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QUALITY AND SAFETY OF AGRICULTURAL PRODUCTS AS A SOURCE OF COMPETITIVENESS OF FARM HOLDINGS

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Abstract: In contemporary business conditions characterized by intense market competition, agricultural farms face the need to continuously improve their market position. The quality of agricultural products is increasingly recognized as a key factor and one of the primary sources of competitive advantage in the agri-food sector. The aim of this paper is to examine the role of agricultural product quality in strengthening the competitiveness of agricultural farms in the Republic of Serbia. The research is based on the assumption that a higher level of product quality enables better market access, greater consumer trust, more stable business performance, and long-term farm growth. The research results indicate a strong and statistically significant relationship between the quality of agricultural products and farm competitiveness, while also confirming the security role of product quality, as it directly contributes to food safety, the stability of contemporary agrarian systems, and the protection of public health. In this paper, the concept of safety refers exclusively to food safety, understood as the ability of agricultural products to meet health, hygiene, and regulatory requirements and to protect consumer health. The conclusions of the paper may serve as a basis for developing business strategies for agricultural producers, as well as for improving agricultural policies aimed at enhancing product quality and the market sustainability of agricultural farms.

Keywords: Product quality, Competitiveness, Agricultural farms, Market, Agriculture, Food safety

INTRODUCTION

Modern agriculture faces numerous challenges arising from market globalization, rapid technological change, climate-related risks, and shifting consumer preferences. Agricultural farms no longer operate within closed and locally limited systems but are increasingly becoming part of a broader market environment in which competitiveness is based on the ability to ensure consistent quality, product safety, and compliance with market and regulatory requirements (FAO, 2020; OECD, 2021). In contemporary agrarian systems, the quality of agricultural products is increasingly considered within security frameworks in order to ensure food safety, public health protection, and the overall stability of consumer and agrarian communities. Under such conditions, traditional models of competition based solely on price are losing importance, while the focus is increasingly shifting toward non-price factors of competitiveness. Among these, product quality occupies a central position, as it enables differentiation of supply, strengthens consumer trust, and facilitates access to more demanding markets. Vujcic et al. (2011) emphasize

that a product represents the way in which each enterprise aligns its capabilities and available resources with customer needs and requirements in order to satisfy them. One of the key objectives of every enterprise is the reliable and cost-effective delivery of the final product to the end user (customer). Within this supply chain, preserving product quality is crucial, as well as retaining existing customers and attracting new ones through recommendations (Nedeljkovic et al., 2023). Quality in agriculture does not refer solely to the physico-chemical characteristics of products, but also encompasses production methods, food safety, traceability, the application of standards, and adherence to the principles of sustainable development. Contemporary competitiveness theory indicates that quality represents a strategic resource capable of ensuring long-term competitive advantage, particularly in sectors characterized by pronounced market and production risks, such as agriculture (Porter, 1985). Daily changes in economic market conditions have imposed the need for a serious approach to planning and organizing all business segments in agriculture and agribusiness, making decision-making a matter of crucial importance for every manager or business organizer (Nedeljković et al., 2017).

In both domestic and international scientific literature, the competitiveness of agricultural farms is examined through the lenses of product quality, market orientation, and institutional support for agricultural development. Research findings suggest that the quality of agricultural products represents a central source of competitive advantage, as it enables product differentiation, more stable market positioning, and the long-term sustainability of farm operations. In addition to quality, the importance of entrepreneurial capabilities of farm holders, access to financial support, and the development of market activities is emphasized, as these factors jointly contribute to strengthening the competitiveness of the agricultural sector. Particular emphasis is placed on the role of human capital and education in the development of agribusiness, as well as on the need to align production with contemporary standards and market requirements. Such an integrated approach confirms that competitiveness in agriculture is not the result of a single factor, but rather of the synergistic interaction of product quality, market strategies, and the institutional environment (Vujičić et al., 2022a; Huang, 2021; Vujicic et al., 2022b; Vujicic et al., 2024).

