ANALYSIS OF THE GROSS ADDED VALUE OF AGRICULTURAL PRODUCTION IN THE REPUBLIC OF SERBIA

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ABSTRACT

This research analyzes the structure and economic impact of agricultural production in Serbia, focusing on gross value added (GVA). The aim is to identify the branches of agriculture that contribute the most to overall production value and quantify their impact on GVA. Basic descriptive statistics and multiple linear regression analysis were used to determine the individual contributions of agricultural sectors. The study covers data from the Statistical Office of the Republic of Serbia for the period 2007–2022. Results show that agriculture significantly influences the national economy, especially through crop and livestock production, with crop production, particularly cereals, having the largest impact on GVA. The conclusions suggest that shifting to more intensive agricultural methods and optimizing livestock production could improve economic outcomes. Policy recommendations include strategic investments in specific sectors to enhance efficiency and economic contributions. Integrated agricultural practices are also suggested to further strengthen the sector's overall performance.

Introduction

Agricultural production as the carrier of the primary sector includes production activities aimed at the production of foodstuffs and raw materials for further processing within the industry. Agricultural activity provides the basis for the development of

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other sectors of the economy, and thus the economy of a country. De Lauwere et al. (2018) state in their research that, considering its specificities, agricultural production represents an important sector of every economy around the world. Some authors (Gelgo et al., 2023) emphasize that agricultural sector has a significant role in poverty reduction enabeling the poor to have food and income from this economic activity. Alshem, Ghader (2022) argue that the agricultural sector is two to four times more effective than other sectors in raising the incomes of the poorest populations. They point out that 40% of people living in poverty experience income growth that is, on average, three times higher when GDP growth is driven by agriculture compared to growth from other sectors of the economy.Wang et al. (2020) debate that improving environmental performance, financial development and agriculture value-added would lessen the positive impact that economic globalization has on CO_2 emission. Agriculture is an important economic sector in the European Union (Burja, Burja 2016; Giannakis, Bruggeman, 2015; Morkunas et al., 2018; Mergoni et al. 2024) and it plays a special role in ensuring food security, employment in rural areas and biodiversity insurance, as well as in the preservation and protection of the natural environment (Delabaere, Serradilla, 2004; Janker, Mann, 2020; Burja et al., 2020).

Bearing in mind the fact that agricultural production stands out for its significant sensitivity to various factors during the production process, the agricultural sector is characterized by an unequal position in relation to other economic activities. The specificities of agricultural production derive primarily from its biological character, which is reflected in slower capital turnover, reduced productivity, and lower income for farmers (Božić et al., 2011). Production uncertainty and the low income for agricultural producers affect the lower attractiveness of engaging in this economic activity, and thus contribute to the continuous confrontation of rural areas with the problems of depopulation and senility. Therefore, every developed country strives to establish a stable agricultural sector that will ensure the food security of the population, provide raw materials of appropriate quality for further processing, but also make this sector sufficiently attractive in terms of business activity, especially for the younger population.

To achieve the stated goals, it is first necessary to determine the position of agricultural activity in relation to other economic activities, with special reference to the influence of individual branches on the total value of agricultural activity. According to Andreescu (2021) GDP consists of Gross Value Added (GVA) by sectors, import duties and Value Added Tax. If we take this into account the value of agricultural activity is most often expressed through the indicator of the gross value added of agriculture (GVA), which has been analyzed by numerous authors.

Kołodziejczak (2020) analyzed GVA values in 17 European Union countries, in the period from 2000 to 2018. The analysis was carried out for the agricultural sector, the industrial sector, and the service sector. Based on the results, the author concluded that in developed countries the smallest GVA is in the agricultural sector, in relation to the industrial sector and the service sector. The GVA of agriculture in developed countries,

in the observed period, was below 2%. Harizanova-Metodieva, Harizanova-Bartos (2021) dealt with the analysis of factors affecting GVA in the agricultural industry of Bulgaria. The authors investigated factors influencing the GVA of agricultural enterprises in the period from 2000 to 2017. Based on the ARDL model, they came to the conclusion that investments in agriculture and human capital stand out as the most important influencing factors.

