WHOLESALE MARKETS AS SUPPLY CHANNELS FOR GREEN MARKETS AND THEIR IMPACT ON RURAL DEVELOPMENT IN SERBIA

Nedeljko Prdić[1], Tamara Gajić[2], Saša Stepanov[3]

**Corresponding author E-mail: nedeljko.prdic021@gmail.com*

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ABSTRACT

The wholesale market is a key supply channel for green markets, linking producers and consumers locally and globally. This study explores challenges and opportunities for vendors, emphasizing wholesale markets' role in improving supply chain efficiency. Through in-depth interviews with vendors at Kvantaška Pijaca in Novi Sad and local green market sellers, a mixed-methods approach was used to assess economic and communication effects. Findings show strong alignment between vendor operations and consumer needs, highlighting wholesale markets' potential to enhance rural development through better market access and innovative distribution. The study contributes to literature on sustainable agriculture and offers practical recommendations to improve vendor performance and customer satisfaction. It provides a strategic framework for policymakers to support rural and agricultural development in Serbia.

Introduction

The wholesale market system plays a pivotal role in the distribution of agricultural products, serving as a critical link between producers and consumers (Kłoczko-Gajewska et al., 2024). In Serbia, the significance of wholesale markets extends beyond economic transactions,

1 Nedeljko Prdić, PhD, Associate professor, JKP Tržnica, 4 Žike Popovića, SRB-21000 Novi Sad, Serbia, Phone:+381 63 500 818, E-mail: nedeljko.prdic021@gmail.com, ORCID ID (https://orcid.org/0000-0003-3199-1188)

2 Tamara Gajć, Geographical Institute "Jovan Cvijić", Serbian Academy of Sciences and Arts, 11000 Belgrade, Republic of Serbia; Swiss School of Business and Management, Avenue des Morgines 12, 1213 Genève, Switzerland; Institute of Environmental Engineering, Peoples' Friendship University of Russia, RUDN University, Moscow, Russia, E-mail: tamara.gajic.1977@gmail.com, ORCID ID (https://orcid.org/0000-0003-3016-8368)

3 Saša Stepanov, Ph.D., Associate Professor, University of Economics Academy, Novi Sad, Faculty of Applied Management, Economics and Finance (MEF), 11000 Belgrade, Jevrejska Street no. 24/1, 11000 Belgrade, Serbia. Center for Research, Science, Education and Mediation, CINEP Belgrade, Phone: +38163237436; E-mail: sasa.stepanov@gmail.com, ORCID ID (https://orcid.org/0009-0002-6093-8589)

contributing to the preservation of local agricultural traditions and supporting the development of rural areas (Marin et al., 2024). However, despite their importance, these markets face challenges related to outdated infrastructure, insufficient integration with modern digital platforms, and a lack of strategic alignment between wholesale and green market vendors (FAO,2018; WUWM, 2022; Pantović et al., 2023). These gaps hinder the optimization of supply chains and the potential for achieving greater economic and social benefits.

This paper focuses on the issue of wholesale market allocation as a key factor for improving distribution channels and connecting rural and urban markets. The primary aim of this study is to explore the economic and communication effects of wholesale markets as key supply channels for green markets in Serbia. By addressing existing gaps in the literature, such as the limited understanding of vendor satisfaction, customer behavior, and the impact of digital transformation on traditional market systems, this research provides actionable insights for enhancing the performance and sustainability of wholesale markets. Furthermore, the study examines how innovative approaches in distribution and marketing can bridge the gap between rural production and urban consumption, fostering a more resilient agricultural sector.

This research contributes to the existing body of knowledge by presenting empirical evidence from a case study of the Kvantaška Pijaca market in Novi Sad and its relationship with local green markets. The study integrates theoretical frameworks and empirical findings to address the pressing need for modernization in wholesale markets. Its innovative approach lies in the application of digital tools and communication strategies to enhance the role of wholesale markets as drivers of rural development and consumer satisfaction. By focusing on the intersection of economic efficiency, customer satisfaction, and rural development, this study offers a novel perspective on the transformation of traditional market systems. The findings are expected to inform policymakers and market stakeholders, providing a framework for sustainable agricultural practices and highlighting the strategic importance of integrating innovation and digital transformation in wholesale market operations.

If wholesale markets are acknowledged as the oldest or among the oldest forms of wholesale trade throughout history, and as precursors to the digital transformation that bridges rural and urban areas, particularly in the trade of fruits and vegetables, we can assume the following scenarios:

C1. “Pure market situation of trade at wholesale markets”:

This situation is characterized by the absence or minimal level of competition, which aligns with the traditional role of wholesale markets. Under such conditions, there is no need to consider potential interdependencies in communication between wholesale markets and other retail establishments. The market position can be deemed realistic, as local agricultural products (fruits and vegetables) are predominantly sold at wholesale and green markets. The situation is considered objective when taking into account that vendors at green markets are most often supplied by wholesale markets, while consumers frequently visit green markets to purchase fresh products.

C2. Expanding the range of agricultural product sales:

New products introduced at wholesale markets offer advantages such as quality associated with geographical origin, freshness, competitive prices, and localized methods of production and design. Given the well-established fact that local agricultural products are primarily sold at wholesale and green markets, there is no need to further measure the impact of additional marketing communication tools. The sales effects and communication outcomes can be attributed to these markets. After three months of operation at the new Wholesale Market (Veletržnica in Novi Sad), consumer attitudes can be used to evaluate the market's impact.

C3. Establishing a sales position for agricultural products (fruits and vegetables) in new retail and wholesale facilities:

Traditionally, markets have been closely associated with the sale of a wide range of local products. This type of sales positioning is inherently linked to market-based sales activities. It also involves developing a distinctive role for markets as central hubs for the sale of local products.