In the Republic of Serbia, agriculture plays a significant role in overall economic development, both through its contribution to gross domestic product and through employment and the preservation of rural areas. However, agricultural farms face a number of structural challenges, including fragmented production, limited financial resources, and insufficient market orientation. In such an environment, improving product quality represents one of the key mechanisms for strengthening competitiveness and adapting to the requirements of both domestic and international markets, particularly in the process of alignment with European Union standards. Although contemporary literature increasingly highlights the importance of quality as a factor of competitiveness, there remains a need in domestic research for empirical analyses that examine this relationship in greater detail within Serbian agricultural farms. It is especially important to assess how producers perceive product quality, which measures they apply to improve it, and what impact quality has on market position and long-term farm development.

The aim of this paper is to identify and analyze the role of agricultural product quality as a source of competitiveness for agricultural farms, as well as to examine the extent of its impact on the market and development performance of farms in the Republic of Serbia.

MATERIAL AND METHODS

In order to examine the role of agricultural product quality as a source of competitiveness of agricultural farms in the Republic of Serbia, an empirical study was conducted using a quantitative research methodology. Data was collected through a structured questionnaire during the period from June to November 2025. The study included a total of 114 respondents, owners or holders of agricultural farms located in the Republic of Serbia. A convenience sampling approach was applied, focusing on farm holders who were accessible through agricultural associations and local networks. The questionnaire was distributed in both electronic and printed formats. For the purposes of the research, a five-point Likert scale was used (1 - strongly disagree; 5 - strongly agree). The internal consistency of the multi-item scales was assessed using Cronbach's alpha coefficient. The reliability values were satisfactory for all constructions ($\alpha > 0.70$), indicating good measurement consistency.

Table 1. Scale reliability

Construct	Number of items	Cronbach's α
Product Quality (APQ)	6	0.84
Market Activities (FMA)	6	0.81
Farm Competitiveness (CAF)	6	0.86

For each variable, six statements were formulated in accordance with relevant literature and previous research in the field of quality and competitiveness.

The theoretical research model consisted of the following variables:

- **Independent Variable A - Agricultural Product Quality (APQ):** product safety (food safety), quality standards, consistency, certifications, consumer perception. In this study, product safety is treated as an integral component of product quality and not as a separate variable.
- **Independent Variable B - Farm Market Activities (FMA):** branding, promotion, distribution, market presence.
- **Dependent Variable C - Competitiveness of Agricultural Farms (CAF):** market position, sales, income stability, farm growth.

The model is based on the assumption that product quality, both independently and in combination with market activities, has a significant impact on the competitiveness of agricultural farms.

The objectives of the research were to:

- determine whether agricultural product quality affects farm competitiveness.
- examine the impact of market activities on competitiveness.
- analyze the joint effect of product quality and market activities on competitiveness.

The research hypotheses were formulated as follows:

- **H01:** Agricultural product quality does not affect farm competitiveness.
- **Ha1:** Agricultural product quality affects farm competitiveness.
- **H02:** Market activities do not affect farm competitiveness.
- **Ha2:** Market activities affect farm competitiveness.
- **H0:** Product quality and market activities do not affect farm competitiveness.
- **Ha:** Product quality and market activities affect farm competitiveness.

EMPIRICAL RESEARCH: AGRICULTURAL PRODUCT QUALITY AS A SOURCE OF FARM COMPETITIVENESS

The research was conducted on a sample of 114 respondents' holders or owners of agricultural farms in the Republic of Serbia. Data was collected through a structured questionnaire during 2025. The questionnaire included statements measured using a five-point Likert scale.

Table 2. Structure of respondents by gender

Gender of respondents	Number of respondents	%
Men	72	63.2
Women	42	36.8
Total	114	100

Table 3. Structure of respondents by age

Age category	Number of respondents	%
Up to 35 years	38	33.3
36-55 years	54	47.4
Over 55 years	22	19.3
Total	114	100

Table 4. Structure of respondents by education

Level of education	Number of respondents	%
Secondary education	66	57.9
Higher/university education	48	42.1
Total	114	100

Table 2 presents the basic demographic characteristics of the respondents included in the study. The sample consists of 114 respondents, with men representing the majority, which is consistent with the structure of agricultural farm holders in Serbia. The largest proportion of respondents belongs to the age group of 36-55 years, indicating that the sample comprises an economically active population with substantial experience in agricultural production. Most respondents have secondary education, while a significant proportion have higher or university-level education, which contributes to the reliability of the obtained responses.