According to Volk et al. (2019), agriculture remains a crucial sector for the national economies of all Western Balkan countries, including Serbia. In 2017, the share of total gross value added (GVA) from the agriculture, forestry, and fishing sectors was approximately 22.7% in Albania, 7.1% in Bosnia and Herzegovina, 10.9% in North Macedonia, and 9.6% in Montenegro. In Croatia, agriculture contributed 3.6% to the total GVA. Nikolić et al. (2017) and Dimitrijević et al. (2023) compare the agricultural sector's contribution across Western Balkan countries, noting that agriculture is a key driver of economic development in the region. Their multi-criteria analysis reveals that Albania stands out with the highest contribution of agriculture to economic growth, as it consistently recorded significantly higher values across the observed criteria. In contrast, the other countries in the study demonstrated a considerably smaller agricultural impact on their economic development.

Alhshem, Ghader (2022) analyzed the participation of GVA of agriculture in the GDP of Asian countries (Russia, China, Kazakhstan, Saudi Arabia, Indonesia, India and Iran). The data were analyzed for the period from 2006 to 2021, and the authors concluded that the smallest oscillations in the share of GVA of agriculture in the total GDP were observed in Russia, where GVA amounted to an average of 4%, while in China there was the largest decline of agriculture GVA, i.e. from the initial 10.63%, this indicator dropped to 7.26%. The authors also observed that the largest contribution of GVA of agriculture to GDP was observed in India, where it averages about 17%.

The authors state that these trends in the GVA contribution of agriculture to the gross domestic product of different countries indicate the importance of changing the share of agriculture in GDP for the country's economic development. Grujić-Vučkovski et al. (2023) also conducted an analysis of the influence of different agricultural branches on the share of GVA of agriculture in the total GDP. They analyzed the values in the period from 2007 to 2020 in Serbia and concluded that to the creation of gross added value in agriculture crop production contributes the most, followed by livestock production, while the agricultural services sector has the smallest share. The results were confirmed by the regression model, which showed that crop and livestock production have a statistically significant influence on the GVA of agricultural crops. Obradović, Gojković (2023) analyzed the impact of various indicators on the gross added value of agriculture in the countries of Central and Southeastern Europe. The analysis covers the period from 2011 to 2020. Using a multiple regression model, the authors concluded that investments in agriculture, research and development expenditures have a significant impact on the gross added value of agriculture.

The research subject in this paper is macroeconomic indicators of agricultural activity in the Republic of Serbia. Specifically, the structure of the value of agricultural production was analyzed, as well as the realized gross added value of agriculture, which represents the balance sheet item of the total production account at the annual level. Also, the goal of the research is to describe the structure of the value of agricultural production in the Republic of Serbia and to identify the branches that contribute the most to the realization of the total gross added value of agricultural production.

Materials and methods

The importance of agricultural production for the overall economic activity of the Republic of Serbia can be evaluated in different ways. However, the quality of the conducted analysis is largely determined by the available data. In the conducted research, the official data of the Statistical Office of the Republic of Serbia (SORS) served as the main source of data. In particular, the data related to the realized gross added value, in total and by activity, were separated, where a special focus is directed to the activity of agricultural production.

Similar to how a company's profitability is the primary measure of its financial success, gross value added (GVA) in an industry is used to measure economic performance (Cai, Leung, 2020). Gross value added (GVA) as an integral element of the total realized gross domestic product (GDP) represents the difference between the production value of a certain activity and intermediate consumption. In other words, when GVA is increased by the tax on products and reduced by the value of realized subsidies, the value of GDP for a certain economic activity is obtained (Krstić, Šoškić, 2015). Unfortunately, in its annual reports, SORS only reports the realized value of GVA by activity, while taxes and subsidies are reported collectively for all activities. Therefore, it is impossible to present the GDP of a specific economic activity, so for the needs of a more detailed analysis of economic activity at the macro level, it is necessary to observe the GVA.