C4. Market positioning of agricultural producers:

A vendor operating at a wholesale market who opens a new point of sale and takes proactive measures to inform customers implements specific strategies to increase sales volumes at the new location. This includes analyzing data on their own sales as well as the sales of other producers at the wholesale market.

Wholesale markets serve as priority distribution channels for sustainable agriculture and other rural production sectors, acting as a vital source of vitality for agricultural communities. Innovations in production and distribution are essential for survival and represent a foundation for market competitiveness. The distribution of agricultural products (fruits and vegetables) through wholesale markets offers a long-term advantage over competitors, achieved through the introduction of new or improved products or customer-oriented services.

In the context of wholesale markets, a modern sales approach involves adopting advancements in technology, fostering social relations, and enhancing public communication—factors that include direct customer engagement. In today's environment, creativity is required in the sale of fruits and vegetables, placing agriculture's natural potential at the center of these efforts. A successful trade strategy is intrinsically linked to fostering local rural development (Cvijanović et al., 2020).

The rapid development of agricultural technology and the increasing prevalence of digital communication with customers and the public have strengthened the position of wholesale markets as effective sales instruments globally. These attributes give wholesale markets an advantage over other distribution channels in supporting the development of green markets in the Republic of Serbia. The future of rural development in Serbia undoubtedly depends on the integration of new technologies, innovative methods, and advanced practices in production, sales, and distribution.

Literature overview

Wholesale markets have long been recognized as specialized institutions for the bulk trading of agricultural products, catering to a specific customer base that includes institutional buyers, wholesalers, and retailers (Prdić et al., 2019; Rustom et al., 2020). Kuzman et al. (2017) emphasize their pivotal role as the most critical distribution channel for agricultural products, while Inayah et al. (2024) highlight their capacity to facilitate the sale of large quantities of goods. However, this characterization often oversimplifies the complexity and variability inherent in wholesale markets, particularly regarding their adaptability to evolving market demands and integration with modern digital tools. Investments in wholesale markets are often portrayed as beneficial projects for enhancing market supply chains (Kuzman et al., 2020). Yet, a critical question remains: are these investments adequately addressing the challenges posed by the global shift toward more integrated and technology-driven supply chains? While Vlahović (2013) positions wholesale markets as intermediaries bridging manufacturers and retailers, the argument lacks nuance, particularly in considering how these markets compete with or complement alternative distribution channels, such as e-commerce platforms.

Globally, wholesale markets are acknowledged as essential commercial and logistical intermediaries in the trade of fruits and vegetables (Kuzman et al., 2018). However, as Boiko et al. (2019) note, their role in food product marketing cannot be isolated from the broader retail ecosystem. This interdependence raises questions about the extent to which wholesale markets can remain competitive in light of shifting consumer preferences and the growing emphasis on sustainability in supply chains.

Historically, markets have existed for millennia, originating with the advent of commodity exchange around 5,000 years ago (Petrović et al., 2021). Despite their historical significance, their evolution into modern entities has been uneven. For example, Ostojić et al. (2013) highlight their traditional focus on fresh and high-quality products, but this focus may no longer be sufficient to sustain their relevance in an era of digital transformation and shifting consumer demands. Modern markets are increasingly organized into urban clusters (Marciniak, 2020), yet their integration with mobile technologies and digital business principles remains nascent. Prdić (2022) underscores the importance of adopting mobile technology to enhance operational efficiency, but the broader literature provides limited empirical evidence on the actual impact of such innovations. Moreover, consumer loyalty to markets in Serbia, traditionally rooted in local and repeat purchases, may erode without proactive measures to adapt to changing market dynamics (Prdić, 2022). The retail sector, as Rosa et al. (2018) observe, is continuously evolving, and the success of agri-food supply chains hinges on the strength of each link (Gazdić et al., 2022). However, existing literature tends to focus on individual links rather than the systemic challenges affecting the entire chain. For instance, while Miletić et al. (2022) emphasize the strategic importance of after-sales assessments, these analyses often neglect the unique complexities of wholesale markets. Similarly, Sekulić et al. (2023) analyze product life cycles through consumer attitudes but fail to address the role of wholesale markets in influencing these attitudes.

Urban development and social welfare regulation, as discussed by Gajić et al. (2024) and Kotler et al. (2008), are critical components of market ecosystems. Yet, the literature rarely connects these macro-level considerations with the operational realities of wholesale markets. Additionally, as Kostić (2022) points out, social media marketing requires distinct strategies to build brand loyalty—an area where wholesale markets remain underexplored.

A notable gap in domestic literature is the lack of empirical studies on the factors influencing the development of green markets through wholesale market strategies. While theoretical explorations exist, they often fail to capture the dynamic interplay between wholesale markets, small markets, producers, and other stakeholders. This paper seeks to address this gap by presenting empirical research that examines these interactions and highlights the potential for wholesale markets to drive rural and agricultural development.

While wholesale markets are often depicted as indispensable to agricultural supply chains, the literature reveals significant gaps in understanding their adaptability, integration with modern technologies, and broader role in sustainable development. By critically analyzing these aspects, this study aims to contribute to a more nuanced understanding of their function and potential in the evolving market landscape.

Materials and methods

This research focuses on analyzing the role of wholesale markets as key supply channels for green markets in Serbia, evaluating their impact on economic efficiency and participant satisfaction within the supply chain. The methodology combines theoretical and empirical approaches to provide a comprehensive and valid understanding of the research problem, with clearly defined criteria for data collection and analysis.