Table 5. Pearson correlation of variables

Variables	APQ	FMA	CAF
Agricultural Product Quality (APQ)	1.000	0.421	0.764
Farm Market Activities (FMA)	0.421	1.000	0.602
Competitiveness of Agricultural Farm (CAF)	0.764	0.602	1.000

Table 5 presents the results of the Pearson correlation analysis among the key variables of the study. A strong positive correlation was identified between the quality of agricultural products and farm competitiveness, indicating that a higher level of quality contributes to a better market position. Market activities also show a moderate to strong association with competitiveness, while the relationship between product quality and market activities is of moderate strength. The results confirm the interrelatedness of the analyzed variables and justify the application of further regression analysis.

Table 6. Results of the multiple regression analysis

Variable	B	Std. Error	Beta	t	p
Constant	0.512	0.214	-	2.39	0.018
Product Quality (APQ)	0.658	0.067	0.621	9.82	<0.001
Market Activities (FMA)	0.274	0.061	0.331	4.49	<0.001

Table 7. Multiple regression results (dependent variable: Farm Competitiveness- FC)

Predictor	B	Std. Error	Beta	t	p	VIF
Constant	0.512	0.214	-	2.39	0.018	-
Product Quality (APQ)	0.658	0.067	0.621	9.82	<0.001	1.28
Market Activities (FMA)	0.274	0.061	0.331	4.49	<0.001	1.28
R				0.809		
R2				0.655		
Adjusted R²				0.649		
F (2, 111)				105.3		
p (model)				<0.001		
Durbin-Watson				1.94		

Table 6 presents the results of the multiple regression analysis examining the impact of agricultural product quality and market activities on farm competitiveness. The results indicate that both independent variables have a statistically significant effect on competitiveness, with product quality making a stronger contribution. The positive values of the regression coefficients confirm that improvements in product quality and market performance lead to a strengthening of farms' competitive position. These findings support the research hypothesis regarding the importance of quality as a source of competitiveness. The regression model was statistically significant ($F = 105.3$, $p < 0.001$) and explained 65.5% of the variance in farm competitiveness ($R^2 = 0.655$). Product quality ($\beta = 0.621$, $p < 0.001$) had a stronger effect than market activities ($\beta = 0.331$, $p < 0.001$), while variance inflation factors confirmed the absence of multicollinearity.

RESULTS AND DISCUSSION

The results of the empirical research are presented through a combination of descriptive sample analysis, correlation analysis of key variables, and regression analysis, with the aim of determining the role of agricultural product quality as a source of competitiveness of agricultural farms. The analysis was conducted on a sample of 114 respondents, owners or holders of agricultural farms in the Republic of Serbia.

Descriptive analysis indicates that the sample consists of respondents who actively participate in agricultural production and business decision-making at the farm level. In terms of gender structure, men dominate the sample, which is consistent with official

statistical data on the structure of agricultural farm holders in Serbia. However, a significant proportion of women in the sample indicates the growing involvement of women in farm management, which further contributes to the diversity of perceptions and experiences included in the study. Analysis of the age structure shows that the largest number of respondents belongs to the 36-55 age group, representing a population with substantial experience in agricultural production that is simultaneously active and adaptable to contemporary market requirements. The presence of younger respondents indicates gradual generational renewal in agriculture, while older respondents contribute to stability and continuity of knowledge and practice. Regarding educational structure, most respondents have secondary education, while a significant proportion possess higher or university-level education. Such a structure suggests that respondents have adequate knowledge and competencies to assess issues related to product quality, market activities, and farm competitiveness, thereby increasing the reliability of the obtained results.

To examine the relationships among variables, Pearson correlation analysis was applied. The results indicate statistically significant positive relationships among all analyzed variables. The strongest correlation was identified between agricultural product quality and farm competitiveness. This finding suggests that respondents who perceive a higher level of product quality also evaluate their farms as more competitive in the market. The strong association between these two variables confirms the assumption that product quality represents one of the key factors of differentiation and market success in contemporary agriculture.

