total	single	total
10	7,219	12,165	7,888	12,341	10,723	14,383
20	4,427	6,716	4,379	6,411	5,373	6,847
30	28,582	39,608	32,451	43,079	34,967	43,156
40	12,790	18,042	12,921	17,348	14,178	17,668
50	133	209	136	193	197	235
60	898	1,293	836	1,131	874	1,188
70	2,202	3,123	1,951	2,740	2,235	2,847
80	13	15	13	15	14	17
Unknown	0	0	1	1	0	0
Total	56,264	81,171	60,577	83,259	68,561	86,341

Source: CROCSI

The foregoing figures reflect the expected labour market demand in the agribusiness sector, while figures presented in Table 14 reflect the total number of formally employed workers in the sector. According to CROCSI data, in 2018, total employment in the agribusiness sector amounted to 204,199. Around 40% of these is employed in Retail sale of agricultural products, around 30% in Production of plant foods, around 11% in Production of animal foods, around 9% in Crop production, while other agribusiness areas account for less than 5% of the total number of workers in the sector.

Workers aged 30-54 years dominate in the age structure with a 71% share of the total number of workers. The number of workers over the age of 60 years, who are expected to leave the sector through a natural process in, approximately, the next five years, stands at 6,297, i.e. 3.1% of all employees in the agribusiness sector. The highest share of the 60+ group of workers is found in the fisheries sector (9.7%). On the other hand, a somewhat more favourable age structure, with an above-average share of workers below the age of 30, is characteristic of the retail sale of agricultural products and mixed production.

Relative to 2017 (Annex A3), total employment in the agribusiness sector increased by 2.8%, primarily as a result of the growth in the number of employees in Retail sale of agricultural products, as well as in Production of plant and animal foods. The age structure of workers in the sector did not significantly change over the observed period.

Table 14. Number of workers in the agribusiness sector, by company activity and age group, average for 2018

Agribusiness Sector	Age group					Total
	Up to 24	25-29	30-54	55-59	60+	
Crop production	823	1,138	12,137	3,434	1,212	18,744
Animal production	295	334	4,396	956	300	6,281
Mixed farming	132	160	1,096	238	79	1,706
Hunting	2	3	88	19	9	121
Support services to agriculture	114	161	1,703	374	164	2,516
Fisheries	52	59	944	275	142	1,472
Production of animal foods	1,452	1,704	16,893	2,318	601	22,969
Production of plant foods	3,895	4,492	42,871	6,548	1,776	59,582
Production of mixed foods	465	774	6,088	734	230	8,292
Retail sale of agricultural products	7,421	7,369	59,302	6,644	1,784	82,519
Total	14,650	16,193	145,517	21,541	6,297	204,199

Source: CROCSI

Data on the gender ratio, presented in Table 15, reveal a bigger share of women (55.7%) across the entire agribusiness sector. This reflects the situation in retail sale of agricultural products where the ratio of employed men to employed women is 1:2.4. On the other hand, men have a dominant share in all other areas of the agribusiness sector, except for Production of plant foods. The sector's gender ratio did not change significantly relative to 2017 (Annex A4).

Table 15. Number of workers in the agribusiness sector, by company activity and gender, average for 2018

Agribusiness Sector	Sex		Total
	Male	Female	
Crop production	13,141	5,603	18,744
Animal production	4,130	2,151	6,281
Mixed production	1,076	630	1,706
Hunting	103	18	121
Services in agriculture	1,528	988	2,516
Fisheries	1,205	267	1,472
Production of animal foods	12,644	10,324	22,969
Production of plant foods	27,179	32,403	59,582
Production of mixed foods	5,200	3,092	8,292
Retail sale of agricultural products	24,300	58,219	82,519
Total	90,506	113,693	204,199

Source: CROCSI

Table 16 shows the breakdown of workers in individual agribusiness sector segments, by education level, in 2018 (absolute values are provided in Annex A5). Workers with secondary education, including four-year secondary education, dominate across all agribusiness areas. Workers with the first four education levels account for minimum 82% of the total number of workers in the agribusiness sector, assuming that everyone in the "unknown" category has a level of qualifications above four. Under the realistic assumption that the educational structure of workers from the "unknown" category corresponds to that of other workers, for whom data on education level are available, this share is as high as 92%. The above-average share of workers with higher education is a typical characteristic of services in agriculture (18%). Data for 2017 and 2016, presented in Annex A6a and A6b, respectively, indicate that there were no significant changes in the structure of the education level of workers in the sector in the observed period.

Table 16. Number of workers in the agribusiness sector, by company activity and education level, average in 2018 (%)

Agribusiness segment	Education level[18]									Total
	10	20	30	40	50	60	70	80	Unknown	
Crop production	20.0	7.0	20.2	25.3	0.4	3.6	9.1	0.2	14.2	9.2
Animal Production	17.1	10.6	22.1	26.1	0.3	2.0	5.1	0.0	16.7	3.1
Mixed production	17.3	5.8	40.1	19.1	0.5	3.4	5.8	0.1	7.9	0.8
Hunting	5.8	1.7	14.0	47.9	1.7	5.0	9.1	0.0	14.9	0.1
Services in agriculture	11.7	4.2	14.9	31.5	0.4	4.8	18.4	0.1	13.9	1.2
Fisheries	14.9	9.8	21.7	24.3	0.5	3.3	4.8	0.1	20.6	0.7
Production of animal foods	14.6	5.8	37.2	23.1	0.5	1.9	4.9	0.0	12.0	11.2
Production of plant foods	16.0	7.6	31.6	25.8	0.4	2.3	4.4	0.0	11.9	29.2
Production of mixed foods	15.7	4.1	19.4	32.0	0.5	3.8	12.0	0.1	12.5	4.1
retail sale of agricultural products	5.2	3.4	50.5	28.9	0.3	1.1	1.6	0.0	8.9	40.4
Total	11.8	5.5	37.8	27.0	0.4	2.0	4.3	0.1	11.2	100.0

Source: CROCSI

We also analysed the extent to which actual qualifications of workers in the agribusiness sector match job qualifications requirements (Table 17). The data required for this analysis were available for 70% of the total number of workers in the sector. These data include the job title, the professional qualifications required for the job and the actual professional qualifications of the employee in that job. The term "overqualified workers" refers to workers who have a higher education level than is required for a particular job. On the other hand, "underqualified" refers to workers who have a lower education level than is required for a particular job. According to the CROCSI database, "overqualified workers" are defined as those whose level of qualifications acquired in formal education is higher than the level of qualifications required for the job by more than one qualifications level according to the NQF[19].

Workers with an adequate level of education that corresponds to the job requirements account for 73% of all employees in the Agribusiness sector. The share of overqualified workers stands at 15%, while underqualified workers account for a 12% share. Relative to the previous two years (Annex A7a and A7b), the share of workers with an adequate level of education remains unchanged. A breakdown by agribusiness segments reveals that the highest share of overqualified workers is typically found in mixed food production (23%), fisheries (19%) and production of plant foods (18%), while the highest share of underqualified workers is present in animal production (28%).

18 The qualifications level includes the following categories: 10 – first level (unskilled workers), 20 – second level (semi-skilled workers), 30 – third level (skilled workers), 40 – fourth level (workers with four-year secondary education), 50 – fifth level (highly skilled workers), 60 – sixth level (workers with an applied study degree), 70 – seventh level (workers with a higher education degree), 80 – eighth level (workers with a postgraduate doctoral degree).

19 http://noks.mpn.gov.rs/sr_lat/uporedna-tabela-nivoa-kvalifikacija-i-vrsta-obrazovanja/

Table 17. Job qualifications requirements versus workers' qualifications level in the agribusiness sector

Agribusiness segment	Workers, in total	Share of workers for which there is no available data for the analysis	Overqualified workers	Underqualified workers	Workers with an adequate education level
Crop production	18,415	12,527	1,779	1,643	9,105
Animal production	6,297	4,793	714	1,352	2,727
Mixed production	1,711	1,378	167	225	986
Hunting	122	60	4	4	52
Services in agriculture	2,440	1,561	228	201	1,132
Fisheries	1,478	907	176	120	611
Production of animal foods	23,520	15,669	2,542	1,858	11,269
Production of plant foods	60,216	43,338	7,898	5,932	29,508
Production of mixed foods	8,357	5,575	1,303	543	3,729
Retail sale of agricultural products	83,423	62,528	6,857	7,063	48,635
Total	205,979	148,336	21,668	18,914	107,754

Source: CROCSI

Across all agribusiness segments, except retail sale of agricultural products, an average 35% of jobs requires qualifications in the field of agribusiness, while 65% of jobs pertain to other occupations (Table 18). On the other hand, in the retail trade of agricultural products segment, a mere 4% of jobs requires qualifications in the field of agribusiness.