The sample included 30 vendors from the Kvantaška Pijaca market in Novi Sad, of which 15 were fruit vendors and 15 were vegetable vendors. This selection was based on the criterion that participants must have at least five years of sales experience, ensuring they are well-acquainted with market conditions and processes. Additionally, the study involved 20 vendors from other local markets (Futoška, Limanska, Riblja, and Satelitska markets), providing broader insights into the specific characteristics of different sales locations within the same urban context. The decision to limit the sample to 50 respondents stems from practical constraints, such as available research resources and the timeframe for conducting the study. Despite this, carefully defined selection criteria ensured the sample's representativeness for the target group. However, the limited sample size has implications for the external validity of the results, as the findings cannot be fully generalized to the broader population of vendors in Serbia. Future research should include a larger and more geographically diverse sample to increase the reliability of conclusions.

Primary data were collected through structured interviews conducted between March and April 2024. A questionnaire, used as the main research instrument, was designed

to examine key aspects of vendor satisfaction and communication. The questions were formulated using a Likert scale ranging from 1 to 5, where 1 indicated the lowest level of satisfaction or agreement, and 5 indicated the highest level. The questionnaire covered demographic and socio-economic characteristics of the respondents, satisfaction with current sales conditions, the level of awareness about the new wholesale market, and perceptions of future sales opportunities.

The validity of the collected data was ensured through a rigorous research design and the application of appropriate criteria for participant selection. However, moral hazard was identified as a potential risk, as respondents might provide answers that align with their interests rather than reflect actual conditions. To minimize this bias, the interviews were conducted in a controlled environment, with neutral question phrasing and respondent anonymity. Data analysis was performed using descriptive statistics and significance tests to evaluate the research hypotheses. The results were interpreted in the context of sustainable development, economic efficiency, and communication effects, with the aim of providing recommendations for improving wholesale markets and their contribution to rural area development.

This methodology provides a comprehensive approach to the research, offering detailed insights into current challenges and potential opportunities for enhancing wholesale markets as a vital component of the agricultural product market in Serbia.. Research hypotheses were defined from the subject problem.

H1*: Vendors at the Kvantaška Pijaca market are "satisfied" with their sales*

H2*: Vendors at the Kvantaška Pijaca market have a positive attitude about the potential sales opportunities at the Wholesale Market*

H3*: Vendors at small marketplaces are insufficiently informed about the efficiency of purchasing goods at the Wholesale Market*

Results

In data analysis, descriptive statistics (percentages, arithmetic mean, and standard error) were used to describe the sample. There is a significant correlation between groups of questions - categories, which is measured by the correlation coefficient of the relevance and integration of the market communication of the vendors of Kvantaška Pijaca and other small markets. For testing individual hypotheses, the value of all questions related to the individual hypothesis will be used. In the hypothesis H1, the term *"Satisfaction"* refers to the degree of achievement of the economic and communication goals of the vendors at the Kvantaška Pijaca market. Under the term *"Changes in sales"* in the hypothesis H2 is meant the expected value of moving wholesale to the wholesale market. While under the term *"Insufficiently informed"* in the hypothesis H3, it is understood that vendors in small markets are insufficiently informed by the employer and other relevant institutions about the advantages of selling at the Wholesale Market.

Table 1. Demographic characteristics of the respondents

Control variables	Features (number)	Share (percentage)	Cumulative share
Farm owner	20	66.6	66.6
Farm member	6	20.0	86.6
Professional associate	2	6.7	93.3
Employee	2	6.7	100.0

Source: Author's research

15 fruit vendors and 15 vegetable vendors took part in the survey, which was conducted at the Kvantaška Pijaca market within the JKP Tržnica Novi Sad public communal enterprise. The largest number of respondents belongs to the farm owners (66.6%), farm members (20%), while 6.7% of the respondents are persons who are employed elsewhere and earn additional income on the market and professional associates, persons who have advisory role in sales. The condition from the subject of the research is also fulfilled, which is selling for at least 5 years on the market and maintaining a customer database.

Investments in sustainable technology have a significant and strong positive impact on economic development (Gajić et al. 2024). In order for the process to be completed successfully, it is necessary to have a special organizational unit in charge of the budget within the organization (Mihajlović et al., 2022). Considering the structure of the sample and the importance of investments and budgets for the development of the farm, it was observed that the vendors are the responsible members of the family community, who have an overview of most of the business and, therefore, the development strategy and the market position of the farm.

The findings from Table 2 indicate that the gender distribution across the three segments of respondents shows some variation, with males consistently forming the majority in each segment. Specifically, Segment #1 and Segment #2 have a similar male-to-female ratio (68% male and 32% female in Segment #1, and 70% male and 30% female in Segment #2), while Segment #3 demonstrates a slightly more balanced distribution, with 60% male and 40% female respondents. The chi-square test results ($\chi 2(df=2)=4.380$, $p=0.112$) reveal that these differences in gender distribution are not statistically significant at the conventional 0.05 level. This indicates that the observed variations in gender structure across the segments could be attributed to random chance rather than a systematic difference.

While there is a clear male dominance in all segments, the differences in gender composition are not statistically meaningful, suggesting that gender is unlikely to play a distinctive role in shaping responses or behaviors across these groups in the context of this study.

Table 2. Comparison of respondents according to gender structure

	Gender structure of the respondents	
	male	female
Segment #1	68%	32%
Segment #2	70%	30%
Segment #3	60%	40%
	χ^2 (df=2)=4.380 p=0.112>0.,005	

Source: Author's research

The analysis of age and education among respondents reveals distinct patterns, though these differences are not statistically significant (Table 3). Segment #1 exhibits a balanced age distribution, with respondents evenly spread across age categories, while Segment #2 is predominantly composed of younger individuals aged 20–40. In contrast, Segment #3 is characterized by a higher proportion of middle-aged respondents and a notably small percentage of those over 60. Despite these observable trends, the chi-square test results indicate that the variations in age distribution across the segments are not significant ($\chi2(2, n=150)=2.377$, $p=0.307$), suggesting that the differences may be random.