Farm market activities also show a significant positive correlation with competitiveness. Respondents who invest more in promotion, distribution, communication with customers, and market presence evaluate their farms as more stable and competitive. This finding indicates that competitiveness is not solely the result of product quality, but also of the ability of farms to adequately present and place that quality on the market. The correlation between product quality and market activities is of moderate strength, suggesting that farms producing higher-quality products more frequently apply more developed market activities. This relationship highlights the interconnection between production and market dimensions of business operations, as well as the fact that high product quality alone is not sufficient if it is not accompanied by an appropriate market approach. To examine the direct impact of agricultural product quality on farm competitiveness, a simple linear regression analysis was conducted. The results show that product quality has a strong and statistically significant effect on competitiveness. The coefficient of determination indicates that a substantial portion of the variability in farm competitiveness can be explained by changes in the level of product quality. The standardized regression coefficient shows a strong positive effect, meaning that an increase in perceived product quality leads to an increase in farm competitiveness. These results confirm the alternative hypothesis that agricultural product quality represents an important source of competitiveness. The findings are consistent with contemporary theoretical approaches emphasizing that non-price factors, such as quality, safety, and product reliability, play a crucial role in the long-term market survival and development of agricultural producers.

In addition to product quality, the impact of market activities on the competitiveness of agricultural farms was also analyzed. The regression analysis results indicate that market activities have a statistically significant but moderate effect on competitiveness. The

coefficient of determination shows that market activities explain a smaller portion of the variability in competitiveness compared to product quality but still represent an important factor. The positive value of the regression coefficient indicates that more intensive market activities contribute to better market positioning of farms. These findings suggest that the competitiveness of agricultural farms depends not only on product quality, but also on the ability of producers to recognize market needs, communicate the value of their products, and ensure continuity of market presence.

Finally, a multiple regression analysis was conducted to examine the joint impact of product quality and market activities on farm competitiveness. The results show that the combined model has strong statistical significance and that both independent variables together explain a significant portion of the variability in competitiveness. The standardized coefficients indicate that product quality has a dominant contribution in explaining competitiveness, while market activities have a complementary but statistically significant effect. This finding confirms that product quality represents the foundation of competitiveness, while market activities act as a reinforcing factor.

Based on the results obtained, it can be concluded that agricultural farms that simultaneously invest in improving product quality and developing market activities achieve a more favorable market position and higher competitiveness. This confirms the main alternative hypothesis of the study regarding the importance of agricultural product quality as a source of farm competitiveness.

The discussion of the research results is focused on interpreting the obtained empirical findings in light of contemporary theoretical approaches to competitiveness, quality management, and the development of agricultural farms. Starting from the main objective of the study examining the role of agricultural product quality as a source of farm competitiveness the research results provide a significant contribution to understanding the factors that shape the market position of agricultural producers in the Republic of Serbia. The results of the correlation analysis indicate a strong positive relationship between the quality of agricultural products and farm competitiveness. This finding confirms theoretical perspectives according to which product quality represents one of the key non-price factors of competitiveness, particularly in sectors exposed to intense market competition and increasing consumer demand. In modern agriculture, quality is no longer viewed solely through the physical characteristics of products, but also includes aspects such as food safety, standardization, traceability, and producer reputation, which further strengthens its role in farm market positioning.

The findings of this study are consistent with previous empirical research showing that agricultural farms that invest in improving product quality achieve more stable revenues, easier market access, and greater long-term business sustainability. The strong impact of product quality on competitiveness, confirmed by regression analysis, indicates that quality represents a fundamental prerequisite for successful business operations, regardless of farm size or type of production. This finding is particularly significant in the context of small and medium-sized agricultural farms, which often face resource constraints and must seek alternative sources of competitive advantage compared to price-based competitors. The results of the regression analysis further confirm that market activities have a statistically significant but weaker impact on competitiveness compared to product quality. This

suggests that market activities, such as promotion, branding, and distribution, play a supportive and reinforcing role in the core competitive foundation built through product quality. In other words, market performance can enhance product visibility and recognition, but it cannot compensate for a lack of quality in the long term.

