INTEGRATION OF SUSTAINABLE INNOVATIONS IN AGRI-FOOD TRADE STRATEGIES AND THEIR IMPACT ON CONSUMER

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A R T I C L E I N F O	A B S T R A C T
	The aim of this paper is to examine the impact of sustainable innovations in agri-food retail on consumer satisfaction and the moderating role of retail store image. A quantitative survey with a structured questionnaire was conducted on 381 consumers. Data were analyzed using correlation, multiple regression, and moderation regression analyses in IBM SPSS Statistics. Results show that environmental sustainability, product and marketing innovations significantly affect consumer satisfaction. Findings suggest that managers can enhance competitiveness and resource efficiency by integrating sustainability into product and marketing innovations, especially for organic and sustainably sourced products. The study introduces novelty by analyzing retail store image as a moderator, providing insights into interdependent relationships that have been largely overlooked in existing literature. This research offers practical implications for strategic decision-making in agri-food retail, promoting sustainable practices and healthy consumer choices.

Introduction

The agri-food sector plays a crucial role in ensuring food security and generating economic benefits, particularly in developing countries. Due to the strong interconnection between agriculture and environmental sustainability, this sector represents an important

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driver of sustainable socio-economic development, whereby the implementation of sustainable innovations within agri-food trade strategies is becoming increasingly significant, as it affects both the competitiveness of the sector and consumer responses and satisfaction (Marković & Simonović, 2025). Food production represents a significant export potential of Serbia, but its full capacity has not yet been realized, whereby the improvement of business performance through sustainable innovations and modern agri-food trade strategies can further strengthen the competitiveness of the sector (Bešić et al., 2014, Pantović et al., 2026).

Sustainability entails the integration of values, beliefs, and practices aimed at the responsible use of social, economic, and environmental resources, whereby retail that aspires to sustainable development goes beyond financial considerations to include environmental stewardship and community well-being in its operations (Vadakkepatt et al., 2021). A sustainable mindset is a key factor in fostering innovation, serving as the basis for lasting and competitive solutions (Lalošević et al., 2013).

A trend has emerged toward the implementation of sustainable practices, with companies striving to actively reduce waste, minimize negative environmental impacts, enhance sustainable food sourcing, and promote a broader range of organic products (Wong, 2023). The increasing importance of sustainability is also discussed by Caccialanza (2024), who highlights a growing interest in its various aspects and dimensions, especially regarding its application within social and governance frameworks.

Recent research has shown a significant link between sustainable innovation and consumer satisfaction (Gil-Saura et al., 2023; Mazzioni et. al., 2021; Marin-Garcia et al., 2023; Fuentes-Blasco et al., 2017; Omri, 2020; Naidoo & Gasparatos, 2023; Milovanović et al., 2023). In this regard, the subject of the research in this paper is the consideration of the relationship between sustainable innovations in the agri-food retail sector and consumer satisfaction, with the focus on aspects of social, economic, environmental sustainability and product innovation, marketing innovation, process innovation on the one hand, and consumer satisfaction on the other. In addition, the moderating role of the image of the retail facility on the aforementioned relationship was also observed.

Based on the defined research subject, the main aim of this study is to examine the impact of sustainable innovations in agri-food retail on consumer satisfaction and to analyze the moderating role of retail store image in this relationship. Special emphasis is placed on assessing the synergistic effect of different sustainability dimensions and types of innovation on consumer satisfaction, as well as on determining whether retail store image strengthens or weakens this relationship through empirical analysis.

In examining the previous literature on agri-food retail, it was found that most studies have examined the effects of innovation and sustainability separately, while there is a small number of studies that examine the synergistic effect of innovation and sustainability, so it is not entirely clear how the combined effect of these two factors affects consumer behavior and satisfaction in the agri-food sector. In particular, Gil-

Saura et al. (2023) indicate that there are no clear explanations for the joint effect of innovation and sustainability on consumer perception and attitude towards retail and that the retail literature has not yet taken into account the synergistic effects that can arise from the analysis of innovation and sustainability from a holistic perspective.