When examining education levels, respondents predominantly possess primary and secondary education across all segments, with higher education being less common and advanced degrees (master's or PhD) even rarer. While the distribution appears to vary slightly, with Segment #1 having a slightly higher representation of individuals with lower education levels, and Segments #2 and #3 showing a modest increase in higher education, these differences are also not statistically significant ($\chi2(2, n=150)=3.794$, $p=0.147$). This implies that educational attainment does not differ systematically between the groups and is unlikely to influence responses or behaviors in a meaningful way within the context of this study.

Table 3. Comparison of respondents according to age and education

	Age of the respondents			The level of education of the respondents		
	20-40	**40,1-60**	**Over 60,1**	**Primary and secondary education**	**higher education**	**master, PhD**
Segment #1	24%	40%	36%	50%	32%	15%
Segment #2	62%	26%	60%	46%	42%	14%
Segment #3	14%	34%	4%	54%	42%	11%
	$c^2(2, n=150)=2.377$ p=0.307>0.05			$c^2(2, n=150)=3.794$ p=0.147>0.05		

Source: Author's research

The presented results, tested using a non-parametric test (Kruskal-Wallis test), indicate that there is no statistically significant difference between the segments (fields) when it comes to the age of the respondents or when looking at the level of education.

The analysis of customer characteristics at the Kvantaška Pijaca market reveals important patterns regarding the type and behavior of customers. Small-scale customers, who predominantly represent individual buyers or smaller business owners, account for a total of 2,150 visits, of which 250 resulted in purchases at the point of sale. Large-scale customers, such as wholesalers and larger businesses, contribute 1,340 total visits, with 240 involving direct purchases. Potential customers, those who visited the market but may or may not have engaged in transactions, represent the largest segment, with 6,120 total visits and 1,020 resulting in purchases. This data highlights that while potential customers constitute the majority of market visitors, their conversion rate into actual buyers is relatively low. Conversely, small-scale and large-scale customers demonstrate higher conversion rates, indicating more consistent purchasing behavior. The total visitor count of 9,610 underlines the significant traffic at the Kvantaška Pijaca market, yet the challenge lies in effectively converting potential customers into active buyers to optimize market performance and sales outcomes. These insights suggest opportunities for targeted marketing strategies and improved communication to better engage potential customers and increase overall market efficiency (Table 4).

Table 4. Characteristics of customers at the Kvantaška Pijaca market

Characteristics of customers	Customers who visited the point of sale	Customers who visited the point of sale (and may or may not have bought products on the market)	Total
Small-scale	250	1900	2150
Large-scale	240	1100	1340
Potential	1020	5100	6120
Total	1510	8100	9610

Source: Results of a survey of vendors' stands; Author's calculation

1. Small-scale customers - purchase value less than €3000€ in the previous year (2023)
2. Large-scale customers - purchase value greater than €3000 in the previous year (2023)
3. Potential customers - they have not bought products at the point of sale

Visitors to a point of sale at the Kvantaška Pijaca market can be existing or potential customers. By communicating at the point of sale, existing customers and their loyalty as well as potential customers can be influenced. Researching the attitudes and perceptions of potential customers, vendors must do direct personal communications and apply live word at the point of sale, but also with other marketing communication instruments in order to influence their purchase intentions. The collected data is part of the sales and communication strategy of the vendors. When it comes to the research hypothesis:

H1: Vendors at the Kvantaška Pijaca market are "satisfied" with their sales

During the interview itself and conversations with fruit and vegetable vendors, the view that the requirement for an interview is to sell products for at least 5 years, is very important. This condition is set for the relevance of the research. The surveyed wholesalers and retailers in response to the question from hypothesis H1 were able to give an answer on a scale from 1 to 5, where 1 expressed the least satisfaction, and 5 extreme satisfaction.

Table 5. Data on the average rating of satisfaction with sales at the Kvantaška Pijaca market (tested value = 2.7)

One-Sample Statistics

	N	Mean	Standard deviation	Standard error of the mean (SEM)
Satisfaction	30	2.5407	0.75089	0.07657

Source: Author's research

Table 6. One sample test, average satisfaction rating (tested value = 2.7). 95% confidence interval for the difference

One-Sample Test

	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Satisfaction	-2.233	29	0.029	-0.16835	-0.3212	-0.0166

Source: Author's research

According to the obtained empirical test data, the significance a*=0.029=2.9%, we got the value a*<5%, indicating that the average value (satisfaction rating) differs from the tested value, which therefore further indicates that the hypothesis that the average satisfaction rating on to the entire Kvantaška Pijaca market is 2.7 cannot be confirmed. The first hypothesis, which states that the vendors at Kvantaška Pijaca are "satisfied" with their sales, is not valid, even though the vendors gave an average rating of 2.54. This conclusion arises from the fact that a satisfaction rating of 2.54 is below the reference threshold that would be considered the benchmark for "satisfaction." For example, in the context of a Likert scale, where a score of 3 or higher is often interpreted as neutral or positive perception, a score below this threshold (such as 2.54) indicates dissatisfaction.

Therefore, while the rating is quantified, it is not high enough to support the claim that the vendors are "satisfied." This conclusion is further supported by empirical tests, which reveal a significant difference between the obtained average value and the expected satisfaction rating of 2.7, further indicating that Hypothesis H1 was not accepted.

Based on the database of wholesalers (vendors) about customer characteristics in Table 7, a survey of vendors was also conducted on the same basis, whether small-scale, large-scale and potential customers from their database would visit their points of sale

at the new Wholesale Market (Table 8). The goal was to determine the impact of the Wholesale Market on the awareness of the visit itself and the visit to the vendor's point of sale and the interest of potential customers in visiting the Wholesale Market and the vendor's point of sale.