Only 33% of workers in jobs that require agribusiness-related qualifications have adequate qualifications, i.e. training/education in the field of agribusiness. This share has seen a decline in December 2018 relative to December 2017, when it stood at 36% (Annex A15). In the production of plant and animal foods segment, which has the highest absolute number of jobs requiring qualifications in agribusiness, the matching ratio with adequately qualified staff is even lower. Specifically, a mere 30% of workers with an education in agribusiness is employed in these jobs.

A share of workers with qualifications in agribusiness are employed in jobs that require qualifications from other areas. Of the total number of jobs that require qualifications from other areas, 8.5% are filled with workers with an education in agribusiness.

Table 18. Workers in the agribusiness sector who have agribusiness-related qualifications, December 2018

Agribusiness segment	Total number of workers	Workers on which data is available for the analysis	Jobs that require qualifications in agribusiness		Jobs that envisage other types of qualifications	
			Total number	Of this, with qualifications in agribusiness	Total number	Of this, with qualifications in agribusiness
Crop production	18,415	12,527	4,527	1,797	8,000	849
Animal production	6,297	4,793	1,556	429	3,237	649
Mixed production	1,711	1,378	475	124	903	72
Hunting	122	60	26	21	34	2
Services in agriculture	2,440	1,561	428	316	1,133	158
Fisheries	1,478	907	410	94	497	30
Production of animal foods	23,520	15,669	5,653	1,957	10,016	920
Production of plant foods	60,216	43,338	15,412	4,365	27,926	2,068
Production of mixed food	8,357	5,575	1,275	388	4,300	411
Retail sale of agricultural products	83,423	62,528	2,595	1,281	59,933	4,690
Total	205,979	148,336	32,357	10,772	115,979	9,849

Source: CROCSI

2.2. NES data on placement of registered jobseekers

Potential demand for workforce in the agribusiness sector can partly be assessed based on data on the number of persons who were registered as unemployed with the NES, and who were placed into employment, i.e. with respect to whom confirmation of obligatory social insurance registration was received, in the observed period. However, these data are an underestimation of the actual workforce demand in the agribusiness sector, for two reasons. First, they only include formally employed workers, resulting in a lower total number of workers in the sector. This is also a drawback of the CROCSI database. The second reason why these data do not reflect the actual sector needs is that any new hires who were previously not on the NES unemployment register are also not be included in these records. An additional challenge is capturing data on workers with the lowest level of education whose field of occupation is classified under the agribusiness sector.[20] In fact, according to NES practices, the occupation code assigned to each worker is determined based on the field in which the worker has the highest completed education level, while workers with the lowest education level are either classified in one of the occupation fields based on their previous work experience, or in the general group 109900 - Persons without occupation and qualifications. As the codes selected to define sector occupations classify workers either by field of education or previous experience, we must bear in mind that a large share of workers with the lowest education level (persons without occupation and qualifications), who could potentially be part of the supply in this sector, are not represented in the following segment.

Data in Table 19 show the number of employed with occupations in the Agribusiness sector in the 2016-2018 period, by level of education. Taking into account that - for the reasons mentioned previously - these data do not include all new hires, we can conclude that the minimum annual demand stands at around 18,000. Also, the trend in the number of placements from the NES register in the observed period is registering a constant decline by around 500 workers annually. Around 80% of workers has secondary education (three-year and four-year secondary education), while a 10% share is highly educated.

Table 19. NES placements of registered job seekers with occupations in the agribusiness sector, by education level

Education level	Total number, at annual level		
	2016	2017	2018
10	10	11	7
20	325	357	357
30	5,545	5,201	5,166
40	9,651	9,624	9,281
50	24	31	29
60	740	757	664
70	2,091	1,941	1,761
80	11	7	6
Total	18,397	17,929	17,271

Source: NES

A breakdown by basic occupation groups classified into the agribusiness sector reveals that the biggest share of workers is in the manufacture of food and beverages (47%) and crop production segments (40%). Also, there is an evident declining trend in the number of placements in all six occupation groups.

20 For a more detailed explanation about the classification of workers in fields of occupations that fall in the Agribusiness sector, please refer to the methodology section.

Table 20. NES placements of registered job seekers with occupations in the agribusiness sector, by activity

Occupations in the agribusiness sector	Total number, at annual level		
	2016	2017	2018
01 - Crop farmers	7,209	7,158	6,982
02 - Cattle and poultry famers	473	440	380
03 - Fishermen and breeders of other animals;	20	29	23
04 - Veterinarians	1,887	1,844	1,653
05 - Food and beverage processors	8,713	8,384	8,153
06 - Tobacco processors	95	74	80
Total	18,397	17,929	17,271

Source: NES

Workers aged 30-54 years are the dominant group in the age structure of job seekers from the NES register who were placed into employment, with a share of around 60% of the total number. The trend of decline in the absolute number of job seekers from the NES register placed in employment at the level of the entire sector is present in the 15-29 and 30-54 age groups. On the other hand, there is an evident annual increase in the number of employed over the age of 55 years (Table 21).

Table 21. NES placements of registered job seekers with occupations in the agribusiness sector, by age

Age group	Total number, at annual level		
	2016	2017	2018
15-29	7,228	6,603	5,990
30-54	10,391	10,368	10,179
55+	778	958	1,102
Total	18,397	17,929	17,271

Source: NES

In the 2016-2018 period, slightly more than a third of placements from the NES register are in just two occupations: agricultural technician for crop production and food technician/biotechnology technician (Table 22). These, together with veterinarian technician, food and beverage processor, baker, butcher, and agricultural machinery operator, account for almost two thirds of placements from the NES register.

Table 22. NES placements of registered job seekers with occupations in the area of agribusiness, by specific occupation

Occupation code	Occupation title	Average number of placements, 2016-2018	Share in total number of placements in the Agribusiness sector
400100	Agricultural technician for crop production	3,229	18.07%
400500	Food technician / biotechnology technician	2,923	16.36%
400400	Veterinarian technician	1,528	8.55%
300500	Food and beverage processor	1,401	7.84%
300502	Baker	1,002	5.61%
300513	Butcher	900	5.04%
300141	Operator of agricultural machinery	520	2.91%
Total for occupations with the biggest share		11,503	64.38%

Source: NES

2.3. Data on employer recruitment needs reported to the NES

In addition to data on NES placement of registered job seekers, data on employer requests for job matching services received by the NES (job orders) can also serve as an indicator of workforce demand in the agribusiness sector. This figure, too, is an underestimation of the actual demand because employers are not obliged to recruit through the NES, they can also opt to use private employment agencies or in-house recruitment, which means that the actual recruitments needs are higher.

In 2018, recruitment needs of employers in the agribusiness sector stood at 11,283 workers (Table 23). According to NES data, 50% of total reported job openings were filled by job seekers from the NES register, with cancellation of job orders being the key reason reported for failing to meet the remaining recruitment needs. When we compare the number of placements with the number of job matching services, the NES placement success rate in 2018 stood at the level of 42%, ranging from 38% to 69%, depending on the narrower group. Three in four job openings are in companies registered for production of plant foods and retail sale of agricultural products. Looking at the data for 2017 and 2016 (Annex A9a and A9b, respectively), we noted an increase in the total number of recruitment needs, spearheaded by the demand in the retail sale of agricultural products, also prominent in production of animal foods, production plant foods and production of mixed foods.

Table 23. Requests for job matching services by agribusiness sector employers, in 2018

Agribusiness segment	Number of workers required	Number of placements	Number of job-matching services delivered	Out-turn rate
Crop production	566	295	716	41%
Animal production	205	130	247	53%
Mixed production	37	21	40	53%
Hunting	1	1	1	100%
Services in agriculture	97	72	104	69%
Fisheries	58	44	73	60%
Production of animal foods	1,452	818	1,721	48%
Production of plant foods	4,181	1,826	4,737	39%
Production of mixed foods	455	203	540	38%
Retail sale of agricultural products	4,231	2,203	5,105	43%
Total	11,283	5,613	13,284	42%

Source: NES

A breakdown of jobs, in respect of which job matching services were requested by employers from the NES, by education, in 2018, is presented in Table 24. In 95% of cases, the jobs entail one of the first four levels of education, with a majority of the jobs requiring three-year vocational secondary education. Relative to the structure of job orders from 2017 and 2016 (Annexes A10a and A10b, respectively), we have seen an increase in the demand for workers in jobs that require the first four levels of education, with the highest growth registered in the demand for the lowest qualifications level, and a somewhat smaller growth rate in the other education levels.

Table 24. Requests for job matching services by agribusiness sector employers, by education level, in 2018, (%)

Education level	Number of workers required	Number of placements	Out-turn rate
10	21%	24%	51%
20	11%	10%	38%
30	50%	48%	40%
40	13%	14%	48%
50	0%	0%	69%
60	1%	1%	40%
70	4%	3%	31%
80	0%	0%	-

Source: NES

Only 23% of the total number of job orders from employers in the agribusiness sector concerns jobs that are closely related to this sector (Table 25). As regards the remaining share of job orders, workers with a degree in technical sciences are in highest demand (mechanical engineering, electrical engineering), followed by transportation, storage, and, finally, administrative support. Compared to 2017 and 2016 (Annex A11a and A11b, respectively), jobs in the food and beverage processing industry account for almost the entire growth in jobs in agribusiness.