The quality of agricultural products in contemporary agrarian systems is increasingly viewed as a security category, given that food safety represents one of the key elements of public health and, consequently, social stability. According to the World Health Organization (WHO, 2021), unsafe and substandard food represents one of the major global risks to population health, while the Food and Agriculture Organization of the United Nations (FAO, 2021; FAO et al., 2022) emphasizes that food quality and safety function as public goods, as they directly affect consumer confidence and the long-term sustainability of agricultural production. In this context, improving the quality of agricultural products represents an important mechanism for preventing health, social, and economic risks in contemporary societies.

The moderate relationship between product quality and market activities indicates that producers who offer higher-quality products are more likely to develop and implement more active market strategies. This finding can be interpreted as evidence of the growing market orientation of agricultural farms, as well as an indication that product quality motivates producers to invest more intensively in promotion and product placement. At the same time, the results point to existing potential for improving market activities among farms that produce high-quality products but do not yet fully utilize their market potential.

Multiple regression analysis confirmed that the combined effect of product quality and market activities has a strong and statistically significant impact on farm competitiveness. The dominant contribution of product quality within this model further emphasizes its central role in the formation of competitive advantage, while market activities perform a complementary function. This result indicates that sustainable competitiveness in agriculture requires an integrated approach that simultaneously improves production and market aspects of business operations. In the context of the integration of the domestic market into broader regional and international flows, product quality becomes a prerequisite for meeting the standards and requirements of contemporary markets. Farms that fail to achieve an adequate level of quality face limited market access and reduced opportunities for growth and development.

It is important to note that the results of this study refer to the examined sample and cannot be fully generalized to all agricultural farms in Serbia. Nevertheless, the findings provide relevant guidelines for further research and practical application, particularly in the areas of business strategy development and agricultural policy formulation aimed at improving quality and enhancing the competitiveness of domestic agriculture.

CONCLUSION

The aim of this research was to examine the role of agricultural product quality as a source of competitiveness of agricultural farms in the Republic of Serbia. Based on contemporary theoretical approaches to competitiveness and quality management, an empirical study was conducted on a sample of 114 respondents, providing a foundation for analyzing the

relationship between product quality, market activities, and farm competitiveness. The research results clearly indicate that the quality of agricultural products represents a key factor of competitiveness. The strong relationship identified between product quality and competitiveness confirms that producers who invest in quality achieve a stronger market position, greater business stability, and improved prospects for long-term development. Product quality proved to be the dominant variable in explaining competitiveness, thereby confirming the main research hypothesis.

In addition to product quality, market activities were identified as an important but secondary factor of competitiveness. The results suggest that market activities contribute to strengthening competitiveness primarily as a complement to product quality. This finding emphasizes that successful market performance cannot be sustainable without an adequate level of product quality, while quality without appropriate market support does not fully realize its potential.

Based on the obtained results, it can be concluded that the competitiveness of agricultural farms requires an integrated approach that includes improving product quality, applying standards, and developing market activities aligned with the needs of modern consumers. It is particularly important for agricultural farms to recognize quality not only as a technical issue, but also as a strategic category that influences all aspects of business operations.

Improving the quality of agricultural products represents not only a market imperative, but also an important security mechanism that contributes to food security and food safety, public health protection, and the long-term stability of contemporary agrarian systems.

The study has certain limitations, primarily related to sample size and geographical scope, which indicate the need for further research using larger and more diverse samples. Future studies could include additional variables, such as innovation, digitalization, institutional support, and sustainability, in order to gain a more comprehensive understanding of the factors influencing farm competitiveness.

Despite these limitations, the results of this study provide significant theoretical and practical implications. From a theoretical perspective, the research contributes to a better understanding of the role of product quality in building competitive advantage in agriculture. From a practical perspective, the findings may serve as a basis for producers' business decision-making, as well as for shaping agricultural policies aimed at improving quality and strengthening the competitiveness of domestic agriculture.

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