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## VALUATION OF AGRICULTURAL LAND IN RELATION TO LOCATION OF CITY CENTERS AS A FACTOR IN THE MANAGEMENT OF MENTIONED RESOURCE

### SUMMARY

Observing the value of agricultural plots is one of the important factors in organizing agricultural production in an economy. The main conclusion of the author would be that there are significant differences (based on the t-test) in the value of agricultural plots, i.e. plots are more expensive if they are located up to 25 km from the center of large cities compared to remote plots that are at a greater distance than 25 km. Secondly, the value of agricultural plots is higher for agricultural plots that are located closer to the center of large cities, as well as the fact that the main reason for buying such plots is their further sale, while the reason for buying more distant plots is the continuation of agricultural production, which is valid for the entire observation period of 2022-2024. Third, there is no significant connection between the value of agricultural land and the reasons for purchasing agricultural land for 2022 and 2023, as well as the fact that the purchase of agricultural plots is rarely carried out in order to consolidate agricultural holdings.

**Key words:** value of agricultural land, reason for land purchase, management, business results.

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## INTRODUCTION

The organization of agricultural production largely depends on realistic representations of the values of all factors that can influence the correct and optimal way of management, as pointed out in numerous works by authors such as (Turak & Koop, 2003; Aničić & Popović, 2015; Vitomir *et al.*, 2020; Astuti *et al.*, 2022).

One of the important factors that should be paid close attention to is the factor of real valuation of agricultural land as part of observing the real organization of agricultural production, which we see in the already published works of authors (Baen, 1997; Abraham, 2020; Zhu *et al.*, 2021; Chen *et al.*, 2022).

Observing the organization of agricultural production is a complex issue, where above all the value of agricultural land represents the first step that affects the formation of clear business decisions by decision makers that are essential for optimal business in agriculture (Wadduwage, 2021; Komariah & Matsumoto, 2021; Schmitt *et al.*, 2022; Biratu *et al.*, 2023; Vinogradovs *et al.*, 2023; Hussain *et al.*, 2024).

However, in addition to the valuation of agricultural land, the existence of other factors that have an impact on the optimization of agricultural production should be taken into account, which should be considered as a basis for making valid management decisions as a whole, which are related to the normal functioning of agriculture in an economy (Munitlak *et al.*, 2015; Eludoyin & Adewole, 2020; Willkomm *et al.*, 2021). The existence of other influences in terms of the organization of agricultural production was pointed out by other authors, each from their own point of view, such as (Matsui *et al.*, 2021) focus on land, authors such as (Siba *et al.*, 2022) focus on climatic influences, authors such as (Yazdandoost *et al.*, 2022) focus on the influence of the water regime and others. Apart from such an observation, there are also authors who researched the application of innovative achievements that can be applied in the organization of agriculture, which was pointed out by authors such as (Dragosavac *et al.*, 2023; Sodjinou, 2024).

In addition, the organization of agricultural production requires a complex multidisciplinary approach using numerous factors (Hojjatnooghi *et al.*, 2019; Grau *et al.*, 2020; Daniels *et al.*, 2023; Bojović *et al.*, 2019; 2024; Popović *et al.*, 2024a; 2024b; Golijan Pantović *et al.*, 2024). However, in a large number of studies, authors draw attention to essential issues related to the physical properties of the soil, such as authors (Chumakov *et al.*, 2024) who focus on afforestation of areas, authors who point to the complexity of the biosphere on agriculture (Fida *et al.*, 2024), in relation to the importance of irrigation, such as authors (Islam *et al.*, 2024).

Making valid management decisions related to the valuation of agricultural land, but also other factors that can affect business results are present in numerous activities, noting that it is of great importance for management within the organization of agricultural production in countries that want to accelerate are

developing and who want to have security in the provision of agricultural products for their population (Jokić et al., 2020; Arnautović et al., 2022; Kockelkoren et al., 2023; Moisa et al., 2023).

The assessment of land value is often positively associated with the implementation of measures by state authorities, such as land consolidation measures, the application of which can increase the market value of agricultural plots, depends on state measures to encourage the purchase of agricultural plots by subsidizing, for example, certain groups such as "young farmers", with full respect for the legal provisions that accompany the circulation of agricultural land in the Republic of Serbia. However, all these measures should be viewed as part of the real valuation of agricultural plots in order to realistically view the movement of the value of agricultural land in a given economy.

Land valuation is followed by trends in the land market, which was the starting point for this study in order to practically analyze trends in the increase in the value of agricultural plots that are closer to large cities, so that the economics of valuation often have an advantage over the organization of agricultural production.