Table 25. Requests for job matching services by agribusiness sector employers, in 2018

Occupations in the agribusiness sector	Number of workers required	Number of placements	Number of job-matching services delivered	Out-turn rate
01 - Crop farmers	204	100	248	40%
02 - Cattle and poultry farmers	41	28	48	58%
03 - Fishermen and breeders of other animals;	5	4	5	80%
04 - Veterinarians	46	17	61	28%
05 - Food and beverage processors	2,258	1,153	2,733	42%
06 - Tobacco processors	-	-	-	-
Total	2,554	1,302	3,095	42%

2.4. NES data on registered jobseekers, with length of unemployment spell

NES data on registered jobseekers were used as the main source of information on the potential workforce supply in the agribusiness sector. The number of unemployed registered with the NES with formal qualifications in the agribusiness field in 2018 stood at 30,704, on average. In parallel, their number registered a clear declining trend in the period from 2016 to 2018, at an annual rate of over 10%. By level of education, the structure of unemployed registered with the NES fully corresponds to the structure of placements from the NES register. Specifically, around 84% of workers has a secondary education degree (three-year and four-year secondary school), while around 9% are highly educated workers (Table 26).

Table 26. Registered jobseekers with occupations in the agribusiness field, by education level

Education level	Average number of unemployed, at annual level		
	2016	2017	2018
10	65	58	48
20	1,051	939	802
30	12,183	10,701	9,301
40	20,839	18,695	16,563
50	74	59	48
60	1,496	1,327	1,158
70	3,431	3,102	2,774
80	15	12	9
Total	39,154	34,892	30,704

Source: NES

If we look at the narrower classes of activity into which workers can be classified according to their registered occupation, we can see a common trend at the level of the entire agribusiness sector. In fact, we are witnessing a declining trend in the number of unemployed registered with the NES across all occupation groups. Around 88% of unemployed are in the manufacture of food and beverages and crop production (Table 27).

Table 27. Registered jobseekers with occupations in the agribusiness field, by activity (%)

Jobs in the agribusiness sector	Average number of unemployed, at annual level					
	2016		2017		2018	
	absolute	%	absolute	%	absolute	%
01 - Crop farmers	16,529	42.20	14,772	42.30	13,147	42.80
02 - Cattle and poultry farmers	1,110	2.80	964	2.75	847	2.75
03 - Fishermen and breeders of other animals;	40	0.10	31	0.10	30	0.10
04 - Veterinarians	3,496	8.90	3,159	9.05	2,738	8.90
05 - Food and beverage processors	17,764	45.40	15,777	45.20	13,766	44.85
06 - Tobacco processors	216	0.60	189	0.60	175	0.60
Total	39,154	100	34,892	100	30,704	100

Source: NES

A breakdown by age group, shown in Table 28 leads us to conclude that only the 55+ cohort registered an increase in the number of unemployed in the observed period, while the total number, as well as the number of unemployed below the age of 55 years significantly decreased. In parallel with the rise in the number of unemployed in the 55+ cohort, the number of placements from the NES register from the same cohort also increased, which is encouraging, on the one side, considering that, according to the existing definition, the 50+ cohort falls in the vulnerable groups on the labour market due to conditions hampering their access to employment.

Table 28. Registered jobseekers with occupations in the agribusiness field, by age

Age group	Average number of unemployed, at annual level		
	2016	2017	2018
15-29	11,197	9,201	7,362
30-54	24,509	22,057	19,413
55+	3,448	3,634	3,929
Total	39,154	34,892	30,704

Source: NES

Unemployed with three-year and four-year secondary education profiles account for the biggest share of registered unemployment in the agribusiness sector (Table 29). As many as 62% of unemployed are in the following occupations: agricultural technician for crop production, food technician and biotechnology technician, veterinarian technician, food and beverage processor, baker, butcher and agricultural machinery operator.

Table 29. Registered jobseekers with qualifications in the agribusiness segment, by occupation

Occupation code	Occupation title	Average number of unemployed, per year, in the 2016-2018 period	Share in the total number of unemployed in the agribusiness sector
400100	Agricultural technician for crop production	6,898	19.8%
400500	Food technician and biotechnology technician	4,725	13.5%
400400	Veterinarian technician	2,685	7.7%
300500	Food and beverage processor	2,614	7.5%
300502	Baker	1,874	5.4%
300513	Butcher	1,802	5.2%
300141	Agricultural machinery operator	1,013	2.9%
Total for occupations with the biggest share		21,611	62.0%

Source: NES

The average length of unemployment for workers from the NES register is an additional performance indicator of the matching of supply and demand in the agribusiness sector. This figure concerns only to registered unemployment, i.e. the unemployed who were registered with the NES before taking up employment. As an unemployed individual is not obliged to register with and seek employment through the NES, this figure does not include all potential cases, but is a good indicator of the transition rate from unemployment to work.

According to data presented in Table 30, the transition rates across most important occupations in the agribusiness sector were relatively stable in the observed period. At the level of the entire sector, the average length of unemployment stood at 24 months, i.e. 2 years. When it comes to the most important occupations presented in Table 30, veterinarian technicians typically experience a slightly shorter unemployment spell of around 18 months.

21 We listed the most important occupations, by number of persons registered as unemployed with the NES, and by number of NES placements of registered jobseekers.

Table 30. Average unemployment period in the agribusiness sector, by occupation (months)

Occupation code	Job title[21]	2016	2017	2018
300141	Agricultural machinery operator	24.56	27.70	26.30
300500	Food and beverage processor	26.18	26.65	25.66
300502	Baker	22.21	22.44	21.44
300513	Butcher	20.74	21.88	22.02
400100	Agricultural technician for crop production	23.55	24.58	23.37
400400	Veterinarian technician	18.18	18.49	18.51
400500	Food technician and biotechnology technician	19.46	22.19	20.65
In total for all occupations in the Agribusiness sector		23.13	24.55	24.02

Source: NES

As regards the length of unemployment by educational structure (Annex A12), the shortest unemployment spell is experienced by job seekers with degrees from technical colleges (around 19 months), as well as by those with four-year secondary education degrees and higher education degrees (around 22 months). On the other side, the longest unemployment spell is experienced by unskilled workers (even exceeding 5 years). The shortest unemployment spell is typical of the youngest population, thus, the unemployment spell for unemployed aged 15-29 years amounts to 15 months (Annex A14). When comparing the individual agribusiness sectors, the shortest unemployment spell is typical of the fisheries sector (around 7 months) and for veterinarians (around 18 months), and the longest unemployment spell is registered in the tobacco processing sector (around 27 months).

3. Assessment of the match between the workforce required by the agribusiness sector and that currently supplied by Serbia's educational sector

3.1. The labour demand and supply match

To identify potential obstacles in the recruitment of new workers and potential structural gaps of candidates applying for new positions in the agribusiness sector, the surveyed companies were invited answer a set of questions concerning the characteristics of average candidates hired in specific jobs. Table 31 shows the average job induction period for new employees, according to information obtained from employers. This information reveals how prepared workers are, on average, to meet job-specific requirements. Considering that workers with no formal education in agribusiness can also be employed in this sector, and vice-versa, this issue is covered in a matrix that includes both different focuses of prior education and the specific job performed, which may, but do not necessarily have to be related to the company's core activity. Regardless of the prior education and the job the worker performs, the average new employee induction period stood at around 3 months, which is a relatively brief period of time, bearing in mind that in some activities, 6-12 months are required before the employee becomes fully productive. Possibly, the foregoing data suggest that there are no significant gaps in the knowledge and skills the candidates bring with them to the new job, nevertheless, we should take into account the specific job structure in the agribusiness sector – a dominant share of manual work with a high level of repetitiveness – which was subsequently confirmed in the interviews with the representatives of selected companies.

Table 31. Job induction period for new employees (months)

	Agribusiness	Other positions
Prior education in job-related area	2.65	3.07
Prior education in non-related areas	2.82	3.29

Source: FREN

Despite the relatively short new employee job induction period, almost two-thirds of the surveyed companies reported having difficulties in recruiting adequate candidates for the job. This percentage is even higher when it comes to positions in the company's core activity (69%) relative to other positions in the company (60%, Table 32). Considering the number of unemployed workers registered with the NES with occupations that correspond to the agribusiness sector activities, the foregoing data indicate the likely presence of barriers, such as workforce mobility, working conditions, salary level, and similar.