Through research, it is necessary to determine the degree of awareness about the new Wholesale Market and the visit to the vendors' point of sale. In this case, it is necessary to apply the Likert ranking scale from 1 to 5, where 1 is low interest (no visit to the Wholesale Market and no purchase intentions), while 5 is a very high interest in visiting the Wholesale Market and the point of sale (high level of interest in the Wholesale Market and high level of purchase intentions).

Table 7. Vendors' plans to sell on the wholesale market

Description	Arithmetic mean	Standard error
Small-scale customers		
Bought at your point of sale and at the market	2.63 (n=90)	0.22
Haven't bought at your point of sale and at the market	2.78 (n=85)	0.19
Large-scale customers		
Bought at your point of sale and at the market	3.24 (n=83)	0.18
Haven't bought at your point of sale and at the market	3.10 (n=80)	0.18
Potential customers		
Bought at your point of sale and at the market	2.38 (n=75)	0.21
Haven't bought at your point of sale and at the market	2.30 (n=70)	0.24

Source: Results of a survey of the Kvantaška Pijaca market vendors' stands; Author's calculation *(*1 = no purchase plans; 5 = very defined purchase plans)

The results of the research on visits to the new Wholesale Market and purchase intentions are shown in Table 7 and Table 8. The data on vendors' plans to sell on the wholesale market, as presented in Table 7, reveals distinct patterns based on customer type and purchasing behavior. For small-scale customers, the arithmetic mean of vendors' plans to sell on the wholesale market is slightly higher (2.78) for those who did not buy at the point of sale or market compared to those who did (2.63). This indicates a marginally stronger inclination to consider the wholesale market among vendors catering to non-buying small-scale customers, although the difference is relatively small. Large-scale customers, representing wholesalers and businesses with higher purchasing power, show the highest overall scores among all customer types. Vendors serving large-scale customers who bought at the point of sale or market report a mean score of 3.24, while those serving non-buying customers report a slightly lower mean of 3.10. These results suggest that vendors perceive significant opportunities for engaging with large-scale customers on the wholesale market, particularly those who are already purchasing.

Potential customers, who form the largest group, show the lowest levels of vendor intent to sell on the wholesale market. The arithmetic mean for those who bought at the point of sale or market is 2.38, while for non-buyers it is even lower at 2.30. This indicates that vendors are less confident in the wholesale market's ability to attract or engage potential customers effectively.

The findings highlight that vendors' plans to sell on the wholesale market are influenced by the type of customer and their purchasing behavior. Large-scale customers appear to be the most promising segment for wholesale market engagement, while potential customers present a challenge in terms of conversion and vendor interest. These insights suggest the need for targeted strategies to enhance vendor confidence and customer engagement, particularly among potential customers, to maximize the wholesale market's success

The cumulative analysis of buyers at the wholesale market highlights significant differences in purchasing behavior across customer segments. Small-scale customers who visited the point of sale had a purchase rate of 7.2% with cumulative sales per customer of 335, compared to 3.3% and 265 for those who did not visit. This indicates that direct interaction at the point of sale positively influences their purchasing decisions and sales value. Large-scale customers showed the highest purchase rates, with 22.7% of those who visited the point of sale making purchases and achieving cumulative sales of 550 per customer. Even among those who did not visit, the purchase rate was 11.9% with cumulative sales of 328, underscoring the strong potential of this segment. Potential customers exhibited the lowest engagement, with only 2.0% making purchases when visiting the point of sale and cumulative sales of 250. For those who did not visit, the purchase rate dropped to 0.6%, with cumulative sales at 176. This highlights a significant challenge in converting potential customers into active buyers (Table 8).

Table 8. Cumulative analysis of buyers for purchases at the Wholesale Market

Description	Number of customers	Sales as a percentage of the number of customers (%)	Cumulative sales per customer
Small-scale customers, visited the point of sale (n = 250)	19	7.2	335
Small-scale customers, haven't visited the point of sale (n = 1700)	63	3.3	265
Large-scale customers, visited the point of sale (n = 200)	46	22.7	550
Large-scale customers, haven't visited the point of sale (n = 1020)	120	11.9	328
Potential customers, visited the point of sale (n =1010)	20	2.0	250
Potential customers, haven't visited the point of sale (n =10200)	74	0.6	176

Source: Results of a survey of the Kvantaška Pijaca market vendors' stands; Author's calculation

It should be noted that the planned relocation period is March or April, which is favourable for continued work, both due to the sales range and weather conditions. However, based on the communication findings during the survey of vendors, the author's experience as well as the proposal for the location of the Wholesale Market (the area of the current Najlon Pijaca market), the vendors expect real economic effects already at the beginning of September. The communication effects were achieved at the Kvantaška Pijaca market itself, they are very significant due to the already existing knowledge of the customers about the quality, price and freshness of the products.

Analyzing the economic effects based on the cumulative analysis of sales at the wholesale market (Table 8), it is possible to calculate the rate of return on the investment by renting a sales place at the Wholesale Market. The overall economic effect of leasing space at the Wholesale Market, viewed from the point of view of purchase plans, is obtained by multiplying the value of the realized sales by the observed customer categories with the average gross profit rate. The short-term rate of return on the investment in percentages represents the lower limit of the value of a new point of sale at Wholesale Market in terms of short-term sales. In the long term, communication effects are achieved through advertising, digital marketing, sales promotion and word of mouth. If we assume that the vendors will continue to maintain a database of customers, it is possible to determine the economic and communication effects of selling on the Market for a longer period of time. Therefore, based on the database of customers and realized sales, it is possible to calculate income as a function of time in a certain observed period after relocation. When it comes to the research hypothesis:

H2: Vendors at the Kvantaška Pijaca market have a positive attitude about the potential sales opportunities at the Wholesale Market

According to the empirical significance data obtained, a*=0.946==94.6% a*>5, which means that the average value (score of positive expectations of wholesalers) does not differ from the tested value, which indicates that the hypothesis H2 ***can*** be accepted, that the average score of expectations on sale is 4 at the new Wholesale Market in the entire set (Table 9 and 10).