## MATERIAL AND METHODS

The focus of the authors of this study was aimed at observing the value of agricultural plots that were located at different distances from the center of the three largest cities in the republic of Serbia, namely in Belgrade, Novi Sad and Niš. The distance was observed through two criteria up to 25 km distance from the center of the mentioned cities and at a distance of more than 25 km. In addition to that basic observation, the research was deepened to observe another factor influencing the valuation of agricultural plots, more precisely the reasons why the respondents decided to buy agricultural plots depending on the distance from the center of the mentioned cities, looking at the possibilities for the decision of the respondents through: continuation of agricultural production, consolidating agricultural land and selling it in order to make a profit on agricultural land.

All this was done by the author in the following way. The survey was conducted in a three-year observation period, more precisely in the period from 2022 to 2024 and from 01.03 to 20.03. The mentioned years. All participants are guaranteed anonymity, as well as the fact that their generals will not be used and disclosed, but that they will be used only for scientific purposes, that is, for the preparation of this study 178 participants were surveyed in each of the observation years 70 participants were surveyed each year whose plots were evaluated using the criteria of being located at a distance of up to 25 km from the center of large cities, as well as 108 respondents whose plots were at a greater distance than 25 km.

The essential choice of distance from the center of large cities was made on the basis of interviews with 10 real estate agencies in all three large cities that were the subject of the research, interviews with five law firms in all three cities

and personal visits to 10 locations at both distances in the three cities. The authors wanted to obtain representative and as realistic data as possible so that the study would have practical value in addition to theoretical value. The same respondents were surveyed in all three years of the research and included about 90% of individual households and about 10% of companies that are mainly engaged in agricultural production. In the structure of agricultural production in the first circle of large cities, about 90% of agricultural producers were engaged in vegetable and berry production, while outside the first circle, i.e. more than 25 km from the city center, agricultural production of field and industrial field crops dominates with about 90%. The average purchase and sale of plots within a radius of 25 km from the city center was about 1.5 ha, and at a distance of more than 25 km it was 4.8 ha.

The second criterion or factor was an examination of the differences in the reasons why the plots were purchased by the respondents, with the possibility for the respondents to choose one of the answers: that the plots are intended for the continuation of agricultural production, consolidation of areas or for resale, depending on the proximity to the center the three largest cities in the country.

In order to realistically show the value of agricultural land, the data of law agencies were used, with the fact that the authors of the study rejected about 5% of values that deviated significantly (about 30%) in relation to the estimated value of agricultural land in that or a similar location, because it was an unrealistic representation due to the reduction of the value due to the reduction of the possible estimated sales tax on the value of the land, i.e. the authors used publicly available data from tax administrations of local self-governments as a corrector and after that, in order to realistically present the research, they eliminated such individual cases of valuation of agricultural plots.

When preparing this study, the authors did not use the valid (new) land categorization in the Republic of Serbia. Essentially, the division of land into: total used agricultural land, uncultivated agricultural land, uncultivated agricultural land in overgrowth, forest land and uncultivated land under buildings, roads, ponds, ponds and reeds is not included. The primary interest of the author was focused on the market value of land.

The participants of the survey in the largest number of cases in the evaluation of plots at a distance of up to 25 km from the center of large cities are mainly determined for the production of vegetables and berries, while the plots that are further than that 25 km from the center are mainly used for agricultural production and industrial production of sugar beets, sunflowers, soybeans and rapeseed.

The method of market assessment of the value of agricultural land was used with an exclusive focus on the location where the agricultural plot is located, specifically in relation to the center of three large cities in Republica Serbia. Thus, the authors were focused on realistic presentation of the subject of purchase and sale.

The authors put forward the following hypotheses:

H: 1 there are no significant individual differences in the value of agricultural land in relation to the distance from the center of large cities in the Republic of Serbia in 2022, 2023 and 2024, as well as the total observed.

H: 2 there are no significant individual differences in the reasons for purchasing agricultural land in relation to the distance of the plot from the city center in 2022, 2023 and 2024, as well as the total observed.

H: 3 that there are no significant relationships between the value of agricultural land and the reasons for purchasing agricultural land for plots up to 25 km from the center of large cities.

H: 4 that there are no significant correlations between the value of agricultural land and the reasons for purchasing agricultural land for plots more than 25 km from the center of large cities.