Literature Review

Sustainability-oriented innovation in agri-food trade

Sustainability-oriented innovations in the agri-food sector are crucial for enhancing firm competitiveness and improving economic and social performance, as this is one of the most influential sectors in the country, contributing to national welfare, food security, and employment growth, while at the same time exerting pressure on the environment, thus posing an ecological challenge (Ponta et al., 2022). Furthermore, Ponta et al. (2022) emphasize that the improvement of sustainable practices in food production and consumption is of paramount importance, and that sustainability-oriented innovations and such an approach represent the main driver of the transformation of agri-food systems.

With the growth of the global population, there is an increasing need for a sustainable approach in the agri-food sector to reduce negative social, environmental, and economic impacts, as unsustainable practices in food production and consumption cause serious adverse effects, including greenhouse gas emissions, biodiversity loss, soil degradation, and pollution, while the use of GMOs poses additional environmental risks (Testa et al., 2022). Same, the growing global population and increasing demand for food highlight the need to transition from the traditional "productivist" model of agriculture to more sustainable agri-food systems, which integrate environmental and social dimensions, thereby promoting better resource management, reducing negative environmental impacts, and strengthening the role of local communities in decision-making (Jia, 2021).

Excessive industrialization of the agri-food sector often leads to environmental and social challenges, which is why sustainability-oriented innovations are considered a key instrument for balancing productivity with ecological and social sustainability (El Bilali, 2018). According to Schumpeter, innovation arises from new ideas and leads to the creation of economic value, and nowadays innovation is a key factor of competitiveness and success, where in addition to the economic dimension of innovation, the social and environmental dimensions are increasingly important, due to the growing need for rational use of resources and the creation of economically sustainable development, which can only be ensured through a combination of the above dimensions of innovation (Gao et al., 2017). Sustainable development is a paradigm designed as a model that will create a compromise between economic growth and the need to protect resources and the environment (Matešić, 2020).

Ottenbacher et al. (2019) point out that contemporary economic development is marked by rising levels of consumption, strain on natural resources, and disruption of ecological stability, while consumers increasingly realize how their actions impact the environment and recognize the seriousness of environmental challenges. This is precisely what further directs retailers to adapt their business strategy to the development and promotion of environmentally responsible products. Sustainability extends from global governance to consumer action groups, where companies recognize the benefits of engaging in sustainability, through improving performance and creating sustainable competitive advantage in the market, where sustainability is advancing from market niches to general awareness (Ritch 2020).

Vuković et al. (2025) indicate in their research that sustainable innovations encompass the development or significant improvement of products, processes, business models or management methods, aiming to achieve a positive impact not only on the economy, but also on society and the environment. Mazzioni et al. (2021) point out that process innovations represent an improved methods of delivering products to end consumers, using enhanced logistics, equipment, or techniques that contribute to more efficient business operations.

The aforementioned innovations at the organizational level require the implementation of strategic sustainability behavior, through the integration of the appropriate strategy into the organizational culture (Rodríguez-Espíndola et al., 2022). Retail can be seen as a service-oriented industry, which is subject to constant innovation and a very important factor of competitive advantage is information technology, which contributes to meeting consumer demand for innovative and qualitative products and services, as well as processes where the quality of service increases through increased consumer participation in these processes (Pantano, 2014).

For sustainable development, it is very important to adopt the principles and practices of sustainable consumption and production, and retailers play a key role in this by influencing and shaping consumer behavior and accordingly incorporating this approach into their business, especially in terms of environmentally-oriented strategies (Naidoo & Gasparatos, 2023). Berry et al. (2010) in their research point out that in retail, innovations in providing interactive services to consumers, through various marketing channels, are critical and represent the key to long-term success, with innovations in theory becoming innovations in practice when they lead to a change in consumer or retailer behavior. Sustainable practices influence the market to respect future generations, by reducing the harmful impact on the resources of the natural environment and by creating a positive impact on the community and society as a whole (Petersona et al., 2021).

Economic sustainability can be defined as the achievement of economic sustainable growth, efficiency and rational allocation of resources, while social sustainability is moderated by respecting communities and improving the quality of life, and finally environmental sustainability refers to the rational and responsible use of natural

resources (Mladenović-Sokolov 2017). These are precisely the aspects of sustainability that will be observed in this research. Moreover, given that retail has a huge share in the economy, this further indicates the importance of observing sustainable innovations in this sector.

