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Original Scientific Article

Exploring Sustainable Agritourism and Emerging Technologies in Society 5.0

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Abstract: *As society continues to evolve, so does our relationship with the environment, technology, and the way we engage with our surroundings. The concept of Society 5.0 envisions a harmonious fusion of technology and human-centric solutions to address societal challenges. This paper explores the transformative role of emerging technologies in sustainable agritourism. This exploration highlights the symbiotic relationship between technological innovation and sustainable agritourism, presenting a forward-looking view of how these intertwined elements can shape the future fabric of Society 5.0. The study presents a comprehensive overview of the transformative potential of sustainable agritourism in the context of Society 5.0, offering insights into the future of responsible and technology-driven rural tourism. The convergence of sustainable agritourism and emerging technologies within the context of Society 5.0 represents a promising path toward a more sustainable and technologically enriched future.*

Keywords: *Society 5.0, Sustainable, Emerging technologies, Agritourism.*

JEL Classification: Q01 · Q13 · O33 · L83 · L97

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1. INTRODUCTION

Since the beginning of the 21st century, humanity has been undergoing complex innovative transformations that activate the era transition to a new socio-economic process. Thus, the development of human civilization is related to the constantly changing economic formations, and the current social and economic situation is determined by concepts such as Society 5.0 and the fourth and fifth industrial revolutions (Melnyk, L.H. et al., 2019). The global landscape has entered a transformative era marked by the sweeping forces of globalization and the swift advancement of digital technologies. Disruptive technologies, like the Internet of Things (IoT), Big Data (BD), Artificial Intelligence (AI), robotics, 3D printing, Cloud Computing (CC), Mobile Devices (MD), and others, are propelling substantial shifts in both business and society. This dynamic interplay is forging an entirely novel environment, heralding significant changes and opportunities on a profound scale. Strategies for industrial modernization should prioritize placing people and the societal needs at the forefront.

Society 5.0 defines a system of systems (such as energy management and road transport systems, among others) that connect to the Internet for the mitigation of both local and global social problems (such as the reduction of carbon emissions). This new concept of society aims to focus on the human to balance the deployment of Big Data Technologies, the Internet of Things, and Artificial Intelligence with the resolution of major problems of society such as: competitiveness, productivity, connection and wellbeing, all these on the basis of achieving the maximization of human use of the ongoing technological transformation, digitization (Narváez Rojas et al., 2021).

Recently discussed concept of Society 5.0 (S5.0) and Industry 5.0 (I5.0) (Carayannis, 2021; Carayannis & Morawska-Jancelewicz, 2021; Breque et al., 2021; Fukuyama, 2018) highlights the need to rethink existing working methods and approaches towards innovation and to focus them on developing human-oriented solutions and social innovation (Morawska-Jancelewicz, 2022). While Society 5.0 is a broad concept focusing on the integration of digital technologies to address societal challenges, it can be applied in various sectors, including agritourism. Agritourism involves the intersection of agriculture and tourism, providing visitors with authentic agricultural experiences. Society 5.0 and Industry 5.0 both reflect fundamental shifts of societies and economies towards a new paradigm to balance economic development with the resolution of social and environmental problems and to tackle challenges associated with human–machine interactions and skills matching (Breque et al., 2021). In this new paradigm, the importance of knowledge is not determined exclusively by competitiveness and productivity, but by taking into account the creation of social well-being, the impact on the quality of life, and co-creation of knowledge as part of public–private partnerships (Morawska-Jancelewicz, 2022, p. 3). If industry should become the provider of true prosperity, the definition of its true purpose must include social, environmental, and societal considerations (Breque et al., 2021, p. 15). It also stresses that even the most advanced technology should not be above humanity (Sułkowski et al., 2021).

What prompts the decision to embrace the trajectory of Society 5.0? This choice is driven by the distinct attributes of agritourism, which is intricately linked to a community defined by its norms, values, beliefs, and expectations for heightened well-being. This community stands to gain from the human-centred societal approach. Agritourism materializes through the active participation of the community, ultimately serving its well-being. The paper delves into the integration of technology and examines how it is perceived in relation to sustainability. *Society 5.0 is a kind of bond between changes taking place in the technology, digital, and information flow areas and focuses its activities on the concept of sustainable development of societies* (Sułkowski et al., 2021, p. 4).