Table 32. Difficulties finding adequate candidates for the job

	Agribusiness	Other positions
Yes	69%	60%
No	25%	39%
No answer	6%	1%

Source: FREN

Table 33 provides an overview of the employers' answers related to identified gaps in the basic skills of employees in jobs pertaining to the company's core business activity, by education level. A 76% share of surveyed companies reported skills gaps among workers hired to perform jobs with a complexity level that requires completed secondary school or further specialization, of which the biggest share reported skills gaps related to specific job-related requirements. Companies rated the lack of work experience as the second biggest issue hampering the smooth performance of work-related activities, while lack of soft skills related to the workers' social capabilities for team work, for communicating with the rest of the staff or buyers, and similar, was ranked third. As regards workers in jobs that entail a higher level of complexity, around 74% of surveyed companies reported identified gaps, the most prominent being the lack of skills related to the specific requirements of the job, reported by almost half of these companies.

Gaps in soft skills, as well as those strictly related to the technical characteristics of the job, have a relatively similar share of around 24-25% across surveyed companies. Much greater gaps in professional and technical skills in jobs employing workers with completed secondary school indicate a greater mismatch between the knowledge students acquire in secondary schools and the knowledge actually required in practice. This was additionally analysed in interviews with representatives of selected companies, who indicated that the lack of functional practical training in a large share of educational profiles in secondary schools is one of the major skills gaps they have to deal with.

Table 33. Lack of skills in workers

	Technicians (secondary school, specialization)	Specialists and managers (Bachelor's, Master's, PhD)
Professional and technical skills	47%	24%
Basic skills (literacy, computing, languages)	19%	7%
Soft skills (working with people, team work, communication skills and similar)	24%	25%
Relevant work experience	36%	33%
Licenses/certificates	8%	4%
There is no gap	24%	26%

Source: FREN

One of the possible reasons for the gap in professional and technical skills is the employers' practice of hiring workers who are not formally trained for the jobs they perform in the company. This is certainly the case with companies in the agribusiness sector, as 57% of the companies in the sample reported they hired workers whose formal education does not necessarily correspond to the job in which they are hired. It would be wrong to interpret such a high share as a mismatch by formal qualification, based on the field of study. Specifically, in our interviews with the representatives of the companies, we established that even though examples of mismatches are present, they are mostly exceptions to the rule and they usually occur in jobs that entail simple manual activities and repetitive processes that can be easily mastered, regardless of the field of study.

The next set of questions was intended to assess the matching of the requirements of companies in agribusiness and educational profiles in secondary schools and in tertiary education. Companies that were included in the survey were invited to list the most prevalent jobs/occupations in their business activity, along with the combination of skills and knowledge that candidates for the position are expected to have, as well as the expected level of qualifications/education. Over three-quarters of the total number of occupations listed by the companies entailed a level of qualifications equivalent to a secondary education level or lower (Table 34). These figures also corroborate the findings obtained based on the questions on the structure of jobs, presented at the end of Part III-2, where we established that simple jobs account for 70-80% of total jobs in the agribusiness sector.

Table 34. Expected level of qualifications/education for the most frequent jobs reported

	Share
Primary education	17%
Secondary education	59%
Tertiary education	24%

Source: FREN

Occupations requiring a higher level of qualifications are predominantly related to the companies' core activity and usually include various types of Technologists, Agronomists, Veterinarians, Chemists, Livestock Engineers and similar occupations. The companies included in the survey reported that workers hired in these jobs without any formal job-specific education accounted for around 13% of the total number. A low level of reskilling is also present in the occupation of butcher, with companies reporting a mere 9% of cases when they hired someone who had no formal training for this job. The share of workers in jobs outside the field in which they were formally trained is significantly higher in the bakers-confectioners segment, and is most prevalent in jobs in agricultural production, farming and processing, in which only 30% of hired workers completed formal training in these fields. The most prevalent occupations, as reported by the companies, were grouped into wider categories, and presented in Table 35. Most new hires are in jobs in production that entail a low to intermediate level of complexity (workers in production, workers in fruit sorting, crop harvesting, fish farmers, animal keepers, farm workers, dairy farm workers, warehouse keepers, manual labourers, field workers, stokers, and similar). More than a third of the new workforce demand entails simple tasks, while high complexity jobs account for the second largest share at 28% (engineers in food technology, agronomy, agriculture, livestock or crop farming, veterinarians, microbiologists, agronomists, farm managers, chemists and similar). Relatively frequent occupations listed by the companies, are those related to shipping and storage of products as well as maintenance of production facilities (tractor drivers, mechanics, warehouse keepers, pallet operators, forklift operators, operators, and similar). Other important occupations include narrowly defined jobs, mostly butchers, and to a lesser extent bakers and confectioners, with similar numbers of new hires registered in the field of trade, finance and administration.

Table 35. Share of the most frequent jobs reported, by wider job group

	Share
Workers in production (crops, husbandry, processing)	37%
Technologists and engineers	28%
Transport and maintenance	18%
Sales representatives	9%
Butchers, bakers and confectioners	9%

Source: FREN

The skills listed for the individual occupations in these groups in most cases correspond to the expected qualifications levels of candidates applying for the job reported by companies. This suggests that there is no significant vertical mismatch, in terms of the level of education or qualification being higher or lower than required of new workers in the sector, and that the presence thereof is primarily a consequence of the surplus or deficit in the supply of certain workforce profiles. Annex A15 provides and overview of expected knowledge/skills for the listed occupation groups, by qualifications level selected by the companies.

In addition to existing workforce needs, the companies were invited to provide their projections concerning the future demand for certain occupations, taking into account dominant trends in the sector and the economy at large. Around 40% of surveyed companies stated that they envisaged a significant increase in the demand for certain occupations, of which almost 30% emphasized they recognize that the growing automation and mechanization of production processes imposes the need for mechatronics engineers with predominantly a high level of knowledge in automation, mechanics and electronics, in combination with knowledge of food technology basics. Another occupation that is expected to register a growth in demand is that of technologist, with a focus on food or fruit and vegetable production, depending on the company type. Other occupations that will be sought after in the future include plant protection engineer, environmental protection engineer, along with a couple of simple occupations such as butcher,

driver and shift manager. Annex A16 provides and overview of the knowledge and skills that workers in these jobs are expected to have.

The matching of business sector demand and education system supply can also be observed by monitoring further trainings targeting new employees starting their first job after completing secondary or tertiary education. Around half of the surveyed companies reported that newly hired workers are always or often referred to further training. The trainings are often related to the technical characteristics of the job that the education system cannot be expected to covered at the level of all profiles, but that could be included in the practical training part that could be implemented at some level of the studies. The scope of practical training should correspond to the complexity of the specific job, as pointed out by company representatives, which is currently often not the case.

The introduction of additional requirements related to obtaining licenses, certificates or permits required to work in some of the positions is also one of the potential obstacles to finding adequate candidates. The largest number of companies, around 46%, does not report any such additional requirements being imposed on candidates applying for the job, while the remaining share, depending on the job opening they are filling, require various types of licenses, certificates and similar. Usually, these are different categories of driver's licenses for employees hired as sales representatives, or workers in transportation of goods from the production facilities, while in specific jobs related to the company's core activity, this entails certificates related to food safety systems, quality assurance, maintenance and environmental protection.

3.2. Information obtained in interviews with company representatives

Aside from data on the mismatch of current supply of educational profiles and the structure of workforce demand in the agribusiness sector obtained through the survey, additional information was collected through a set of interviews with companies from this sector. Meetings were organized with representatives of the human resources department (HR), production and processing executives in companies selected for this segment of the analysis.

Based on the interviews we can conclude that several leading trends are present in terms of workforce demand in the agribusiness sector. Interestingly, these trends do not depend so much on the specific activity, and are manifested regardless of company size, which confirms their structural character. The interviews support the survey findings that - regardless of their size or specific activity - companies mostly employ workers with three- and four-year secondary education according to the NQF classification. Depending on the specific activity, candidates that do not fulfil formal education requirements defined in the internal job classification will be hired in these jobs when there are no candidates with formal education in the required field. This is not the case with narrowly specialized tasks requiring technical skills, such as butcher, which are most frequently listed as occupations in short supply in meat production and processing. Despite the technological progress and automation of processes in the production and processing facilities, the working conditions in this industry are not attractive for most workers. In fact, it is extremely hard to motivate workers to take up a job in the meat processing industry, considering that these jobs are classified in the unclean, heavy duty industry field. Income and working conditions are by far more favourable in neighbouring countries such as Hungary, especially for this type of secondary level educational profile, which is the reason why some companies have permanent openings for this position. The deficit issue is becoming increasingly more prominent because, according to the companies, the best, most qualified and most experienced workers are leaving. Representatives from companies from the agribusiness sector do not believe that the deficit in certain profiles could be remedied by reskilling the unemployed on the NES register. The reason for this is that due to the growth in this business activity, the greatest share of unemployed managed to find employment in their field, or reoriented themselves to other fields, while the remaining share of unemployed on the register are not really ready to work. Consequently, the reskilling programmes in which a share of the surveyed companies participated were only partially successful in recent years.