As the value of production is an integral element of the calculated value of GVA, the value of agricultural production is separately set aside. Initially, the analyzed value of production was divided into vegetable and livestock production. Then, in accordance with the structure of individual production, the influence of individual branches of production was analyzed. As part of plant production, the value of produced agricultural crops, vegetables, fruits, as well as the value of viticulture production was observed. Within animal husbandry, the values of cattle production (meat and milk), pig farming, poultry farming (meat and eggs) and others were specially observed.

Bearing in mind the different time dimensions of the available data related to the value of production on the one hand and the realized GVA on the other hand, for the sake of equalizing the time horizon, the extracted data were analyzed for the period from 2007 to 2022.

Building on the previous discussion, two key hypotheses can be defined as the foundation of this research:

H1: Plant production has a statistically significant influence on the gross value added (GVA) of agricultural production in the Republic of Serbia;

H2: Animal production has a statistically significant influence on the GVA of agricultural production in the Republic of Serbia.

When examining the influence of certain types of agricultural production, i.e. branches of agricultural production on the realized value of agricultural GVA, regression and correlation analysis was used. Specifically, the multiple linear regression model was evaluated, which in its general form can be written as follows (Mutavdžić et al., 2023):

$$\hat{Y}_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_p X_{pi} + \varepsilon_i \ .$$

$\hat{Y}_i$ represents the estimated value of the dependent variable. In accordance with the objective of the research when evaluating the regression models, the total value of GVA of agricultural activity was observed as a dependent variable. Independent variables in the model are marked with X_{1i}, X_{2i}, … , X_{pi}, where p is the number of independent variables in the model so that: $i = 1,2, \dots, N$. The parameter β_0 represents the free term, while the parameters β_1, β_2,…, β_p are estimated regression coefficients. Finally, ε_i represents the random error of the model.

Before evaluating the model in accordance with the methodology, the fulfillment of the assumptions was checked on the basis of which the conclusion is made whether it is meaningful to evaluate the desired regression model. In particular, the presence of harmful multicollinearity, heteroscedastic variance and autocorrelation was checked. The presence of multicollinearity was checked based on the *VIF* and *TOL* indicators. If the *VIF* indicator value is less than 10 and the *TOL* indicator value is greater than 0.1, it will be considered that the data are not burdened by multicollinearity. Also, the presence of homoscedastic variance of the residuals was checked with *Breusch-Pagan* test, while autocorrelation was checked with the *Durbin-Watson* test. A *p*-value greater than 0.05 suggests acceptance of the null hypothesis when conducting the Breusch-Pagan test, which assumes the presence of homoscedastic variance of residuals. On the other hand, a Durbin-Watson test value close to 2, indicates the absence of harmful autocorrelation.

In addition to the above, the basic indicators of descriptive statistics were also used for the purposes of the analysis. Also, it is important to point out that all values are presented in constant prices, where the last year 2022 was taken as the base year. Fixed prices are recalculated based on the price index of agricultural products and presented in EUR for comparability at the international level.

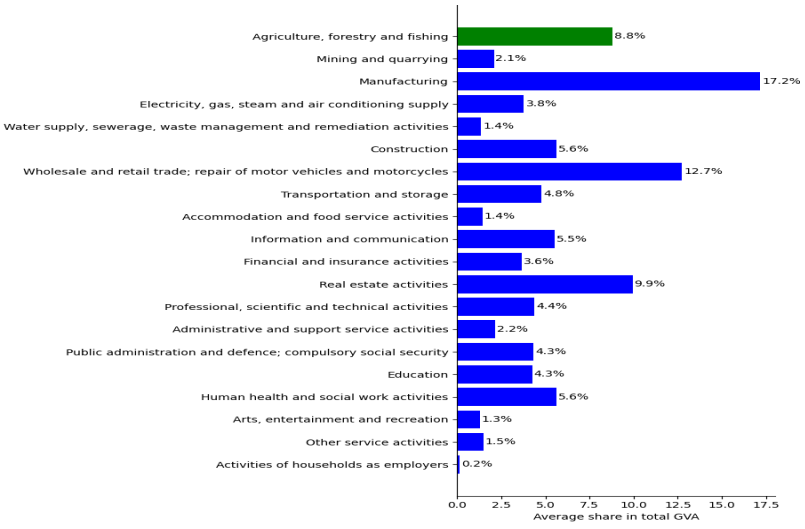
Results and discussion

The share of the value of agricultural activity within the total economic activity indicates the degree of economic development of a country. Countries where agricultural production takes a significant part in the total realized value of GVA are