Statistical data processing and analysis were done using the software ibm SPSS (statistical package of social science) version 25. The t-test of independent samples was applied in the paper to examine the difference in land value and reason for purchase between plots in relation to proximity to the city center. Pearson's correlation analysis was applied to examine the association between land value and reason for purchase. A level of 0.05 was used for the threshold value of significance.

## RESULTS AND DISCUSSION

The obtained research results are grouped into three units.

Within the first unit, the results showed trends in the value of agricultural plots in the research period 2022-2024 in relation to the location measured from the center of the analyzed cities.

In the second part, the reasons why the respondents decided to buy agricultural plots in the research period 2022-2024 are presented in relation to their position, i.e. the location in relation to the center of the analyzed cities.

In the third part of the research, the relationship between the value of agricultural land and the reasons for purchasing agricultural land for plots up to 25 km from the city center, as well as for plots located outside of 25 km from the city center, is presented.

### **Presentation of the results of the value of agricultural land in relation to the distance from the center of large cities in the Republic of Serbia**

The presentation of the results of the valuation of agricultural land in relation to the distance from the center of large cities is given in Table 1.

The results indicate that there is a significant difference in the value of agricultural land observed in 2022, especially if the location of agricultural plots is analyzed, especially if they are located closer to the city center. Examination of differences was powered using an independent samples t test (Table 1). Based on this, the value of agricultural land is much higher for plots that are up to 25 km from the city center.

**Table 1.** Differences in the value of agricultural plots for 2022-2024 and the total observed for the entire observation period.

Year of observation	Plot distance up to 25 km from the city center	The plot is more than 25 km from the city center	t	p
	Middle value			
2022	11635.90 ± 820.67	6717.25 ± 384.68	46.915	<0.0005*
2023	26785.85 ± 2751.11	8465.05 ± 6721.26	21.644	<0.0005*
2024	80241.10 ± 4009.99	9889.49 ± 2382.70	132.413	<0.0005*
<b>Total period</b>	39554.28 ± 1493.68	8357.26 ± 2313.65	109.320	<0.0005*

\*Statistical level of significance at the level of 0.05

**Source:** authors' calculation (2024).

The results in the second year of observation related to the display of differences in the values of agricultural plots in relation to the distance from the city center. It can be seen that there are significant differences in the value of agricultural land, i.e. agricultural plots for the analyzed year 2023. In addition, after the t-test, it can be seen that there are values of agricultural land that differ significantly in their value in relation to their location in relation to the center of large cities. The value of agricultural plots is significantly higher for plots that are up to 25 km from the center of large cities compared to those agricultural plots that are more than 25 km from the center of large cities.

The results shown indicate the existence of significant differences in the value of agricultural land for 2024. After the t-test, it can be seen that the value of agricultural land (agricultural plots) is higher for the analyzed plots located up to 25 km from the center of large cities compared to those agricultural plots located further from the center of large cities.

The results show that there is a significant difference based on the value of agricultural plots for the entire observation period from 2022 to 2024 in relation to the proximity of the location to the center of large cities. The value of agricultural land in the entire observation period, i.e. from 2022 to 2024, is higher for the analyzed agricultural plots located up to 25 km from the center of large cities compared to those agricultural plots located at a greater distance than 25 km from the center of large cities, which is supported by the results obtained after the survey.

Respecting the setting H:1, it can be pointed out that the results of the research showed that there are significant differences in the value of agricultural plots in relation to the distance of the plots that are located from the center of large cities, and that in the entire observation period of 2022-2024. Therefore, the valuation of agricultural land depends on numerous internal factors related to the making of management decisions, which was pointed out in their works by authors such as (Popović *et al.*, 2016; Lakić *et al.*, 2024), which largely coincides with the obtained research results that indicated the existence of specific differences that may arise in the valuation of agricultural plots in relation to their location.

**Presentation of the results of the value of agricultural land in relation to the examined differences in relation to making a decision on the purchase of agricultural land in relation to the distance from the center of large cities in the Republic of Serbia**

The presentation of the obtained results is given in Table 2. Based on the results shown in Table 2, it can be seen that there is a significant difference based on the analyzed reasons for purchasing agricultural land for the year 2022 based on the established differences between plots in relation to the location from the center of large cities.

**Table 2.** Presentation of differences based on the reasons for purchasing agricultural land for 2022-2024 and overall.