Several of the interviewed companies from the sector highlighted a trend of declining worker motivation and declining popularity of jobs in the core business activities requiring a secondary level of education. The issue of the deficit of workers in these jobs is also partly a consequence of the poor "image" these jobs have in society. Secondary school students enrolling in three-year programmes in this area are often candidates with average, or below-average performance and their choice to train for a specific profession is not motivated by the desire to work in

that particular field but rather a consequence of a limited set of available opportunities. When taking into account the facilitated access to jobs in the EU in the recent period, a large number of workers avails itself of this option even when the jobs they are taking up in the EU are not connected to the occupation they had in Serbia. Large companies are trying to overcome this problem through cooperation programmes with secondary schools providing training in the occupations that are in short supply, by providing scholarship programmes, and funding various school activities.

Only a few companies believe that participation in the dual education system is a potential solution for the workforce deficit. Most of them are of the opinion that this system does not meet sector needs, in its current form. Medium and large enterprises reiterate that participation in this process does not pay off, because its costs by far exceed the benefits in the period when the need for workers is in decline, at least according to the system currently offered. The system of work experience placements offered by the dual vocational education system, does not guarantee that employers will be able to meet their needs for workers of a certain profile and, frequently, depending on the school, working with individual candidates for a period of ten workdays, will not adequately prepare these candidates for the actual work in a specific job, or guarantee that employers will see a return on their investment of time and money in this type of training. As regards the traditional companies in production, which most of the companies in this sector are, they do not expect to see a rise in the demand for occupations currently not covered by the schools' agribusiness curriculum. Nevertheless, changes brought by the growing automation of the production process are having an impact on the change in the demand structure. Companies with production centres outside the territory of the Belgrade region report having difficulties finding workers with different technical profiles to work in the maintenance of production facilities and, unless anything changes, they expect that this problem will become even more acute in the future. Poor workforce mobility and a high concentration of the workforce supply in the Belgrade region will lead to the employment of (overqualified) workers in jobs requiring a lower educational level, according to the internal job classification. These observations were provided by companies whose production is fully or partly based in this region, while in other regions of Serbia it is often the other way around.

As regards workers in positions that require an academic degree (Veterinary Sciences and Agriculture), the skills gap, according to employers, is usually not related to technical specialized knowledge these workers have acquired in higher education institutions, but usually to managerial skills required for managing and coordinating farm operations, or production processes in production facilities. While the education system produces experts in this field, it has been noted that not even talented students possess the basic practical skills related to the functioning and organization of farming activities, which significantly reduces their productivity in the first couple of years in the job, in the case of positions in farm management.

The impact of the Covid-19 pandemic on Serbia's agribusiness sector

According to the findings of international organizations, such as the World Bank, the International Monetary Fund, the International Labour Organization, economic challenges related to the Coronavirus pandemic are unique in modern history, from several aspects. The International Monetary Fund (IMF) revised its global economic growth projections, stressing that the global economy will experience a recession with a more severe negative impact than the 2008 financial crisis. According to the IMF report, global growth is expected to decline by 3% in 2020 relative to the previous year. The International Labour Organization estimated that 25 million jobs will be lost in 2020. According to this organization's report on the impact of the Covid-19 pandemic on the global economy, it is estimated that 2.7 billion workers, i.e. 80% of the global workforce, are employed in companies that were forced to suspend their activity.

Tourism and the transportation and logistics sectors are among the economic sectors that will be most affected by the negative impact of the virus pandemic. One of the economic sectors that holds a prominent place among the moderately affected group, at global level, is the agribusiness sector. This stems from the fact that companies in the production and sale of agricultural products are experiencing a growth in demand, on the one side, and disruptions related to the distribution of their products, on the other side. Specifically, restrictions of domestic and international travel greatly hamper the activity of logistical services, in turn causing problems in the supply of products from the domain of the agribusiness sector production. Yet, it should be noted that the agribusiness sector is very segmented, considering that it is based on both online and offline business patterns, hence, the Covid-19 pandemic impact is dual. In its communication of March, Deloitte points out that, as expected, in-home consumption registered growth during

the pandemic, while consumption outside home registered a decline.[22] Consequently, these sudden changes of consumer behaviour patterns had repercussions on the Agribusiness sector too, causing positive effects in some segments of this sector and negative in other segments.

As shown in the report, the share of the agribusiness sector in Serbia's Gross Domestic Product is relatively high. As the negative effects of the Covid-19 pandemic are not expected to be as severe in this economic sector as in some of the other sectors, the decline in Serbia's GDP will be smaller and recovery from the recession faster. The IMF's April World Economic Outlook confirms this, projecting the global growth rate to fall to -3% in 2020, while in EU member states this decline is expected to be significantly higher. For instance, Germany's GDP is expected to decline by 7%, and Italy's GDP by 9%. Also, according to IMF's projections, Serbia's growth rate is expected to reach 7.1% in 2021. This stems from the fact that Serbia, primarily due to the structure of its economy, i.e. a greater share of agriculture and the food industry, and a smaller share of the highly sophisticated industry in its GDP, Serbia will experience a less severe economic downturn relative to most member countries of the European Union.[23]

When we look at the Agribusiness sector in Serbia, we can highlight the following potential effects of the Covid-19 pandemic. First, in the domain of agricultural production, the impact of the pandemic will be negligible. Specifically, the negative effects will not affect the production of cereals, since all processes related to this segment of agricultural production were mostly finalized before the outbreak of the pandemic. Furthermore, the pandemic will not have a significant negative effect on production of animal foods, except in isolated cases. Second, food production will not register a significant decline, especially in view of the increase in the demand for a large number of agricultural products in the first quarter of 2020. Still, some segments of agricultural production can expect negative repercussions, particularly export-oriented producers, or small producers that have problems selling the product on the market due to difficulties with distribution. Third, the greatest challenge that segments of the agribusiness sector can face, primarily the agricultural production and food production segments, is related to securing the raw materials (inputs) required for production which are mostly imported. Due to restricted trade, the deficit in certain raw materials can hamper the production process and thus negatively impact the agribusiness sector. Four, some changes are expected to occur in the agribusiness sector business patterns, because we have seen a significant increase in online consumption in recent months, due to restrictions of movement, and this can accelerate the digitalization process. There is a notable increase in the use of existing applications that help connect producers and consumers, and new applications are being developed to ensure the availability of products. Furthermore, the pandemic also revealed the need for greater flexibility in terms of product stocks and adjusting the product range.

As it is not very likely that the Covid-19 pandemic will have any significant repercussions on Serbia's agribusiness sector, the report findings are not expected to incur any significant changes on account of the new situation. The underlying reason is that the agribusiness sector in Serbia, as in most other countries, is not particularly vulnerable to the circumstances caused by the pandemic. Even so, changes can be expected to occur, particularly with respect to online business patterns, which can prompt changes in the agribusiness sector demand for certain occupations.

22 https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/COVID-19/COVID-19-Impact-Consumer-Sector-Food-Beverage-Companies.pdf

23 https://www.imf.org/en/Publications/WEO/Issues/2020/04/14/weo-april-2020

Conclusion

Serbia has a developed tradition of agricultural production and is a prominent producer of food and beverages. Almost one-fourth of Serbia's population is indirectly engaged in agricultural production, and almost 10% of the total workforce is directly engaged in the processing of agricultural products and food production. According to SORS data, there were 12,823 registered active companies in this sector, employing 150,265 people in 2017.

In terms of employment, large companies still play a leading role. Although large companies account for a mere 0.64% of active companies in the agribusiness sector, they employ a significant 45% of the total workforce in this sector. Only 12% of the workforce is employed in micro-sized companies, which have, by far, the biggest share (87% of the total number of active companies).

The analysis we undertook shows that the two industries with the largest share of workers in the sector are retail sale of agricultural products (around 40%) and the production of plant foods (30%), followed by production of animal foods, crop production and animal production. In the group of companies that operated with a profit at the end of 2017, the biggest share (around 80% of companies) is in crop production, production of plant foods, wholesale and retail trade, while the biggest net profit was registered in the production of plant foods, followed by production of animal foods and crop production. Based on these indicators we can expect a further growth and employment growth in these segments of agribusiness.

Employees with secondary education, which entails maximum a four-year secondary education degree, account for a dominant share (around 90%) of total employment across all agribusiness segments. An above-average share of workers with a higher education degree is a typical characteristic of service activities in agriculture (18%) and production of mixed foods (12%).

As a consequence of difficult working conditions in individual agribusiness segments (animal production, meat processing and similar), there is a smaller share of youth and women among employees, and also a high share of low-skilled workers in certain positions. Employees aged 30-54 years are the dominant age group, with a 60% to 70% share in the total number of workers. An above-average share of workers below the age of 30 years is typical for retail sale of agricultural products and mixed production. Retail sale of agricultural products also has a higher share of women relative to other agribusiness segments (a ratio of 2.4 women to one employed man), while men have a dominant share in all other segments, except for production of plant foods. The highest share of low-skilled workers in certain positions is present in the animal production segment (28%).