considered underdeveloped or, at best, developing countries. On the other hand, one of the basic characteristics of the developed countries of the world is the relatively low participation of the value of agricultural activity in the total realized GVA, which is a consequence of the dominance of other activities that are more profitable (Mitrović et al., 2017). Related to this, Alhshem, Ghader (2022) discuss the agricultural value added as a percentage of GDP in various countries, comparing the performance of this metric across the selected nations. In this regard, the analysis began by looking at the position of agricultural activity in relation to other economic activities of the Republic of Serbia.

Figure 1 shows the average participation of individual economic activities in the total realized GVA of the Republic of Serbia for the period from 2007 to 2022. It is noticeable that the value of agricultural production participates with 8.8% on average for the observed time period, which represents the fourth activity in order of contribution to the total realized GVA. Processing industry (17.2%), trade (12.7%) and real estate business (9.9%) have a larger share than agricultural activity. Here it is important to point out that the dominant participation of the processing industry additionally points to the indirect contribution of the agricultural sector, bearing in mind that raw materials from agricultural production are used to a significant extent within this activity. According to Ristanović et al., (2022), the same is true for the trade sector, which can be additionally substantiated by the fact that agricultural products participate with 19.0% in the total value of exports for the observed period. In addition to the aforementioned participation, the importance of agricultural production for the total GVA can also be expressed through the share of the employed working-age population within jobs related to agricultural production, which is 13.9% according to the latest data for 2022 (author's calculation based on SORS data, 2008 -2023).

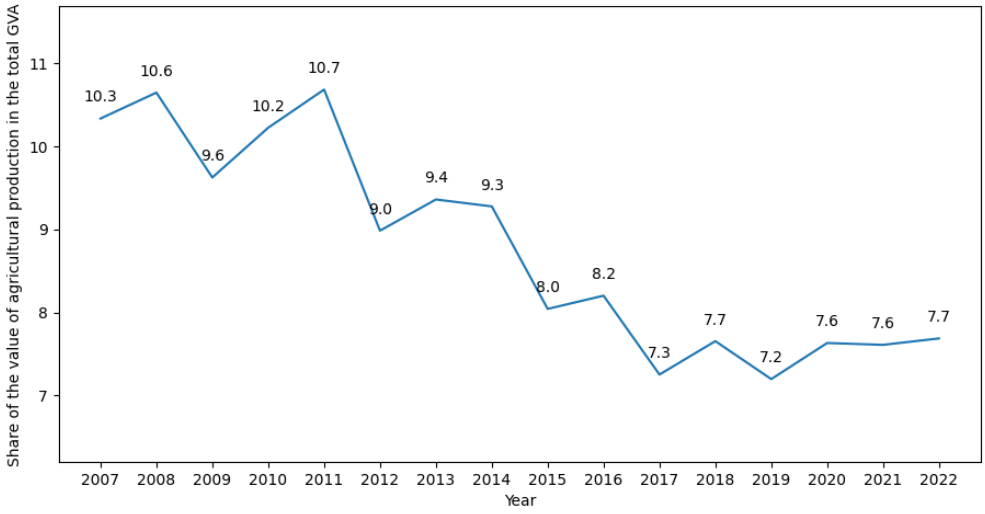
Figure 1. The average share of the value of economic activities in the total GVA for the period 2007-2022



Source: Authors' calculations

Observing the participation of the realized value of agricultural production in the total realized GVA, as shown in figure 2, it is noticeable that the participation is decraesing from year to year. The rate at which the participation decreases is 1.9% on an annual basis. In the initial years, participation amounted to more than 10%, while in the last years it amounted to less than 8%. The decrease in the share of the value of agricultural production in the total realized GVA can also be interpreted as a consequence of the faster growth of the value of other economic activities due to the increase of investments in certain economic activities (Voicilas et al., 2010).