Year of observation	Plot distance up to 25 km from the city center	The plot is more than 25 km from the city center	t	p
	Middle value			
<b>2022</b>	2.87 ± 0.41	1.16 ± 0.48	24.283	<0.0005*
<b>2023</b>	2.84 ± 0.47	1.24 ± 0.57	20.258	<0.0005*
<b>2024</b>	2.90 ± 0.38	1.24 ± 0.56	23.344	<0.0005*
<b>Total period</b>	2.87 ± 0.41	1.21 ± 0.52	23.482	<0.0005*

\*Statistical level of significance at the level of 0.05

**Source:** authors' calculation (2024).

The obtained results are such that plots located closer to the center of large cities were mostly bought for further sale, and plots at a greater distance of 25 km from the city center were mostly bought for continued production.

The results indicate that there is a significant difference based on the reason for purchasing agricultural land for the year 2023. After the t-test, the results obtained (Table 2) are such that differences can be seen based on the reasons for purchasing agricultural plots in relation to the location near the center of large cities. Plots closer to the center of big cities were mostly bought for further sale, and plots at a greater distance of 25 km from the center of big cities were mostly bought for the continuation of agricultural production.

The results indicate that there is a significant difference based on the reasons for purchasing agricultural plots in 2024. The presentation of the obtained results in Table 2 refers to the determined differences between plots in relation to the proximity to the center of large cities. Plots closer to the city were mostly bought for further sale, and plots at a greater distance of 25 km from the city center were mostly bought for continued production.

The results indicate that there is a significant difference based on the reasons for purchasing agricultural land, which refer to the entire research period. The entire period of observation from 2022 to 2024 is such that a significant difference can be seen between agricultural plots in relation to the proximity of the center of large cities based on (factors) reasons for purchasing agricultural land (plots), where plots located closer to the city were predominantly purchased

for further sale, and plots at a greater distance of 25 km from the center of large cities were mostly bought for the continuation of agricultural production.

In addition, taking into account the statement H: 2, we determined that there are significant differences regarding the formation of reasons for the purchase of agricultural land in relation to the observation of the distance of agricultural plots in relation to the center of large cities in the entire observation period of 2022-2024.

**Presentation of the results of the connection between the value of agricultural land and the reasons for purchasing agricultural land in the observation period 2022-2024.**

The results obtained based on the analysis of the connection between the factor of the value of agricultural land and the factor of reasons for purchasing agricultural land for the observation period from 2022 to 2024 are presented in Table 3.

**Table 3.** Correlation between the value of agricultural land and reasons for purchasing agricultural land for plots located up to 25 km from the center of large cities

Analyzed factor	Observation period	Reasons for buying agricultural plots
Value of agricultural plots	2022	0.129
	2023	0.008
	2024	-0.485*
	<b>Total period</b>	-0.464*

\*Statistical level of significance at the level of 0.05

**Source:** authors' calculation (2024).

In addition, the obtained results were based on the use of Pearson's correlation analysis. Based on that, it can be seen that there is a significant connection between the value of agricultural land and the reasons for purchasing agricultural land for the year 2024 as well as for the entire observed period.

Starting from the already expressed views of the authors (Popović *et al.*, 2015; Popović, 2018; Radović *et al.*, 2021; Čolović *et al.*, 2024) regarding the importance of proper analysis and heterogeneous factors on the value of agricultural land, the existence of complementarity with the results obtained in this study can be seen.

Below is a presentation of the obtained results, which are shown in Table 4. The presentation given in the last table indicates that there is no significant connection between the value of agricultural land and the analyzed reasons for the purchase of agricultural land for the years 2022, 2023, 2024, as well as for the entire observed period, which is confirmed by the obtained values, which are low values of the correlation coefficient.



**Table 4.** Correlation between the value of agricultural land and reasons for purchasing agricultural land for plots located more than 25 km from the center of large cities

Analyzed factor	Observation period	Reasons for buying agricultural plots
Value of agricultural plots	2022	-0.094
	2023	-0.055
	2024	0.068
	<b>Total period</b>	0.023

\*Statistical level of significance at the level of 0.05

**Source:** authors' calculation (2024).

Analyzing and summarizing the research results, the authors point out that in their opinion the research fully justified its existence. In particular, they point out that it showed that there are significant differences in the field of agricultural land valuation on the one hand, as well as from the point of view of discovering the reasons for the purchase of agricultural land for the period from 2022 to 2024 in the Republic of Serbia. All of this was determined based on the research of movement in relation to the location of plots near the center of large cities.

The results we reached indicate a partial acceptance of hypothesis H: 3, that is, that there are significant connections between the value of agricultural land and the reason for purchasing agricultural land for agricultural plots located at a distance of up to 25 km from the city center.