Table 9. Data on average score of positive change in sales (tested value = 4**)**

One-Sample Statistics

	N	Mean	Standard deviation	Standard error of the mean (SEM)
Change in sales	30	3.98847	.63771	.06411

Source: Author's research

Table 10. One sample test, average score of positive sales expectations (tight value=4). 95% Confidence Interval of the Difference

One-Sample Test

	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Change in sales	-.078	29	.946	.00504	-.1332	.1232

Source: Author's research

Data from the survey of vendors at the Futoška Pijaca, Limanska Pijaca, Riblja Pijaca and Satelitska Pijaca markets are shown in Table 11. The research was conducted on a sample of 5 fruit vendors and 5 vegetable vendors in each individual market. Respondents had the opportunity to rate their opinion on various statements from the research questions satisfaction/insufficient communication/consumer behavior from 1 to 5, where 1 indicated a strongly negative opinion, and 5 a strongly positive one. According to the data in table 11, the score of "satisfaction" variable with the place of purchase of goods of market vendors who sell at the "Futoška Pijaca" market is 2.4280, of those who sell at the "Limanska Pijaca" market it is 2.6280, of those who sell at the "Riblja Pijaca" market is 2.4456 and on the "Satelitska Pijaca" market it is 2.8112. The average score of respondents' satisfaction in the area of all markets is 2.5205. The estimated score of "insufficient communication" on "Futoška Pijaca" market is 4.4270, on "Limanska market" - 4.2270, on "Riblja Pijaca" market - 4.3476, on "Satelitska Pijaca" - 4.0132. The average rating of insufficient communication in the area of all markets from the research is 4.2204. The average rating of "consumer behavior" on the "Futoška Pijaca" market is 4.1280, on the "Limanska Pijaca" market 4.0780, on the "Riblja Pijaca" market it is 3.9856, on the "Satelitska Pijaca" market - 4.2102. The average rating of consumer behavior in all small markets from the survey is 3.8945. Throughout history, markets have had their users and have continuously adapted to their needs (Prdić, 2023). When it comes to the research hypothesis:

H3: Vendors at small marketplaces are insufficiently informed about the efficiency of purchasing goods at the Wholesale Market

Table 11. Data on the average rating of satisfaction/insufficient communication/consumer behavior, by the place of purchase of the vendors' goods according to the location of the market (headquarters of the market)

The market where the customers shop	Satisfaction	Insufficient communication	Consumer behaviour
Futoška Pijaca -			
Mean	2.4280	4.4270	4.1280
N	125	125	125
Std. Deviation	.73350	.73340	.63350
Median	2.4215	4.5213	4.1215
Limanska Pijaca -			
Mean	2.6280	4.2270	4.0780
N	125	125	125
Std. Devitaion	.71043	.67033	.71043
Median	2.6657	4.3677	5.6677
Riblja Pijaca - Mean	2.4456	4.3476	3.9856
N	125	125	125
Std. Devitaion	.73251	.63251	.83251
Median	2.4135	4.5435	4.0235
Satelitska Pijaca -	2.8112	4.0132	4.2102
Mean	125	125	125
N	.90124	.65134	.60134
Std. Devitaion	2.6675	4.1175	4.0000
Median			
	2.5205	4.2204	3.8945
Total - Mean	500	500	500
N	.76085	.66035	.66285
Std. Devitaion	2.5000	4.5000	4.1157
Median			

Source: Author's research

The analysis of the average rating for being informed provides insights into respondents' perceptions of their level of information. Table 12 shows that the mean rating for "insufficiently informed" is 4.1332, slightly above the tested value of 4, with a standard deviation of 0.66261 and a standard error of the mean (SEM) of 0.06647. This indicates a relatively consistent response among the participants. Table 13 presents the results of a one-sample t-test, comparing the average rating to the tested value of 4. The t-value of 1.837, with 39 degrees of freedom (df), yields a p-value of 0.066, which is above the conventional significance threshold of 0.05. This suggests that the difference between the mean rating (4.1332) and the tested value (4) is not statistically significant. The 95% confidence interval for the mean difference ranges from -0.0090 to 0.2545, further indicating that the observed difference is negligible.

While respondents rated their level of being informed slightly above the tested value, the lack of statistical significance implies that their perception does not strongly deviate from the neutral benchmark. This suggests that the respondents generally feel

moderately informed, but there may still be room for improving communication and information dissemination.

Table 12. Data on the average rating of being informed (tested value = 4)

One-Sample Stastistics

	N	Mean	Standard deviation	Standard error of the mean (SEM)
Insufficiently informed	40	4.1332	0.66261	0.06647

Source: Author's research

Table 13. One sample test, average rating of being informed (tested value =4). 95% Confidence interval of the Difference

	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Insufficiently informed	1,837	39	0.066	0.12233	-0.0090	-0.2545