The influence of sustainable innovations in agri-food retail |n consumer satisfaction

Research by Ponta et al. (2022) shows that sustainability-oriented innovations in the agri-food sector positively impact firm economic performance, and that joint patent development can further enhance this relationship. In the agri-food sector, such innovations involve the integration of technical, production, social, and organizational dimensions, as only through this holistic approach can innovations support the transformation of the system by increasing production, promoting social equity, and engaging local communities (El Bilali, 2018).

A study by Gil-Saura et al. (2023) examined the impact of the SOCI model (which includes six basic components: economic sustainability, social sustainability, environmental sustainability, product innovation, marketing innovation, and relationship innovation) on consumer satisfaction, and the results confirmed the direct impact of the SOCI model on consumer. Mazzioni et al. (2021) showed that process and organizational innovations, which improve products and technology, indirectly contribute to social and environmental sustainability through enhanced organizational performance, where organizations with better performance apply sustainable practices in the pursuit of global corporate sustainability.

The results of a study conducted by Marin-Garcia et al. (2023) in Spain on consumers of food retail establishments show that technological innovations strengthen sustainability and that sustainability is a very important factor in the image and loyalty of a retail establishment, with the intensity of these relationships varying depending on the commercial format. In this study, technological innovations from the consumer perspective are observed through product innovations, as the most visible element of technological innovations, through the introduction of new products or variations of existing products that meet consumer needs.

Fuentes-Blasco et al. (2017) conducted a study and the results obtained showed that both technological innovations and marketing innovations enable the improvement of the image of a retail facility as perceived by consumers and that the image of the facility is the factor that influences consumer satisfaction the most, and satisfaction is a significant factor that precedes word-of-mouth. According to Omri (2020), technological innovations primarily support economic, social, and environmental development in developed countries, while in middle-income countries they mainly affect the economic and environmental aspects, whereas their impact in low-income countries has not been clearly demonstrate.

Naidoo & Gasparatos (2023) conducted a study and the results obtained showed that consumers have a positive attitude towards different approaches to sustainability, with recycling being the most noticeable strategy. However, they point out that this may not always lead to sustainable consumer behavior and that the socio-demographic characteristics of consumers influence their lifestyle, which can further influence their perception of sustainably oriented innovations. Zlatanović et al. (2022) shows that the environmental aspects of corporate social responsibility have a statistically significant impact on organizational performance. The research by Milovanović et al. (2023) demonstrated that adopting a comprehensive environmental strategy helps align both social responsibility and marketing strategies, which in turn enhances the organization's environmental accountability and supports the attainment of a sustainable competitive advantage over the long term.

Prdić et al. (2025) confirm the importance of wholesale trade as a primary factor in the marketing of agricultural products and indicate that innovations in production and distribution processes are essential for the competitiveness and sustainability of this sector. This is an important implication given the growing consumer orientation towards organic agricultural products. This paper explores the hypotheses outlined below:

H1: Social sustainability has a positive and statistically significant impact on consumer satisfaction.
H2: Economic sustainability has a positive and statistically significant impact on consumer satisfaction.
H3: Environmental sustainability has a positive and statistically significant effect on consumer satisfaction.
H4: Product innovation has a positive and statistically significant effect on consumer satisfaction.
H5: Marketing innovation has a positive and statistically significant effect on consumer satisfaction.
H6: Process innovation has a positive and statistically significant effect on consumer satisfaction.

The moderating role of retail store image

Image management is an important strategic task. Amgad et al. (2021) represent image as the perception and identity of a retail store in the mind of consumers based on previous tangible and intangible experience, highlighting a number of factors that influence image creation, such as atmosphere, product display, assortment, prices, quality of service provision, etc. The study also showed that technological innovations play a more significant role than marketing innovations in influencing customer satisfaction, and the retail store's image was identified as the strongest determinant of consumer satisfaction.

Thomas (2013) demonstrated that retail store image has a positive and statistically significant impact on customer loyalty, mediated by customer satisfaction. The

study indicates that store image can influence the choice of a particular retail store by reducing perceived purchase risk, shaping the overall customer experience, and subsequently affecting satisfaction. Bashir & Amir (2019) in their research indicate that the implementation of sustainable practices in terms of social, economic and environmental perspectives contributes to the creation of a better image, which can further affect consumer attraction and satisfaction. In addition, they point out that image can have an indirect effect between socially responsible behavior (which implies the implementation of sustainable practices) and satisfaction.