In other words, the vision of Society 5.0 requires us to think about two kinds of relationships: the relationship between technology and society and the technology-mediated relationship between individuals and society (Society 5.0: A people-centric super-smart society, 2018, p. 5).

Through this study, we aim to shed light on the challenges and opportunities faced by agritourism pensions in embracing technology. The insights gained will not only contribute to the existing knowledge base but also provide valuable recommendations for stakeholders, including pension owners, local authorities, and technology providers.

The Tourbit project (2022) was selected as a reference framework due to its alignment with EU strategies promoting digitalization in tourism SMEs. The project's Digital Readiness Index, developed by Arctur d.o.o., serves as a validated online tool for evaluating the maturity of digital adoption across multiple dimensions such as infrastructure, marketing, operations, and innovation. Its structured metrics provided a relevant benchmark to assess the digital capabilities of agritourism businesses in this study.

2. MATERIALS AND METHODS

The primary aim of this study is to unravel the layers of technology usage, examining the challenges faced and opportunities seized by agritourism pensions in embracing digital advancements. This study analyzes the current digital readiness level using two main areas: technology usage and capacity of the organisation in 50 agritourism pensions, but only 25 answered all the questions completely. For our analysis we use Tourbit project (2022). Digital readiness index (Software by Arctur d.o.o.) [Online tool]. The core of the Digital Readiness Index (DRI) is based on a multi-attribute decision-making (MADM) methodology that allows evaluation, analysis, and comparison of individual tourism SMEs. In Table 1 are presented the three main topics for technology usage and capacity of the organization from different questions concerning digital tools and the organizational culture.

Table 1. Main topics from different questions for the digitalization level

Technology usage	**Capacity of the organisation**:
Internal operations/management • Technologies for internal management • The digital workplace • Cloud computing • Blockchain • Internet of Things (IoT) • Cybersecurity • Data analytics	**Informatics policy** • Digitalization strategy • Data management • Share of investment
Customer management • Social media • Technologies for relations with customers • Mobile business for customers • Digital channels • Customer acquisition	**General strategy** • Education and training • Key personnel management • Digital competences • Agility • Method of management • Method of decision making • Propensity to take risk
Product/service development • Value proposition • Relations with suppliers and partners • Revenue/costs • Virtual Reality (AR and VR)	**Organizational culture** • Informatics • Engagement • Accepting changes • Employee autonomy • Open communication

Source: Own research

After that it will be positioned like: beginner, intermediate, proficient, expert. The second dimension is capacity of the organization, aggregated results of all questions present in the tool's Capacity of the organisation section. It integrates the results of different questions concerning the organisational culture and the readiness of the company to take steps towards digitalisation. It is comprised of 3 main topics: informatics policy, general strategy, and organisational culture. By the end, we have a conclusion such as 'not yet ready,' 'promising,' 'in the process,' or 'front-runner.'

In the study, we also used an exploratory qualitative research based on interviews to evaluate the opinion of entrepreneurs regarding the positive and negative effects of digitalisation in agritourism on three levels: economic, social, and environmental.

The study employed purposeful sampling, targeting owners and managers of agritourism businesses in Gorj County, Romania. A total of 25 participants were selected based on their active involvement in tourism-related rural activities and their willingness to engage in discussions about digitalization. This sample size was considered adequate for an exploratory case study aiming to gather both quantitative and qualitative insights.

The use of the Digital Readiness Index developed within the Tourbit Project (2022) was chosen due to its structured evaluation framework specifically designed for tourism SMEs. This tool enabled the identification of digital maturity levels across multiple dimensions such as infrastructure, marketing, and operations. Its standardized indicators provided a reliable basis for comparing results across respondents.

Complementing the questionnaire, semi-structured interviews were conducted to gather deeper, context-rich information. This qualitative method was selected to allow participants to express their experiences, perceptions, and expectations regarding digital transformation—adding interpretive depth to the structured survey findings.

Quantitative data were processed using descriptive statistical methods (mean, frequency, and percentage analysis), while qualitative responses were analysed thematically, combining deductive coding based on research questions and inductive coding to capture emerging patterns. This methodological triangulation enhances the validity and credibility of the results. The structured questionnaire used in this study was adapted from the **Digital Readiness Index** developed within the *Tourbit Project (2022),* an EU initiative aimed at supporting digital transformation in tourism SMEs. The questionnaire consisted of both closed-ended and open-ended questions, targeting four key dimensions:

1. Current use of digital tools,
2. Perceived benefits of digitalization,
3. Barriers to adoption,
4. Support needs for digital transformation.