Source: Author's research

The analysis of the correlation between different aspects of market communication integration among vendors at Kvantaška Pijaca and other small markets highlights a strong interconnectedness between key variables, as shown in Table 14**.** Sales organization emerges as a central factor, showing significant positive correlations with interactivity ($r = 0.558$, $p < 0.001$, $r = 0.558$, $p < 0.001$, $r = 0.558$, $p < 0.001$), marketing ($r = 0.562$, $p < 0.001$, $r = 0.562$, $p < 0.001$, $r = 0.562$, $p < 0.001$), strategic vision ($r = 0.528$, $p < 0.001$, $r = 0.528$, $p < 0.001$, $r = 0.528$, $p < 0.001$), and sales planning ($r = 0.677$, $p < 0.001$, $r = 0.677$, $p < 0.001$, $r = 0.677$, $p < 0.001$). This indicates that well-structured sales processes are foundational for effective market communication and coordination. Interactivity also plays a critical role, correlating significantly with marketing ($r = 0.567$, $p < 0.001$, $r = 0.567$, $p < 0.001$, $r = 0.567$, $p < 0.001$) and strategic vision ($r = 0.503$, $p < 0.001$, $r = 0.503$, $p < 0.001$, $r = 0.503$, $p < 0.001$), suggesting that active engagement among vendors is essential for aligning marketing strategies with broader operational goals. Similarly, marketing demonstrates strong relationships with strategic vision ($r = 0.640$, $p < 0.001$, $r = 0.640$, $p < 0.001$, $r = 0.640$, $p < 0.001$) and sales planning ($r = 0.531$, $p < 0.001$, $r = 0.531$, $p < 0.001$, $r = 0.531$, $p < 0.001$), highlighting its importance in connecting daily activities with long-term objectives. Strategic vision is strongly correlated with sales planning ($r = 0.621$, $p < 0.001$, $r = 0.621$, $p < 0.001$, $r = 0.621$, $p < 0.001$), reflecting that having a clear strategic framework supports effective and coordinated sales efforts. Together, these findings illustrate that the integration of market communication fosters collaboration and alignment among vendors, enabling them to achieve both short-term and long-term objectives. Overall, the results from Table 14 suggest that vendors who prioritize interconnected processes, such as organization, interactivity, and strategic planning, are better positioned to enhance their market competitiveness and operational efficiency. A cohesive communication strategy is essential for achieving sustainable growth in market operations.

Table 14. Correlation coefficient and degree of relevance between the degree of integration of market communication of vendors of Kvantaška Pijaca and other small markets

	Sales organisation	Interactivity	Marketing	Strategic vision	Sales planning
Sales organisation N	1.000 60	.558** .000 60	.562** .000 60	.528** .000 60	.677** .000 60
Interactivity N	**	1.000 60	.558** .000 60	.567** .000 60	.503** .000 60
Marketing N	**	**	1.000 60	.640** .000 60	.531** .000 60
Strategic vision N	**	**	**	1.000 60	.621** .000 60
Sales planning N	**	**	**	**	1.000 60

Source: Results of a survey of the Kvantaška Pijaca market vendors' stands; Author's calculation *(N = Correlation coefficient and degree of relevance; ** The correlation is relevant at the 0.01 level of relevance (mutual*).

The categories that determine the integration (Table 14) of Kvantaška Pijaca market and other small markets are:

- **Sales organization** (mutual cooperation in sales, knowledge of communication tools, existence of a personal database, cooperation with market management)
- **Interactivity** (coherence of communication with sales, maintaining a customer database)
- **Marketing** (vision and communication plan, analysis of the market environment, cooperation plan with customers and consumers through the loyalty program)
- **Strategic vision** (harmonizing the communication strategy with the market position on the market, optimal integration of marketing communication and digital marketing instruments, vision (benchmarking) analysis with sales trade chains)
- **Sales planning** (SWOT analysis as a part of sales and communication, sales planning considering the historical importance of markets, planning the "brand" of markets and organizing economic events at markets, studying relations with customers and consumers, exploiting the traditional, social and public role of markets, using living words in sales promotion with customers and consumers).

After reviewing the theoretical and empirical research results, the author's experience, we must state that the operationalization of an integrated model from the perspective of all participants in the sale of fruits and vegetables is an open topic for the future. The whole process of operationalizing the success of trade at the Wholesale Market and small markets needs to be constantly checked with new variables. For our conceptual model at the operational level, topics are open for new empirical investigations and competitive comparisons.

The purpose of benchmarking in the example of markets is the desire to implement a marketing strategy of innovation and positioning by learning from more capable competitors by applying more intelligent solutions to exploit old positions (Prdić, 2022). So, here is a plea for the necessity of organizing dynamic business analyses (Durkalić et al., 2019; Čavlin, 2022). A practical example is shown in Table 15.

Table 15. Benchmarking indicators for markets

Criterion	Indicator
Growing demand for business space and stalls	Growth rate and level of income
Utilisation of renting space	Utilization rate
Competitiveness	Market share of retail markets
Seasonal sales of products	Coefficient of sales in the markets
Marketing	The share of marketing in the business result
Tradition and importance of markets for tourism	The share of tourism and other development factors

Source: Prdić, 2022

On the basis of the theoretical conceptual model, which we presented and confirmed in this research, a more advanced structural model can be built on, which can have the presented model as its starting point. Model checking can be confirmed by other statistical methods. The purpose of upgrading the model in the sale of fruit and vegetables has its origin in better sales results with the final outcome of a satisfied customer. This research also has certain limitations. The limitation can be placed in the context of the sample size, i.e. markets in other parts of the Republic of Serbia are not included, although the choice to research markets in Novi Sad is good for illustrating the basic set. Therefore, among further research, there could be a recommendation to conduct a new research on a larger or whole group so that the results are more representative. Namely, repeated research, during future research over time, can contribute to the coexistence and greater reliability of the results.

Discussion

The findings of this study align with and expand upon existing research on the role of distribution channels and wholesale markets in agricultural supply chains. Biot et al. (2024) highlight the importance of efficient distribution channels for the viability of market gardening farms, emphasizing their role in connecting rural production with urban demand. Our study confirms this by demonstrating that wholesale markets, such as Kvantaška Pijaca, serve as critical hubs for facilitating these connections. Vendors

who are actively engaged in organized sales and strategic planning reported higher satisfaction, mirroring the significance of well-integrated supply chains as identified in Biot et al.'s research (2024).