Research conducted by Ahn & Seo (2015) on a sample of 371 respondents showed that social responsibility in sustainability management (economic, social and environmental sustainability through innovation) has a statistically impact on the image of the facility and behavioral intention, which indicates the positive effect that sustainable practices have on the development of the image of the facility from the consumer perspective.

Based on the literature review, we can conclude that there is a high degree of interdependence between image, sustainable innovations and satisfaction. It is clear that sustainable innovations affect consumer satisfaction, through the creation of an adequate image of a retail facility, which can significantly affect consumer perception of the facility itself. It is more common to observe how sustainable practices affect image, and then how image further affects consumer satisfaction and loyalty, with a positive relationship emerging here. In this study, image is positioned in the model as a moderator, precisely because it is useful to see whether the relationship between sustainable innovations and consumer satisfaction changes depending on the quality of the retail facility's image. Accordingly, another hypothesis was defined:

H7: The image of a retail store represents a factor that conditions the relationship between sustainable innovations and consumer satisfaction.

Materials and methods

In order to examine the impact of sustainable innovations in agro-food retail on consumer satisfaction, the empirical research used a survey method to collect primary data. A questionnaire was developed containing relevant statements to assess sustainable innovations in retail and consumer satisfaction. The degree of agreement of the respondents with these statements was measured using a Likert scale. Based on a review of the extensive literature dealing with this area, the selection and adaptation of questions (statements) was carried out, which resulted in the design of a research questionnaire (Gil-Saura et al., 2023; Marin-Garcia et al., 2023; Khalid et al., 2023; Fuentes-Blasco et al., 2017; Nikolić et al., 2022; Zlatanović et al., 2022).

The questionnaire was distributed electronically, and the responses to the questionnaire were collected using a convenience sample of 381 respondents (*Table 1*). The data were collected in the period from 25 November 2025. to 18 December 2025. in the territory of central Serbia.

Table 1: Profile of study participants

RESPONDENT PROFILE		Numerically	%
GENDER	Female	237	62,2%
	Male	144	37,8%
AGE	18-25	57	15%
	26-35	151	39,6%
	36-50	85	22,3%
	51+	88	23.1%
EDUCATION	Elementary	0	0%
	Middle	136	35,7%
	Higher	245	64.3%
RETAIL FORMAT	Supermarket	152	39,9%
	Hypermarket	229	60,1%

Source: Author's research

Statistical analysis of the data was conducted using IBM SPSS software. Reliability analysis was used to determine the reliability of variables, i.e. the internal consistency of the statements through which they were measured, followed by correlation analysis to determine the degree of linear dependence between the formed variables of sustainable innovations. Regression analysis was used to determine the impact of sustainable innovations in retail on consumer satisfaction, and moderation regression analysis was used to examine the moderating role of the image of the retail facility.

Results

Results are the third section of an IMRAD paper. Its purpose is to present the new information gained in the study being reported. It should be clear and concise. The Results are core of the paper. You shouldn`t start the Results section by describing methods that you inadvertently omitted from the Materials and Methods section. The Results must be writing in past tense.

The results of the reliability analysis were satisfactory for all observed factors, except for the one related to economic sustainability. The Cronbach's alpha coefficient for this factor was 0.600, indicating questionable internal consistency. As a result, this factor was excluded from further analysis, leading to the rejection of hypothesis H2. The results of the reliability analysis are shown in *Table 2*.

Table 2: Results of factor analysis

FACTORS	CRONBACH'S ALPHA
Social Sustainability	0.715
Environmental Sustainability	0.771
Economic Sustainability	0.600

FACTORS	CRONBACH'S ALPHA
Product Innovation	0.790
Marketing Innovation	0.782
Process Innovation	0.780
Retail Store Image	0.753
Satisfaction	0.718

Source: Author's research

The research also included a correlation analysis and the results obtained show that the positive correlation values obtained between the observed factors are statistically significant at the 0.01 level, i.e. with a probability of 99%, except for the correlation between the retail store image factor and satisfaction, where the value is statistically significant at the 0.05 level, i.e. with a probability of 95%. A strong positive statistically significant linear correlation is present between the following factors: process innovation and marketing innovation (r=0.776, p<0.01), product innovation and marketing innovation (r=0.705, p<0.01), product innovation and process innovation (r=0.694, p<0.01), marketing innovation and satisfaction (r=0.658, p<0.01), product innovation and satisfaction (r=0.625, p<0.01). The weakest positive statistically significant linear correlation is present between satisfaction and the image of the retail facility (r=0.112, p<0.05).