On average, 35% of jobs in all agribusiness segments, except retail sale of agricultural products, require specialized qualifications from the agribusiness sector, while 65% of jobs require qualifications from other fields. In spite of this, a mere 33% of workers employed in jobs that require qualifications from the agribusiness field has the required qualifications.

Upon analysing data collected from various sources, we came to the conclusion that the biggest share of workers is employed in the following jobs: agricultural technician for crop production, food technician, biotechnology technician, veterinarian technician, food and beverages processor, baker, butcher, and agricultural machinery operator. We also observed an increase in the demand for workers in companies in the manufacturing and processing of foods and beverages.

Only a small share of the surveyed companies registered a decline in demand, while most projected an increase in demand, which, if materialized, can be translated into demand for new employees. Notably, 72% of companies from the sample hired at least one employee in jobs related to the company's core activity in the previous 12-month period.

When it comes to the workers' education level, the data obtained from other sources are supported by information obtained through the company survey. The largest share of employees in companies in the agricultural sector (70-80%) work in simple to low complexity manual jobs. On average, only 9% of company positions entail jobs that require a high level of skills related to the company's core business activity, while the remaining workforce is engaged in support activities (human resources management, finance, marketing, and similar). As regards companies in the field of processing of agricultural products, simple jobs in the manufacturing industry account for the greatest

average share (around 55%), followed by somewhat more complex jobs of operators of machinery in manufacturing and processing (around 23%), while jobs with the highest level of complexity account for the smallest share (5-9% of workers). Other company workers are engaged in non-core work.

The surveys have shown that, regardless of prior education and the work the employee performs, the average job induction period is set at around 3 months, which is relatively short. These data may suggest that there are no significant gaps in the knowledge and skills the candidates bring with them to their new job, but we still must take into account the specific structure of jobs in the agribusiness sector – a dominant share of manual labour and a high level of repetitiveness. On the other hand, almost two-thirds of the surveyed companies reported having difficulties finding adequate candidates for the job. In turn, this can be linked with issues that are present in some sectors, related to the working conditions, salary level, and similar.

As regards skills of workers engaged in jobs that require completed secondary school or further specialization, companies have to cope with the skills gap related to the specific job requirements, lack of work experience, lack of soft skills related to the social capabilities of workers for team work, for interpersonal communication with colleagues, or buyers, and similar. Another problem that arises, in particular among younger workers, is the lack of motivation, and ambition to learn and develop professionally. As regards workers in jobs that entail a higher level of complexity, most companies have difficulties finding employees with adequate work experience. Significantly higher professional and technical skills gaps, found in positions filled with workers with completed secondary education, point to a sizeable mismatch between the knowledge students acquire in secondary schools and the practical requirements. This was addressed in more depth in the course of interviews with representatives of selected companies, who highlighted that the lack of functional work experience placements in a large number of educational profiles in secondary schools was one of the major difficulties they faced.

Occupations in which a higher level of qualifications is expected are predominantly linked to the company's core business and usually include different types of technologists, agronomists, veterinarians, chemists, livestock engineers and similar qualifications.

The survey reveals that a large number of companies recognized the increasing demand for mechatronics engineers, with a high level of knowledge in automation, mechanics and electronics, along with knowledge of basic elements of food technology, imposed by the increased automation and mechanization of the production process. Other occupations that are expected to be in high demand in the future are technologists with a focus on food or fruit and vegetable production (depending on the type of company). In addition, other occupations that will be in demand in the forthcoming period include engineers in plant protection, environmental protection and a couple of simple occupations such as butcher, driver and shift manager.

ANNEX

A1. Overview of agribusiness sector activities

01111 growing of cereals (except rice), leguminous crops and oil seeds
0112 growing of rice
0113 growing of vegetables, and melons, roots and tubers
0114 growing of fibre crops
0119 growing of other non-perennial crops
0121 growing of grapes
0124 growing of pome fruits and stone fruits
0125 growing of other wood and bush fruits and nuts
0127 growing of beverage crops
0128 growing of spices, aromatic, drug and pharmaceutical crops
0129 growing of other perennial crops
0130 growing of seeds
0141 raising of dairy cattle
0142 raising of other cattle and buffalos
0143 raising of horses and other equines
0145 raising of sheep and goats
0146 raising of swine/pigs
0147 raising of poultry
0149 raising of other animals
0150 mixed agricultural production
0161 services in crop and plant production
0162 auxiliary activities in animal production
0163 post-harvest activities
0164 seed processing
0170 hunting, trapping and related service activities
0312 freshwater fishing
0322 freshwater aquaculture
1011 processing and preserving of meat
1012 processing and preserving of poultry meat
1013 production of meat products
1020 processing and preserving of fish, crustaceans and molluscs
1031 processing and preserving of potatoes
1032 manufacture of fruit and vegetable juices
1039 other processing and preserving of fruit and vegetables
1041 manufacture of oils and fats
1042 manufacture of margarine and similar edible fats
1051 operation of dairies and cheese making
1052 manufacture of ice cream
1061 manufacture of grain mill products
1062 manufacture of starches and starch products
1071 manufacture of bread, fresh pastry goods and cakes

1072 manufacture of rusks and biscuits, preserved pastry goods and cakes

1073 manufacture of macaroni, noodles and similar farinaceous products

1081 manufacture of sugar

1082 manufacture of cocoa, chocolate and sugar confectionery

1083 processing of tea and coffee

1084 manufacture of condiments and seasonings

1085 manufacture of prepared meals and dishes

1086 manufacture of homogenized food preparations and dietetic food

1087 manufacture of other food products

1091 manufacture of prepared feeds for farm animals

1092 manufacture of prepared pet foods

4611 agents involved in the sale of agricultural raw materials, live animals, textile raw materials and semi-finished goods

4617 agents involved in the sale of food, beverages and tobacco

4711 retail sale in non-specialized stores with food, beverages and tobacco predominating

4721 retail sale of fruit and vegetables in specialized stores

4722 retail sale of meat and meat products in specialized stores

4723 retail sale of fish, crustaceans and molluscs in specialized stores

4724 retail sale of bread, pasta, cakes and sugar confectionery in specialized stores

4725 retail sale of beverages in specialized stores

4726 retail sale of tobacco products in specialized stores

4729 other retail sale of food in specialized stores

A2. Number of companies/sole proprietors, with number of employees, by statistical activity group registered in the agribusiness sector, at the end of 2017

	Number of companies/ sole proprietors	Number of employees	
Growing of beverage crops	14	6	Crop production
Growing of fibre crops	7	7	
Growing of grapes	56	267	
Growing of pome fruits and stone fruits	173	854	
Growing of non-perennial crops	61	1,067	
Growing of perennial crops	8	10	
Growing of other tree and bush fruits and nuts	249	546	
Growing of rice	1	0	
Growing of vegetables, and melons, roots and tubers	223	718	
Growing of seedlings	114	319	
Growing of spices, aromatic and pharmaceutical crops	19	13	
Growing of cereals (except rice), leguminous crops and oil seeds	1,457	12,832	
Raising of other cattle and buffalo	24	35	Animal production
Raising of horses and other equines	32	73	
Raising of dairy cattle	137	2,205	
Raising of other animals	106	120	
Raising of sheep and goats	30	42	
Raising of swine/pigs	82	1,588	
Raising of poultry	195	2,063	
Mixed farming	306	1,007	Mixed production
Hunting, trapping and related service activities	29	23	Hunting
Services in crop and plant farming	201	1060	Support services in agriculture
Post-harvest activities	5	10	
Seed processing	6	121	
Support activities for animal production	129	359	
Agents involved in the sale of food, beverages and tobacco	78	348	
Agents involved in the sale of agricultural raw materials	119	235	
Marine aquaculture	1	0	Fisheries
Freshwater aquaculture	95	1,136	
Freshwater fisheries	22	77	
Processing and preserving of meat	1,143	8,667	Production of animal foods
Processing and preserving of poultry meat	216	1,093	
Production of meat products	989	2,468	
Processing and preserving of fish, crustaceans and molluscs	159	316	
Operation of dairies and cheese making	814	5,109	
Manufacture of ice cream	322	1,199	