Figure 2. The share of the value of agricultural production in the total GVA for the period 2007-2022



Source: Authors' calculations

For the sake of comparison, the average share of the realized value of agricultural production in the total GVA of the countries of the European Union (EU) is only 2% (Jarosz-Angowska et al., 2022), while in the countries of the region it is at a relatively similar level (Grujić-Vučkovski et al., 2022). The mentioned difference in comparison to EU countries additionally indicates the still significant contribution of agricultural activity in the Republic of Serbia to economic activity as a whole.

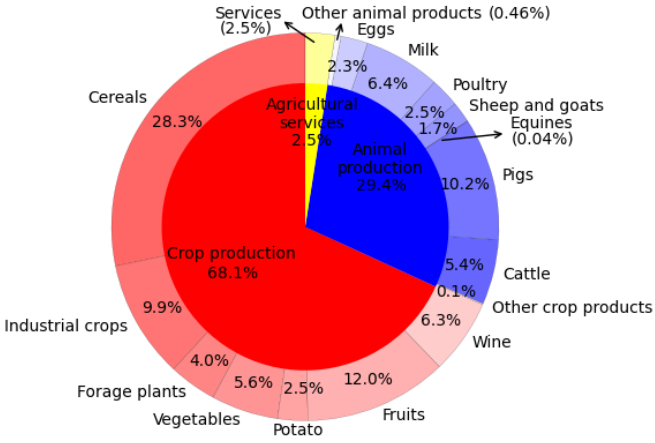
When compared to other Western Balkan countries, Serbian agriculture shows a slightly lower contribution to overall GVA. Croatia is the only country with a lower contribution, which can be attributed to its dominant tourism sector, as Croatia is the sole EU member among the Western Balkan nations.

Bearing in mind that agricultural production directly or indirectly participates in the creation of the total realized GVA, it is interesting to look at the value structure of agricultural production. Figure 3 shows the average participation of individual branches of production in the total realized value of agricultural production for the period 2007-2022.

It is noticeable that plant production contributes the most considering that it participates with 68.1% in the total realized value of agricultural production for the observed period. Within crop production, the value of produced cereals is particularly noteworthy, as it participates with 28.3% in the total realized value of agricultural production. In addition to the share of the value of produced cereals, it is necessary to point out the share of industrial plants, fodder plants and potatoes, which is 9.9%, 4.0% and 2.5% respectively. In this way, the share of the value of arable production in the total realized value of agricultural production is reached, which is as much as 44.7%. The importance of the common presentation of the value of field crops is reflected in the fact that it is primarily an extensive production. When it comes to intensive production, the share of the value of fruit production is 12.0%, while the average share of the value of viticulture is at the level of 6.3% of the total value of agricultural production.

On the other hand, livestock production participates with a total of 29.4% in the total realized value of agricultural production. Within animal husbandry, cattle breeding and pig breeding stands out. The total value of cattle breeding, which includes the production of beef and milk, accounts for 11.8%, while the share of the value of pig farming is at the level of 10.2%. The share of poultry farming, which includes the production of poultry meat and eggs, is 4.8% on average, while the share of other lines of livestock farming is almost negligible. Finally, in addition to plant and livestock production, the value of agricultural services, which amounts to 2.5%, also participates in the formation of the total value of agricultural production.

Figure 3. The structure of the value of agricultural production for the period 2007-2022



Source: Authors' calculations

With the presented structure of the value of agricultural production in the Republic of Serbia in mind, in the continuation of the analysis, a regression model was evaluated

based on which the impact of crop and livestock production on the realized value of agricultural GVA was examined. In this regard, before the evaluation of the model, a check of the assumptions was carried out, based on which conclusion is made whether it is meaningful to evaluate the desired regression model. Specifically, the presence of harmful multicollinearity was checked based on the *VIF* and *TOL* indicators. Then, with the *Breusch-Pagan* test, the presence of homoscedastic variance of the residuals was checked, while the presence of harmful autocorrelation was checked with the *Durbin-Watson* test.