Table 3: Results of correlation analysis

FACTOR	1	2	3	4	5	6	7
1	1	0.346**	0.348**	0.553**	0.318**	0.298**	0.437**
2	0.346**	1	0.202**	0.214**	0.161**	0.240**	0.173**
3	0.348**	0.202**	1	0.705**	0.694**	0.304**	0.625**
4	0.553**	0.214**	0.705**	1	0.776**	0.431**	0.658**
5	0.318**	0.161**	0.694**	0.776**	1	0.390**	0.526**
6	0.298**	0.240**	0.304**	0.431**	0.390**	1	0.112*
7	0.437**	0.173**	0.625**	0.658**	0.526**	0.112*	1

Note: 1 - Environmental sustainability; 2 - Social sustainability; 3 - Product innovation; 4 - Marketing innovation; 5 - Process innovation; 6 - Retail store image; 7 – Satisfaction
** Significance at the p < 0.01 level
* Significance at the p < 0.05 level

Source: Author's research

Based on the results of the regression analysis (*Table 4*.), it is concluded that 49.6% of the variability of satisfaction is described by this regression model, i.e. under the influence of these factors of sustainable innovations in trade (coefficient of determination $R^2=0.496$), while 50.4% of the variability of the dependent variable is described by other factors that are not included in this regression model. It should be noted that the value of this coefficient is significant at the 0.01 level and that multicollinearity does not exist in the analysis.

The regression analysis determined that environmental sustainability has a statistically significant positive impact on satisfaction (β=0.122, $p < 0.05$), which confirms hypothesis H3. In addition, multiple regression analysis showed that product innovation (β=0.349, $p < 0.01$) and marketing innovation (β=0.391, $p < 0.01$) have a statistically significant positive impact on consumer satisfaction, thus confirming hypotheses H4 and H5. Marketing innovation has a greater impact on consumer satisfaction, as shown by the higher beta coefficient value, followed by product innovation. On the other hand, it was found that social sustainability does not have a statistically significant impact on consumer satisfaction ($p > 0.05$). This rejects hypothesis H1. Hypothesis H6 is also rejected, as regression analysis showed that process innovation does not have a statistically significant impact on consumer satisfaction.

The results of the multiple regression analysis show that incorporating environmental sustainability through product innovation and marketing innovation can lead to a synergistic effect, leading to numerous benefits that can go beyond consumer satisfaction and lead to the creation of consumer loyalty, which is precisely the goal of every retailer, as they are the source of profitability. Accordingly, Naidoo and Gasparatos (2023) emphasize in their study that retailers are primarily focused on environmental issues, which corresponds to the environmental sustainability dimension confirmed in this research.

Table 4: Multiple regression analysis

VARIABLE	SATISFACTION			
	B	T	P	VIF
Social Sustainability	-0.014	-0.360	0.719	1.149
Environmental Sustainability	0.122	2.596	0.010	1.644
Product Innovation	0.349	6.353	0.000	2.246
Marketing Innovation	0.391	5.465	0.000	3.816
Process Innovation	-0.057	-0.900	0.369	2.945
R^2 = 0,496; F = 73.938 ($p < 0,01$)				

Source: Author's research

To examine the image of a retail facility as a factor that conditions the relationship between sustainable innovations and consumer satisfaction, a moderator analysis was conducted (Table 5), in which the coefficient of determination is statistically significant and amounts to 0.574, with the VIF value also being within the permissible range (> 10). The moderation regression analysis showed that image has a statistically significant negative moderating effect on the relationship between social sustainability and satisfaction (p=0.001 < 0.01), (β=-0.455). This means that image has a moderating role, i.e., by strengthening the image of a retail facility, the relationship between social sustainability and consumer satisfaction weakens (for example, if a retail facility does not fully adapt to the needs of society, consumers will still be satisfied due to a strong image).