We used an interview guide, and the answers were formulated on a 5-point scale, ranging from strongly disagree to strongly agree.

The research objectives guiding this study are:

1. To assess the level of digital readiness among agritourism stakeholders.
2. To explore the perceived benefits and barriers to digitalization in agritourism.
3. To identify support needs for digital transformation in line with Society 5.0 principles.

These objectives are addressed through a mixed-methods approach, combining quantitative assessment using the Digital Readiness Index and qualitative interviews.

3. RESULTS AND DISCUSSION

Determining the Digital Readiness Index allowed the identification of the stage of digitalisation for the studied pensions. As an example, Figure 1 presents the stage of digitalisation for one of the agritourism pensions from our study.

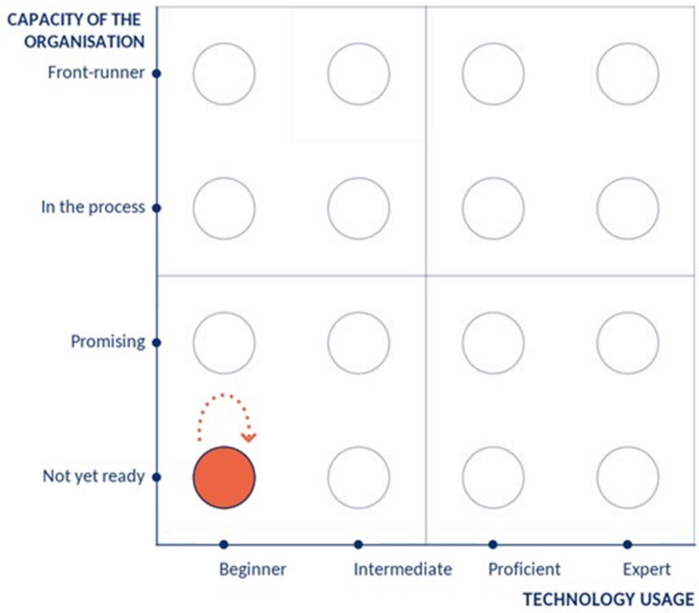

Figure 1. Example of a graph for stage of digitalisation for the agritourism pension
Source: Own research

The graph indicates the digital readiness of the agritourism pension based on two areas, the technology usage and the capacity of the organisation, using the position and the colour of the circle. The recommendations are to improve the digital level. Our focus was on deciphering the varying degrees of technological integration within agritourism pensions.

Understanding the distribution of technology usage is pivotal in shaping the narrative of how these establishments navigate the evolving demands of the digital era. Before delving into percentage calculations and identifying their implications, it's essential to recognize the diverse nature of agritourism pensions. Factors such as size, resources, and the adaptability of each establishment contribute to a nuanced technological landscape. This study seeks to provide a comprehensive overview. By calculating the percentages of pensions at different technology proficiency levels, we aim to draw meaningful conclusions that can guide stakeholders, policymakers, and individual agritourism entrepreneurs. These insights are not just numbers; they represent the potential for growth, collaboration, and sustainable development within this unique sector.

The collected data is used to quantify the levels of technology usage among agritourism pensions and extract valuable insights that pave the way for a more informed and technologically empowered future for these rustic havens. We calculate the percentages of technology usage levels among the agritourism pensions, we can count the number of occurrences for each level and then express it as a percentage of the total number of pensions.

Dominance of Beginner Level: a significant majority, approximately 56%, of agritourism pensions from our study are at the beginner level of technology usage (Figure 2). This suggests a prevalent need for further adoption and integration of technology in these establishments. Around 20% of agritourism pensions have reached an intermediate level of technology usage. While not the majority, this indicates a moderate level of tech-savviness among a portion of the establishments. Both the proficient and expert levels exhibit a similar percentage, each comprising 12% of the total. This suggests that a comparable number of agritourism pensions have achieved a higher level of technology proficiency, showcasing a balanced distribution in the more advanced tiers.