The values of the *VIF* indicators for the independent variables used in the multiple linear regression model indicate the absence of harmful multicollinearity. Namely, the average value of the *VIF* indicator is 9.5350, which is less than the limit value of 10. Similarly, the *TOL* indicator is 0.1049, so the value of this indicator is also desirable, bearing in mind that it is higher than the limit value of 0.1.

Given that the multicollinearity was assessed at an acceptable level, the results of the *Breusch-Pagan* and *Durbin-Watson* tests are presented in Table 1. The value of the *Breusch-Pagan (BP)* statistic of 0.1505 (p=0.9275), indicates acceptance of the null hypothesis assuming that the variance of the residuals is homoscedastic, which is the desired scenario. Additionally, the *Durbin-Watson (DW)* statistic, which is 1.5759, is close to the threshold value of two, which unequivocally indicates the absence of harmful autocorrelation. In accordance with the obtained results of the performed tests, it can be concluded that it is meaningful to evaluate the multiple linear regression model, where the dependent variable is the GVA value of agriculture, while the independent variables are the value of plant production and the value of livestock production.

Table 1. Checking the fulfillment of the assumptions for the evaluation of the regression model

Test	The null hypothesis	Test statistics	p-values	Results
Breusch-Pagan heteroskedasticity test	Homoscedastic model variance	BP = 0.1505	0,9275	H_0 is accepted
Durbin-Watson autocorrelation test	Absence of first-order autocorrelation	DW = 1.5759	-	H_0 is rejected

Source: Authors' calculations

The evaluation of the multiple linear regression model where the dependent variable is the GVA of agricultural activity, and the independent variable is the value of plant and livestock production is presented in table 2. The evaluated model shows high statistical significance considering the value of the F-test which is 862.00 (p=0.0000). This is supported by the fact that the corrected coefficient of multiple determination is at the level of 99.4%.

It is noticeable that the value of plant production shows a highly statistically significant influence on the realized value of agricultural GVA for the period 2007-2022. In other words, with an increase in plant production by EUR 1, it is to be expected that the GVA

of agricultural activity will increase by EUR 0.5688. On the other hand, the variable related to livestock production is statistically significant, but only at the threshold of significance α=0.07. Therefore, the importance of livestock production on the total realized value of the GVA of agriculture must be taken with caution.

Table 2. Evaluation of model 1 (Y=GVA of agriculture, X_1=value of crop production, X_2=value of livestock production)

Parameter	*Variable*	*Coefficient*	*Standard Error*	*p-value*
β_0	*Const*	0.8186	54.1720	0.9880
β_1	*Plant_production*	0.5688	0.090	0.0000
β_2	*Animal_production*	0.5138	0.244	0.0640
R-squared		0.9950		
Adjusted R-squared		0.9940		
F-statistics		862.00		
Prob. (F-statistics)		0.0000		
Standard Error		59.3654		
No. Observations		12		

Source: Authors' calculations

Considering the previously defined hypotheses, it can be concluded that the first hypothesis is confirmed, as plant production has been shown to have a statistically significant impact on the GVA of agricultural production. In contrast, the second hypothesis can only be partially accepted, as the variable for livestock production reaches statistical significance at a marginal threshold of α = 0.07.

With the highly statistically significant contribution of plant production to the multiple linear regression model, where the dependent variable is the GVA of agriculture, it is meaningful to analyze the contribution of individual lines of plant production to the realized value of the GVA of agricultural activity. In this regard, a multiple linear regression model was evaluated, where the dependent variable is the GVA of agricultural activity, while the values of crop, fruit and viticulture production were observed as independent variables (table 3). The variable related to the value of vegetable production was excluded from the model considering that this variable is highly correlated with the variable related to the value of arable production. Therefore, the model is burdened with the problem of multicollinearity, which was overcome by omitting the mentioned variable.