Processing and preserving of potatoes	56	128	Production of plant foods
Manufacture of fruit and vegetable juice	248	1,632	
Other processing and preserving of fruit and vegetables	1,500	7,780	
Manufacture of oils and fats	147	2,300	
Manufacture of margarine and similar edible oils	1	0	
Manufacture of grain mill products	1,019	4,120	
Manufacture of starch and starches products	31	251	
Manufacture of bread, fresh pastry goods and cakes	1,500	15,062	
Manufacture of rusks, biscuits, preserved pastry goods and cakes	607	3,471	
Manufacture of macaroni, noodles and similar farinaceous products	861	664	
Manufacture of sugar	47	1,806	
Manufacture of cocoa, chocolate and sugar confectionery	805	7,382	
Processing of tea and coffee	1,896	3,320	
Manufacture of condiments and seasonings	366	1,100	
Manufacture of prepared meals and dishes	76	236	Production of mixed foods
Manufacture of homogenized food preparations and dietetic food	325	936	
Manufacture of other food products	475	3,151	
Manufacture of prepared feeds for farm animals	708	3,357	
Manufacture of prepared pet foods	101	222	
Retail sale of bread, pasta, cakes and sugar confectionery in specialized stores	94	579	Retail sale of agricultural products
Retail sale of meat and meat products in specialized stores	200	957	
Retail sale of beverages in specialized stores	80	736	
Retail sale of tobacco products in specialized stores	38	65	
Retail sale of fish, crustaceans and molluscs in specialized stores	64	139	
Retail sale in non-specialized stores, with food predominating	2,623	48,660	
Retail sale of fruit and vegetables in specialized stores	114	254	
Other retail sale of food in specialized stores	281	1,798	

Source: SORS

A3. Number of workers in the agribusiness sector, by company activity and age group, average for 2017

Agribusiness segment	Age group					Total
	Up to 24	25-29	30-54	55-59	60+	
Crop production	877	1,104	12,443	3,326	1,049	18,799
Animal production	305	353	4,589	904	277	6,427
Mixed production	149	160	1,074	210	79	1,672
Hunting	2	2	95	18	5	123
Support services in agriculture	114	162	1,735	356	144	2,511
Fisheries	51	58	956	252	124	1,440
Production of animal foods	1,362	1,722	16,218	2,053	489	21,844
Production of plant foods	3,934	4,499	42,240	5,831	1,468	57,973
Production of mixed foods	436	725	5,815	669	207	7,852
Retail sale of agricultural products	7,023	7,516	58,073	5,986	1,425	80,022
Total	14,252	16,300	143,238	19,605	5,268	198,663

Source: CROCSI

A4. Number of workers in the agribusiness sector, by company activity and gender, average for 2017

Agribusiness segment	Sex		Total
	Male	Female	
Crop production	13,241	5,558	18,799
Animal production	4,205	2,223	6,427
Mixed production	1,064	608	1,672
Hunting	103	20	123
Support services in agriculture	1,533	977	2,511
Fisheries	1,175	265	1,440
Production of animal foods	12,246	9,598	21,844
Production of plant foods	27,112	30,861	57,973
Production of mixed foods	5,014	2,838	7,852
Retail sale of agricultural products	24,181	55,841	80,022
Total	89,875	108,788	198,663

Source: CROCSI

A5. Number of workers in the agribusiness sector, by company activity and education level, average for 2018

Agribusiness segment	Education level									Total
	10	20	30	40	50	60	70	80	Unknown	
Crop production	3,753	1,304	3,780	4,739	82	677	1,706	46	2,658	18,743
Animal production	1,076	664	1,386	1,638	17	126	320	3	1,050	6,281
Mixed production	295	99	684	326	9	58	99	1	135	1,706
Hunting	7	2	17	58	2	6	11	0	18	121
Support services in agriculture	295	105	376	792	10	122	463	3	350	2,516
Fisheries	220	144	319	357	8	48	70	2	303	1,472
Production of animal foods	3,350	1,323	8,535	5,311	111	440	1,134	5	2,760	22,969
Production of plant foods	9,519	4,532	18,800	15,382	244	1,361	2,611	19	7,115	59,582
Production of mixed foods	1,301	341	1,605	2,653	40	313	996	8	1,035	8,292
Retail sale of agricultural products	4,279	2,779	41,690	23,842	285	948	1,297	37	7,362	82,519
Total	24,093	11,293	77,190	55,098	810	4,098	8,707	125	22,785	204,199

A6a. Number of workers in the agribusiness sector, by company activity and qualifications level, average for 2017

Agribusiness segment	Qualifications level									Total
	10	20	30	40	50	60	70	80	Unknown	
Crop production	3,586	1,284	3,723	4,802	77	700	1,653	49	2,926	18,799
Animal production	1,038	667	1,344	1,707	17	124	318	3	1,210	6,427
Mixed production	252	100	676	330	8	55	93	0	159	1,672
Hunting	7	2	17	58	2	6	14	0	18	123
Support services in agriculture	286	107	375	784	9	129	452	2	367	2,511
Fisheries	187	121	329	375	8	39	72	2	309	1,440
Production of animal foods	2,966	989	8,070	5,155	99	427	1,073	5	3,060	21,844
Production of plant foods	8,804	4,135	18,052	15,251	243	1,301	2,549	19	7,618	57,973
Production of mixed foods	1,124	310	1,484	2,577	40	291	887	8	1,130	7,852
Retail sale of agricultural products	3,788	2,673	38,262	24,663	312	997	1,328	37	7,963	80,022
Total	22,037	10,388	72,331	55,700	816	4,067	8,440	125	24,759	198,663

Source: CROCSI

A6b. Number of workers in the agribusiness sector, by company activity and qualifications level, average for 2016

Agribusiness segment	Qualifications level									Total
	10	20	30	40	50	60	70	80	Unknown	
Crop production	2,733	768	3,345	3,325	61	498	1,124	29	3,143	15,026
Animal production	925	477	1,367	1,306	15	95	230	3	1,281	5,698
Mixed production	228	62	592	245	7	37	65	1	175	1,412
Hunting	8	4	17	43	3	4	12	1	17	107
Support services in agriculture	221	69	331	543	7	87	295	3	348	1,903
Fisheries	148	86	316	208	2	22	51	2	253	1,089
Production of animal foods	2,506	654	7,053	3,554	102	298	725	5	3,291	18,188
Production of plant foods	7,186	2,431	15,953	10,178	209	872	1,746	8	6,665	45,247
Production of mixed foods	1,011	232	1,402	1,846	33	205	620	6	1,161	6,514
Retail sale of agricultural products	3,289	1,716	33,136	15,670	262	700	959	6	4,851	60,589
Total	18,253	6,497	63,511	36,919	701	2,818	5,826	64	21,185	155,773

Source: CROCSI

A7a. Match between job qualifications requirements and workers' level of qualifications in the agribusiness sector (vertical mismatch), December 2017

Agribusiness segment	Total number of workers	Share of workers for which data are available	Overqualified workers	Underqualified workers	Adequately qualified workers
Crop production	18,205	12,203	1,643	1,521	9,039
Animal production	6,360	4,001	646	372	2,983
Mixed production	1,687	1,321	146	183	992
Hunting	121	60	5	3	52
Services in agriculture	2,471	1,559	229	185	1,145
Fisheries	1,415	878	173	118	587
Production of animal foods	22,061	14,914	1,585	2,150	11,179
Production of plant foods	58,065	40,395	7,096	5,105	28,194
Production of mixed foods	8,034	5,043	1,180	493	3,370
Retail sale of agricultural products	81,091	59,336	6,464	6,148	46,724
Total	199,510	139,710	19,167	16,278	104,265

Source: CROCSI

A7b. Match between job qualifications requirements and workers' level of qualifications in the agribusiness sector (vertical mismatch), December 2016

Agribusiness segment	Employees, total	Share of workers for which data are available	Overqualified workers	Underqualified workers	Adequately qualified workers
Crop production	17,042	11,179	1,423	1,321	8,434
Animal production	6,164	3,829	600	359	2,870
Mixed production	1,615	1,319	168	169	982
Hunting	118	59	5	2	52
Support services in agriculture	2,191	1,354	177	163	1,014
Fisheries	1,163	812	122	107	583
Production of animal foods	20,343	13,458	2,145	1,363	9,950
Production of plant foods	51,808	36,543	6,261	4,299	25,983
Production of mixed foods	7,432	4,597	1,031	444	3,122
Retail sale of agricultural products	68,187	51,192	5,723	4,828	40,641
Total	176,063	124,341	17,655	13,055	93,631

Source: CROCSI

A8a. Workers in the agribusiness sector with agribusiness-related qualifications (field-of-study or horizontal mismatch), December 2017

Agribusiness segment	Employees, total	Share of workers for which data are available	Jobs requiring qualifications in agribusiness		Jobs requiring other types of qualifications	
			Total number	Share of total number with qualifications in agribusiness	Total number	Share of total number with qualifications in agribusiness
Crop production	18,205	12,203	4,330	1,738	7,873	825
Animal production	6,360	4,001	1,835	519	2,166	275
Mixed production	1,687	1,321	435	124	886	78
Hunting	121	60	26	21	34	4
Support services in agriculture	2,471	1,559	421	312	1,138	163
Fisheries	1,415	878	401	95	477	37
Production of animal foods	22,061	14,914	5,031	1,851	9,883	931
Production of plant foods	58,065	40,395	13,499	4,227	26,896	1,992
Production of mixed foods	8,034	5,043	1,165	376	3,878	392
Retail sale of agricultural products	81,091	59,336	2,564	1,325	56,772	4,255
Total	199,510	139,710	29,707	10,588	110,003	8,952