Same effect also occurs on the relationship between environmental sustainability and satisfaction (p=0.001 < 0.01), (β=-0.148). This further means that by strengthening the image of a retail facility, the relationship between environmental sustainability and consumer satisfaction weakens (for example, if a retail facility does not use materials that contribute to sustainable development, consumers will still be satisfied due to the strength of the existing image).

The results obtained further showed that image has a positive statistically significant moderating role in the relationship between marketing innovation and consumer satisfaction (p=0.001 < 0.01), (β=0.506). This indicates that by strengthening the image of a retail outlet, the relationship between marketing innovation and consumer satisfaction also strengthens. In the other relationships between product and process innovation on the one hand and consumer satisfaction on the other hand, image does not have a moderating role (p > 0.1), i.e. the quality of the image does not affect the strength of the aforementioned relationships.

Hypothesis 7 is accepted when it comes to the relationship of integration between social and environmental sustainability and marketing innovations on the one hand, and consumer satisfaction on the other. In other cases, the moderating influence of image on the observed relationships was not confirmed.

Table 5. Moderation regression analysis

VARIABLE	SATISFACTION			
	B	T	P	VIF
Social Sustainability	-0.024	-0.631	0.528	1.274
Environmental Sustainability	0.221	4.566	0.000	2.028
Product Innovation	0.216	4.026	0.000	2.492
Marketing Innovation	0.426	6.190	0.000	4.105
Process Innovation	-0.143	-2.409	0.017	3.046
Image * Social Sustainability	-0.455	-6.342	0.000	4.460
Image * Environmental Sustainability	-0.148	-2.902	0.004	2.266
Image * Product Innovation	0.065	0.838	0.402	5.283
Image * Marketing Innovation	0.506	4.975	0.000	8.984
Image * Process Innovation	-0.031	-0.416	0.678	4.868
$R^2 = 0,574$; F = 49.828 (p < 0,01)				

Source: Author's research

Discussions

The analysis of the results showed that environmental sustainability has a statistically significant positive impact on consumer satisfaction. This finding suggests that consumers have a more favorable perception of agri-food retail outlets that align their operations with environmental principles, particularly when offering sustainably produced and organic agricultural products, which are often associated with higher quality and safety standards. Such practices not only meet consumer expectations but also support rural development and local farming communities. On the other hand, social sustainability does not have a statistically significant direct impact on consumer satisfaction. However, it may indirectly enhance the consumer experience by fostering a positive image of the retail outlet, especially in communities where social responsibility and support for local producers are increasingly valued.

Product innovation has a statistically significant positive impact on consumer satisfaction, within the agri-food retail sector. This indicates that product innovation affects consumer satisfaction by improving the consumer experience, by solving a specific problem that contributes to satisfying a need, such as the demand for sustainably produced, organic or locally sourced food, by prestige and status, and by influencing consumer emotion (e.g., excitement) that leads to the need to try something new. In addition, regression analysis showed that marketing innovation has a statistically significant positive impact on consumer satisfaction, which further indicates that consumers are very sensitive to various promotions and marketing tricks, including transparent communication of product origin, sustainability labels and certifications, as well as the great influence of loyalty programs. All of this is related to price, and price is one of the most important factors in making a purchase decision, particularly when purchasing food products, and in addition, the marketing mix ensures differentiation in the market and competitive advantage for agri-food retail outlets.

Research has shown that process innovation does not have a statistically significant impact on consumer satisfaction, particularly in the agri-food retail context, which can be explained by the fact that consumers better perceive and remember tangible elements that provide a direct and quantitative result, such as a product that is tangible and directly satisfies a specific need, including food quality, freshness, safety, or sustainability attributes, or marketing innovations, where promotions, for example, discounts, free packaging and other methods of improving sales or loyalty programs, directly affect consumer satisfaction, which can also lead to the creation of consumer loyalty (Isse, 2019; Triyadi, 2020). On the other hand, process innovations are less tangible for consumers, especially when related to internal operations in agri-food retail, where if there is no direct benefit from it, then consumers perceive that innovation less well. Certainly, process innovation is more visible to retailers themselves, as it can improve and accelerate numerous processes, such as logistics processes, with the help of technological processes, which further leads to lower costs, reduced food waste and a sustainable approach to business.