Table 3. *Evaluation of model 2 (Y=GVA of agriculture, X_1=value of cereal production, X_2=value of fruit production, X_3=value of wine production)*

Parameter	*Variable*	*Coefficient*	*Standard Error*	*p-value*
β_0	***Const***	78.0138	83.809	0.3790
β_1	***Crop production***	0.7614	0.1230	0.0000
β_2	***Fruit production***	0.9663	0.4000	0.0420
β_3	***Viticulture***	0.2714	0.5790	0.6520
R-squared		0.9930		
Adjusted R-squared		0.9900		
F-statistics		371.40		
Prob. (F-statistics)		0.0000		
Standard Error		73.8095		
No. Observations		12		

Source: Authors' calculations

The estimated multiple linear regression model is statistically significant as a whole (F=371.40; p=0.0000). Also, the corrected coefficient of multiple determination is 99%. It is noticeable that the value of agricultural production shows a highly statistically significant influence on the realized value of the GVA of agricultural activity. Namely, with an increase in the value of agricultural production by EUR 1, an increase in the total realized GVA of agriculture by EUR 0.7614 can be expected. In addition to agricultural production, statistical significance is also shown by the variable related to the value of fruit production, but only for the significance threshold α=0.05. In addition to the above, it is important to point out that the value of viticulture production does not show a statistically significant influence on the value of GVA agriculture in the evaluated model.

In the end, it is important to point out that a multiple linear regression model was also evaluated, where the variable related to the GVA of agricultural production was used as the dependent variable, while the variables related to the branches of livestock production were used as independent variables: the value of cattle production, the value of pig farming, poultry and the value of other livestock production. The model was not statistically significant so its results are not presented. Referring to the results of model 1, where the value of livestock production is statistically significant for the significance threshold α=0.07, it can be stated that the importance of livestock production at this moment should be viewed through the overall contribution, while individual branches of livestock production still do not have the strength to individually influence the total

realized value of agricultural GVA. In support of the above, the structure presented in figure 3, where the participation of individual branches of animal husbandry is at a much lower level than the branches of plant production, also speaks.

The Gross Value Added indicator plays a crucial role in evaluating the current state of any industry sector. As highlighted earlier, GVA in agriculture is particularly significant as it provides insights into both current trends and future potential. GVA serves as a key metric for offering essential quantitative economic information, helping to inform or assess policy interventions within specific sectors. Since different activities contribute varying levels of GVA, it is vital to identify the causes of these variations and the composition of economic activities in order to gauge their effect on productivity and economic growth. In essence, GVA is one of the most important indicators for assessing the economic performance of any industry or sector (Andreescu, 2021).

Feher et al. (2022) stated that this indicator largely reflects the level and trends of efficiency of economic activity in agriculture. But, on the other hand, the development of the agricultural sector depends on several factors - some can be easily influenced and some are beyond control. Mergoni et al. (2024) are investigating sustainable agricultural efficiency using GVA in agriculture and they point out that this indicator is considered as a desirable output in the assement of agricultural efficiency. Gelgo et al. (2023) examine the impact of institutional quality on agricultural value added in East Africa. Their findings suggest that higher per capita GDP, a smaller rural population share, and increased spending on education significantly enhance agricultural value added. The study underscores the critical role institutional quality plays in driving the growth of agricultural value added in the region.

Salimova et al. (2020) conducted a comparative analysis of the agricultural sector's GVA across various countries. The study aimed to determine the role of agriculture in contributing to GVA and to identify key areas for economic development through cross-country comparisons and insights. Similarly, Rajeb et al. (2012) explored how factors such as land use, irrigated area, pesticide consumption, forest coverage, fertilizer use, and improved seeds influence the GVA of the agricultural sector in Bangladesh. In line with these findings, Pacheco et al. (2018) note that several variables, including the GVA of agriculture, average household income, and the economically active population, positively impact agricultural diversification.

As the value of the GVA indicator has been unequivocally proven in scientific researchs, in accordance with the obtained results presented in the previous part, it can be stated that plant production contributes to the greatest extent to the total realized value of agricultural production in the Republic of Serbia. In a broader context, it can be concluded that plant production to the greatest extent profiles the value of agricultural activity as a whole, which especially confirms the statistically significant influence of the variable related to the value of plant production in the estimated regression model. The same conclusion was reached by Grujić-Vučkovski et al. (2023).