Source: CROCSI

A8b. Workers in the agribusiness sector with agribusiness-related qualifications (field-of-study or horizontal mismatch), December 2016

Agribusiness segment	Employees, total	Share of workers for which data are available	Jobs requiring qualifications in agribusiness		Jobs requiring other types of qualifications	
			Total number	Share of total number with qualifications in agribusiness	Total number	Share of total number with qualifications in agribusiness
Crop production	17,042	11,179	2,485	1,700	8,693	2,081
Animal production	6,164	3,829	766	491	3,062	1,100
Mixed production	1,615	1,319	203	116	1,115	305
Hunting	118	59	8	2	51	0
Services in agriculture	2,191	1,354	425	283	929	82
Fisheries	1,163	812	125	89	687	220
Production of animal foods	20,343	13,458	2,590	1,761	10,868	2,607
Production of plant foods	51,808	36,543	5,776	3,901	30,756	7,868
Production of mixed foods	7,432	4,597	668	316	3,928	716
Retail sale of agricultural products	68,187	51,192	4,909	1,260	46,263	980
Total	176,063	124,341	17,955	9,919	106,352	15,959

Source: CROCSI

A9a. Requests for job matching services by agribusiness sector employers, in 2017

Agribusiness segment	Number of workers required	Number of placements	Number of job matching services delivered	Success rate
Crop production	551	419	634	66%
Animal production	186	85	190	45%
Mixed production	79	21	79	27%
Hunting	-	-	-	-
Support services in agriculture	108	60	110	55%
Fisheries	27	10	27	37%
Production of animal foods	1,079	600	1,101	54%
Production of plant foods	3,765	1,646	3,918	42%
Production of mixed foods	323	140	330	42%
Retail sale of agricultural products	4,106	2,569	4,795	54%
Total	10,224	5,550	11,184	50%

Source: NES

A9b. Requests for job matching services by agribusiness sector employers, in 2016

Agribusiness segment	Number of workers required	Number of placements	Number of job matching services delivered	Success rate
Crop production	586	508	755	67%
Animal production	161	70	171	41%
Mixed production	93	64	93	69%
Hunting	-	-	-	-
Support services in agriculture	94	54	94	57%
Fisheries	37	10	37	27%
Production of animal foods	1,160	580	1,190	49%
Production of plant foods	3,617	2,141	3,972	54%
Production of mixed foods	240	119	244	49%
Retail sale of agricultural products	3,350	1,746	3,523	50%
Total	9,338	5,292	10,079	53%

Source: NES

A10a. Requests for job matching services by agribusiness sector employers, by qualifications level, in 2017, %

Qualifications level	Number of workers required	Number of placements	Success rate
10	18%	26%	70%
20	7%	8%	59%
30	53%	45%	46%
40	15%	15%	53%
50	0%	0%	53%
60	1%	1%	41%
70	6%	5%	48%
80	0%	-	0%

Source: NES

A10b. Requests by employers from the agribusiness sector for job matching services, by qualifications level, in 2016, %

Qualifications level	Number of workers required	Number of placements	Success rate
10	20%	29%	63%
20	7%	8%	56%
30	53%	46%	44%
40	14%	13%	45%
50	0%	0%	44%
60	1%	1%	40%
70	4%	3%	37%
80	-	-	-

Source: NES

A11a. Requests for job matching services by agribusiness sector employers, for agribusiness-related jobs, in 2017

Jobs in the agribusiness sector	Number of workers required	Number of placements	Number of job matching services delivered	Success rate
01 - Crop farmers	226	102	229	45%
02 - Cattle and poultry farmers	35	9	35	26%
03 - Fishermen and breeders of other animals;	2	-	2	0%
04 - Veterinarians	31	13	31	42%
05 - Food and beverage processors	1,933	907	1,936	47%
06 - Tobacco processors	-	-	-	-
Total	2,227	1,031	2,233	46%

A11b. Requests for job matching services by agribusiness sector employers, for agribusiness-related jobs, in 2016

Jobs in the agribusiness sector	Number of workers required	Number of placements	Number of job matching services delivered	Out-turn rate
01 - Crop farmers	267	161	279	58%
02 - Cattle and poultry farmers	49	40	56	71%
03 - Fishermen and breeders of other animals;	11	1	11	9%
04 - Veterinarians	48	19	48	40%
05 - Food and beverage processors	1,733	855	1,834	47%
06 - Tobacco processors	-	-	-	-
Total	2,108	1,076	2,228	48%

A12. Average duration of unemployment (months), by qualifications level

Qualifications level	2016	2017	2018
10	51.90	23.40	64.29
20	26.88	32.29	30.68
30	24.77	26.30	26.07
40	21.88	23.32	22.27
50	30.12	32.61	25.66
61	27.04	29.41	32.81
62	19.96	21.70	18.29
71	22.92	23.40	24.42
72	39.88	30.31	25.32
80	22.64	18.86	36.50

Source: NES

A13. Average duration of unemployment (months), by activity

Jobs in the agribusiness sector	2016	2017	2018
01 - Crop farmers	24.00	25.99	25.01
02 - Cattle and poultry farmers	28.00	27.44	26.25
03 - Fishermen and breeders of other animals;	12.90	14.48	6.65
04 - Veterinarians	18.51	18.10	18.68
05 - Food and beverage processors	23.13	24.54	24.17
06 - Tobacco processors	27.03	32.47	27.06

Source: NES

A14. Average duration of unemployment (months), by age

Age group	2016	2017	2018
15-29	17.44	17.25	15.30
30-54	26.47	28.43	28.11
55+	31.46	33.03	33.96

Source: NES

A15. Expected knowledge and skills for the jobs in highest demand, by qualifications level

Job	Required knowledge and skills for qualifications level 1 and 2	Required knowledge and skills for qualifications level 3 and 4
Workers in production (plants, animals, processing)	Quality assurance Handling machines Processing technology HACCP skills Knowledge of the production process Treatment of plants Food safety Knowledge of plants Knowledge of soil Knowledge of pesticides Assembly of production line Speed	Handling equipment Team work Knowledge of genetics Agrimanagement Knowledge of agricultural production Handling equipment Processing technology Knowledge of foreign languages
Technologists and engineers	Plant protection Poultry farming management Crop dusting Feeling for details, analytical and systematic skills Management of people Knowledge of GMP, GHP and HACCP guidelines Communications Knowledge of technological processes Computer skills High level of conscientiousness and responsibility	HACCP Processing technology Quality assurance Excellent verbal and written communication skills Agricultural engineering Food safety Testing growing methods Knowledge of organizational processes Knowledge of Global GAP standards Knowledge of genetics Veterinarian medicine ISO22000 Implementation of reports Computers, languages, communications
Transport and maintenance	Knowledge of machines and mechanization Food safety Occupational safety and health Processing technology Operation and maintenance of machine parts Operation of various transport machinery Repair and procurement of machine parts Electronic fundamentals	Understanding of mechanical engineering and electrical engineering Mechanical engineering Work under pressure Proactive, fast action in emergencies, self-initiative
Sales executives	Commercial knowledge of products Communication skills Working with people Food safety Occupational safety and health Communication skills Cash register work Knowledge of the product range Knowledge of sanitary and hygienic requirements	Communication skills Knowledge of economic/accounting regulations Work administration Enforcement of economic regulations Bookkeeping Computer skills
Butchers, bakers and confectioners	Quality assurance Food safety Meat processing Knowledge of processing technologies	

A16. Expectations with regard to a significant increase in demand for certain professions with knowledge and skills that will be in demand

Job	Required knowledge and skills
Mechatronics Engineer	Repair of spare parts for automated technologies and electronic low-voltage regulators; Knowledge in electronics, automation, robotics and mechanics; Construction of process systems; Knowledge of machines and processes; Maintenance of electronic elements in technological lines; Repair and maintenance of machines for automated shaping, filling and packaging; Knowledge of information technologies.
Environmental Protection	Knowledge of laws and regulations; Knowledge of ecology; Knowledge of plant and animal species; Knowledge of soil;
Technologists specialized for various fields	Knowledge of advanced processing technologies; Knowledge of technical standards; Knowledge of the production process; Knowledge of new technologies/machines; Preparation of recipes and technological production processes; Coordination of the production process; Product innovation and application of new technologies; Knowledge of crop protection technologies
Warehouse keeper and shift manager	Electronic sorting of merchandize; Organizing and managing activities in shifts on several technological lines; Coordinating receiving and shipping of merchandise; Monitoring the execution of work assignments; Knowledge of machine operations and production process; Record-keeping, preparing and submitting activity reports