It was found that H:4 can be rejected completely, that is, there is a significant connection between the value of agricultural land and the reason for purchasing agricultural land for plots located more than 25 km from the center of large cities and that in the entire observation period of 2022-2024. All of this was confirmed using Pearson's correlation analysis, that is, there is a connection between the middle and negative levels. The negative association indicates that as the value of land increases, the demand for buying land for sale increases. The results obtained in the study largely coincide with the already stated views of authors such as (Popović et al., 2017; Negassa et al., 2023; Saleem et al., 2024) regarding the creation conditions for the unhindered performance of agricultural production (Terzić et al., 2018; 2019; Stevanović et al., 2023; 2024; Kosev et al., 2023; 2024).

In addition, the study shows that there is no significant connection between the value of agricultural land and the reasons for purchasing agricultural land for 2022 and 2023, which is confirmed by the low values of the correlation coefficient for the observed continuation of agricultural production and the further sale of agricultural plots, as well as the fact that respondents rarely buy agricultural land plots so that the total agricultural holding in the observed period 2022-2024 regardless of the distance of agricultural plots in relation to the location in relation to the center of large cities.

The statements in tables 1-4 indicate that the value of agricultural plots is very important and in subsequent research it is possible to expand the research to

other motives related to the purchase of agricultural plots, such as those that are intended for further sale, improvement of production, whether the focus is quick profit by reselling plots that are close to cities, etc.

The land consolidation process in the Republic of Serbia is a necessary applicable factor for agricultural producers, because the land consolidation process optimizes agricultural areas, which mainly occurs outside the area of 25 km from the center of large cities, where local governments are involved in land consolidation processes based on the Land Consolidation Law, through the practical engagement of surveyors, where they often fully cover the costs incurred as part of land consolidation, and the consolidation of plots mainly refers to the organization of plots in farming and the production of industrial crops. The framework for such consideration by state authorities is the implementation of the Law on Agricultural Land ("Official Gazette of the Republic of Serbia", No. 62/2006, 65/2008 - other law, 41/2009, 112/2015, 80/2017 and 95/2018 - other law), Regulation on the content, procedure of development and adoption of the consolidation program ("Official Gazette of Republic of Serbia", No. 62/2020).

In the following researches, it is possible to pay more attention, i.e. put in the focus of the researches the categorization of the land in relation to the real market valuation, with the fact that the results we obtained in the study show the importance of studying the proximity of agricultural land in relation to the center of large cities as a real indicator that must be taken into account in the case of a real expression of the value of agricultural land.

The application of this study is possible in most of the countries of the former Yugoslavia, taking care to adapt them to the actual state of the respective economy, that is, the state of the economic system, which has its own specificities. This study relies on the application of international accounting standards that are valid in the accounting of developed economies, that is, which is visible in works such as (Popović *et al.*, 2017). Nevertheless, this study in the methodological sense is innovative and in a way it was applied for the first time and applied in this study, and in general it can be expanded in the future both in the research sense in the Republic of Serbia and also to all the countries of the Western Balkans.

## CONCLUSIONS

The results of this study point to the importance of real consideration of two important factors, the application of which can influence the improvement of the management of the agrarian organization in one economy. Two factors were analyzed in the paper: the value of agricultural plots, as well as the factor of reasons for buying agricultural plots, which was analyzed in relation to the proximity of locations to the center of three large cities in the Republic of Serbia.

The first conclusion would be that there are significant differences in the value of agricultural plots in relation to the distance of the plot from the center of large cities in the entire observation period of 2022-2024. The value of agricultural plots is higher in the analyzed agricultural plots that are located up to

25 km in relation to their distance from the center of large cities compared to those agricultural plots that are located at a distance of more than 25 km, which is reinforced with the results obtained after the conducted t- test.

Another conclusion would be that there are significant differences regarding the formation of reasons for purchasing agricultural land in relation to the observation of the distance of agricultural plots in relation to the center of large cities in the entire observation period of 2022-2024. At the same time, plots located closer to the city were mostly bought for further sale, and plots at a greater distance of 25 km from the center of large cities were mostly bought for the continuation of agricultural production.

The third conclusion would be that there is no significant connection between the value of agricultural land and the reason for purchasing agricultural land for 2022 and 2023, which is confirmed by the low values of the correlation coefficient for the observed continuation of agricultural production as well as for the further sale of agricultural plots, as well as the fact that rarely purchases agricultural plots in order to consolidate agricultural holdings, which refers to the entire observed period of 2022-2024, regardless of the distance of the agricultural plots in relation to the distance of the location in relation to the center of large cities in the Republic of Serbia.

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