The significant influence of plant production, within which arable production stands out, indicates that the extensive method of agricultural production prevails in relation to the intensive method of production. This is also supported by the findings that Feher et al. (2022) had for the Romanian GVA in agriculture. In support of the above, the fact that the value of intensive forms of plant production participates in a significantly smaller percentage of the total realized value of agricultural production is shown in figure 2.

This conclusion comes to the fore especially considering that the value of livestock production shows a statistically significant impact on the realized value of agricultural GVA only for the significance threshold of $\alpha=0.07$, so the contribution of livestock must be taken with a certain amount of reserve. Bearing in mind that the successful organization of livestock production implies a vertical connection with plant production, the dominant participation of one line of production, in this case plant production, indicates an insufficient connection between the mentioned lines of agricultural production.

Considering the statistical significance of the variable related to animal husbandry in model 1, it is reasonable to expect that additional investments in animal husbandry will improve the agricultural activity as a whole. However, at this moment it is not possible to precisely determine which specific branches of livestock production would possibly contribute to the improvement of agricultural activity. At this level of research, it can be concluded that the improvement of agricultural activity with additional investments in animal husbandry is to be expected, but it cannot be stated which branches of animal husbandry would be the carriers of those improvements when no branch of animal husbandry has an individual influence on the value of GVA of agriculture in the Republic of Serbia.

The statistically significant impact of fruit production (model 2) indicates the possibility for additional improvement of agricultural production in the Republic of Serbia. Namely, with additional investment in fruit growing, the improvement of agricultural activity as a whole is to be expected. On the other hand, the value of viticulture production did not show a statistically significant impact on the realized value of agricultural activity. Therefore, one gets the impression that when it comes to plant production that additional investments must be focused primarily on fruit growing.

Feher et al. (2022) suggests that with the right conditions, such as restructuring agricultural production and allocating additional financial resources, Romania's GVA in agriculture can increase and approach the levels of other European countries. The same or similar can be stated for agriculture of the Republic of Serbia.

Conclusions

The research encountered several important limitations. From a methodological standpoint, a longer time series would have undoubtedly yielded more reliable conclusions about the contributions of individual agricultural production sectors to overall GVA. Unfortunately, the available data series did not allow for such in-

depth analysis. Furthermore, a more comprehensive interpretation could be achieved by analyzing panel data that encompasses a broader range of countries, such as EU countries or those in the Western Balkans. This approach would enable a more nuanced assessment of how specific production lines impact agricultural GVA, while also considering the influence of the international market.

Taking into account the presented research results, it can be stated that there is a possibility for additional improvement of the agricultural production sector, especially in terms of the realized gross added value of production. By moving from an extensive to an intensive form of production, better utilization of available inputs per unit of capacity and an increase in production productivity, and consequently better economic results, can be expected.

Here, the need for a vertical connection of agricultural and livestock production stands out, where a significant part of the dominant crop production would be an input for the livestock production that provides much better financial results on the agricultural market. In addition to the above, one of the possible directions of development is the intensification of agricultural production or a reorientation towards organic production, primarily vegetables and fruits.

The obtained results can be useful both for the creators of agricultural policy and for the needs of future research. It is known that the development of the agricultural sector as the primary sector is the first step towards the further development of the secondary and then the tertiary sector. Therefore, the identified factors that profile the sector of agricultural activity in the Republic of Serbia can be of particular importance. On the other hand, it is important to consider why certain branches of agricultural production in the Republic of Serbia, such as cattle breeding, pig breeding or viticulture, do not have a significant impact on the realized GDP of agriculture, if it is known that they provide a better economic result per unit of capacity than e.g. crop production, which absolutely dominates Serbian agriculture. The latter lights the way for future research. In line with the aforementioned, a promising topic for future research would be to examine the factors that could contribute to the intensification of agricultural production in the Republic of Serbia.

The research holds significant scientific and professional value by offering critical insights into the structure of agricultural production and its contribution to Serbia's GVA. These findings can serve as a foundation for policymakers to make informed, strategic investments in key agricultural sectors, improve production methods, and ultimately boost the country's economic outcomes, with a particular focus on the most influential sectors, such as crop and livestock production.

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Conflict of interests

The authors declare no conflict of interest.

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