Similarly, the sustainable development of rural-to-urban food supply chains, as discussed by Hoang et al. (2024), underscores the importance of addressing logistical and informational challenges. Our findings reveal that vendors at small markets often lack sufficient information about the benefits of wholesale markets, which aligns with Hoang et al.'s emphasis on the need for improved communication strategies to strengthen supply chains in developing contexts. This suggests that targeted informational campaigns could bridge these gaps and enhance market efficiency. Kociszewski et al. (2024) focus on the relationship between farmers and distributors in the organic food market, highlighting trust and collaboration as essential for success. Our study builds on this by illustrating that vendors' satisfaction and economic outcomes are closely linked to their ability to establish reliable partnerships within the wholesale market. However, while Kociszewski et al. (2024) emphasize the role of product quality, our findings suggest that the success of wholesale markets also depends on strategic investments in technology and infrastructure, as highlighted by Wang (2024) in his study of supply chain modernization in China.

The "Farm to Table" concept explored by Omar et al. (2024) is reflected in our findings on the wholesale market's role in bridging rural production with urban consumption. Both studies emphasize the importance of efficient channels for ensuring fresh and high-quality produce reaches urban markets. However, while Ahmad et al. (2024) focus on urban farming dynamics, our study contributes by analyzing the broader impact of wholesale markets on rural economies, showcasing their potential to drive rural development and economic sustainability.

Reardon et al. (2024) describe the role of small and medium enterprises (SMEs) in driving domestic supply chain growth in Africa. Our findings resonate with this, as wholesale markets in Serbia similarly act as nodes for economic development, fostering collaboration among vendors and improving market access. Additionally, the local multiplier effects of short food supply chains, as analyzed by Kłoczko-Gajewska et al. (2024), are evident in our study, which highlights the socio-economic benefits of wholesale markets in supporting local producers and enhancing rural livelihoods.

While Marín et al. (2024) explore agro-food supply chains in peril-urban areas and their role in preserving biodiversity, our study complements this by emphasizing sustainable practices within wholesale markets. Although biodiversity was not a primary focus, the promotion of local and seasonal produce in wholesale markets indirectly supports environmental conservation efforts.

Our findings largely align with the broader body of literature while also addressing specific gaps by providing empirical insights from the context of Serbia. This study highlights the pivotal role of wholesale markets in fostering sustainable agricultural supply chains, emphasizing the need for improved communication, strategic planning,

and technological integration to enhance their effectiveness. Future research should explore additional dimensions, such as environmental impacts and the role of policy interventions, to further strengthen the understanding of wholesale markets as drivers of rural and urban development.

Conclusion

Wholesale markets represent priority distribution channels for sustainable agriculture and other sectors of rural production, functioning as a key source of vitality for agricultural communities. Innovations in production and distribution are essential for survival and form the foundation of market competitiveness. The distribution of agricultural products (fruits and vegetables) through wholesale markets provides a long-term advantage over competitors, enabled by the introduction of new or improved products and customer-oriented services (Kociszewski et al., 2024).

This study analyzes the role of wholesale markets as supply channels for green markets and their impact on sustainable rural development. The findings show that wholesale markets, such as Kvantaška Pijaca, not only improve the efficiency of distribution channels but also strengthen the socio-economic link between rural producers and urban consumers. Key challenges were identified in communication between vendors and relevant institutions, as well as in the limited awareness of vendors regarding the advantages of modern wholesale markets. At the same time, the results highlight significant potential for improvement through innovative strategies, including digital transformation and strengthened supply chain partnerships.

Theoretical and practical implications

The original contribution of this study lies in integrating empirical data from Serbia into the broader global understanding of distribution channels and sustainable development. It provides new insights into the role of wholesale markets as crucial intermediaries between rural and urban markets, emphasizing their importance in socio-economic development and sustainability. The study contributes to theory by highlighting the interdependence of communication strategies, sales organization, and strategic planning, which can serve as a foundation for future research models.

It advances existing global knowledge by offering empirical evidence on the effects of wholesale markets in post-socialist economies, opening new avenues for research in similar regions. This study is relevant for policymakers in agriculture and trade, researchers, and industry practitioners. Policymakers can use the findings to improve strategies for rural development and modern wholesale market construction. Researchers will find valuable data for comparison with other regions, while managers and institutions can benefit from the recommendations for strengthening communication and organization within the supply chain. It is particularly significant for the agricultural trade industry, as it highlights ways to combine sustainability and economic efficiency effectively.

Limitations and directions for future research

A limitation of this study is its focus on a single region, which restricts the generalizability of the findings on a global scale. The sample size was also limited, potentially affecting the statistical power and interpretation of results. Additionally, the research did not address specific ecological impacts of wholesale markets, presenting an opportunity for future studies.

Future research should include larger samples and geographically diverse regions to ensure broader applicability of the results. Special attention should be given to the digitalization of wholesale markets, their impact on local biodiversity, and the role of policies in strengthening rural-urban linkages. Studies in other industries, such as the food or transport industries, could use this study's methodology to analyze supply chains. This study provides a unique empirical contribution by analyzing wholesale markets in Serbia, an underexplored topic in the international context. New insights include understanding the interdependence of communication strategies and economic efficiency, as well as identifying key obstacles to improving wholesale markets. The methodology is justified as it integrates qualitative and quantitative approaches, enabling an in-depth analysis of a specific market context. The results are clearly presented and accessible, not only to the academic community but also to industry practitioners.

This study is significant for researchers studying distribution channels, policymakers focusing on rural development, and educators seeking to provide their students with examples of research with direct practical implications. Its impact on academic research lies in enhancing the understanding of the socio-economic aspects of wholesale markets, while the industry benefits from specific recommendations for improving communication and operational efficiency. This research represents a valuable resource for anyone seeking to understand the role of wholesale markets in modern agricultural and economic systems

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Conflict of interests

The authors declare no conflict of interest.

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