Image as a moderator in trade, affects consumer satisfaction differently. Namely, a well-built image reduces the effect of social and ecological sustainability on satisfaction, because consumers already have a positive perception and expect such values, and even if the activities in these domains are not at a high level, this does not change the consumer's opinion. On the other hand, a strong image strengthens the impact of marketing innovations such as personalized offers, loyalty programs, mobile applications and the like on satisfaction. Consumers directly evaluate product and process innovations, without the influence of image perception.

Conclusions

The goal of every retailer is to achieve consumer satisfaction and loyalty, which increasingly depends on the ability to implement innovative solutions aligned with sustainable practices. Such an approach is particularly relevant in the context of agri-food retail and agricultural products, where consumers show growing interest in the origin, quality, and ecological footprint of what they buy. By integrating sustainability into innovations within the agri-food sector - whether through environmentally friendly packaging, support for local producers, or promotion of organic and sustainably sourced food - retailers can contribute not only to environmental protection and social responsibility but also to the creation of added value for consumers. As emphasized throughout the paper, adapting business strategies in agri-food retail to the principles of social, economic, and environmental sustainability is essential for long-term success and for supporting sustainable agricultural and economic development.

The theoretical contribution of the work is reflected in the acquisition of new knowledge in the field of consumer behavior and is reflected in the elimination of the observed gap in the literature. Previous research indicates that there are no clear explanations for the joint effect of innovation and sustainability on consumer perception and attitude towards retailing, particularly within the agri-food retail sector, and that the literature dealing with retailing has not yet taken into account the synergistic effects that may arise from the aforementioned relationship, but previous research tends to look at these two factors separately. In this regard, this research contributes to a better understanding of the synergistic effect between sustainability and innovation in the context of agri-food products on consumer satisfaction. In addition, there are few studies that test the moderating role of image in the relationship between sustainable innovations and consumer satisfaction in agri-food retail outlets. Previous research has mainly focused on examining main, rather than interaction effects, and has mainly examined the impact of sustainable practices on the image of a retail outlet, and then how this further affects satisfaction. Based on this, the originality of this research lies in examining how the image of a retail facility moderates the relationship between sustainable innovations and consumer satisfaction. This is particularly significant given the limited number of studies, both domestic and international, that have explored this topic.

The paper also provides some practical implications that may be useful for marketers and retail managers, businesses, consumers, and future research on this or similar

topics. The research highlights the importance of sustainable innovations for consumer satisfaction, especially in the agri-food retail sector. Creating business success and sustainable competitive advantage today requires the existence of satisfied and loyal consumers, which can be achieved through the incorporation of sustainability into innovations, so as to achieve a long-term strategic effect. However, a prerequisite for creating consumer satisfaction is knowing the needs and attitudes of consumers regarding sustainable innovations, i.e. which sustainable innovations have a statistically significant impact on their purchase intention. The results of this research have identified that the integration of environmental sustainability and product innovation and marketing innovation, through their synergistic effect, have a statistically significant impact on creating consumer satisfaction, which may enable retailers in the agri-food sector to invest more and focus on the aforementioned relationship in future business. This would lead to numerous benefits such as attracting and satisfying consumers who value sustainable agri-food products and services, strengthening the competitive position in the market and strengthening the image, rational use of resources and minimizing costs, which contributes to economic sustainability.

Given that the results showed that image has a positive moderating role in the relationship between marketing innovation and consumer satisfaction, this further indicates the great importance of marketing innovation and that retailers should pay special attention to it, i.e. focus their business strategy on marketing innovations.

The study faces certain constraints. First, the scope of the sample was not broad enough, which may limit the depth of the analysis. Second, the research area was geographically narrow, covering only central Serbia. Additionally, the focus was limited to only three types of innovation, leaving out other potentially relevant categories.

Future research directions arise from the above limitations. The research could be conducted over a longer period of time, or in multiple time series on a larger sample. In addition, the research could be repeated in other parts of the Republic of Serbia, but also outside the borders of Serbia, and then conduct a comparative analysis of the effectiveness of sustainable innovations aimed at consumer satisfaction both in our country and in neighboring countries. In addition, future research could include other types of innovations in the research, such as technological innovations or relationship innovations, and it is proposed to include the economic dimension of sustainability in the regression model. Future research could focus on observing the impact of sustainable innovations on consumer loyalty, which could be interesting, because satisfaction precedes loyalty, but does not necessarily lead to it.

Conflict of interests

The authors declare no conflict of interest.

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