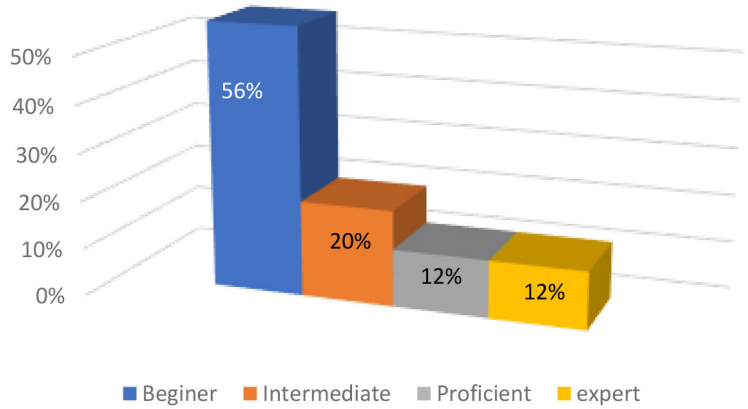

Figure 2. Graph of the level of technology usage in agritourism pensions from the county Gorj
Source: Own processing

A significant portion, accounting for 36%, of agritourism pensions is currently in the process of enhancing their organizational readiness (Figure 3). This suggests a widespread movement toward embracing technological and organizational advancements. A substantial 32% of pensions indicate that they are not yet ready for advanced technological adoption. This presents an opportunity for targeted interventions and support to elevate their organizational capacities. While 24% of pensions are deemed promising, signifying an initial level of preparedness, this category may indicate establishments with the potential to lead in technological adoption with the right support and resources. A small but noteworthy 8% of agritourism pensions are identified as front-runners, indicating a high level of organizational readiness. These establishments could serve as exemplars for others in the industry.

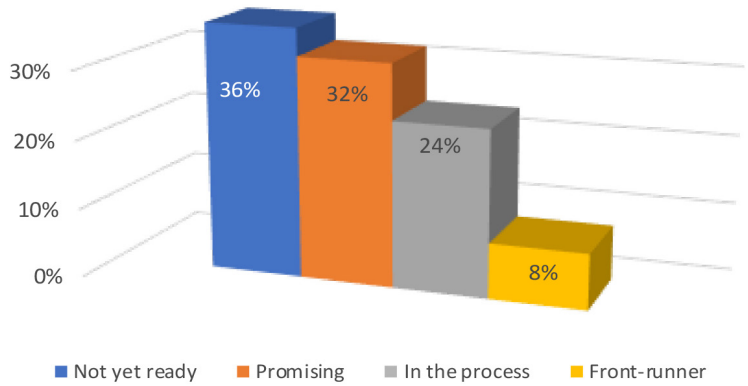

Figure 3. Graph of the level of capacity of the organisation in agritourism pensions
Source: Own processing

Emphasise that the potential of social innovation is further increased by the availability and accessibility of new emerging tools and technologies like AI. This IT-enabled or digital social innovation can help to digitalise social services processes and to make them more proactive, and more goal-oriented and needs-driven. They also promote direct engagement of citizens in the whole social services process design and management. In other words, (digital) social innovation can become the real driver of social change, thus promoting also equality and shared prosperity (Misuraca & Pasi, 2019).

Following the processing of the data collected as a result of the exploratory qualitative interview-based research, we can observe that, regarding the positive effects to be generated by the development of agritourism activities in the area through digitization, the majority of respondents are of the opinion that they will not be late to defend. Talking about the positive effects that will be registered at the economic level, 37% of the respondents place their answers in the „totally agree" area, 40% in the „agree" area, 14% in the „neither agree nor disagree" area, 3% in the „disagree" area „, and 1% are in the „totally disagree" area, the situation being similar for the positive effects that will be felt at the social level, so that 32% of respondents place their answers in the „totally agree" area, 43% in the „agree" area, and 21% in the area „neither agree nor disagree", 3% „disagree", and 4% „totally disagree" (Figure 4). In relation to the positive effects that will be felt at the level of environmental protection, and here it can be observed that the entrepreneurs are of the opinion that they will exist, 36% of the answers being placed in the „totally agree" area, 35% in the „agree" area, 21 % are undecided, placing the answers in the „neither agree nor disagree" zone, and 8% are more pessimistic, considering that they will not exist.

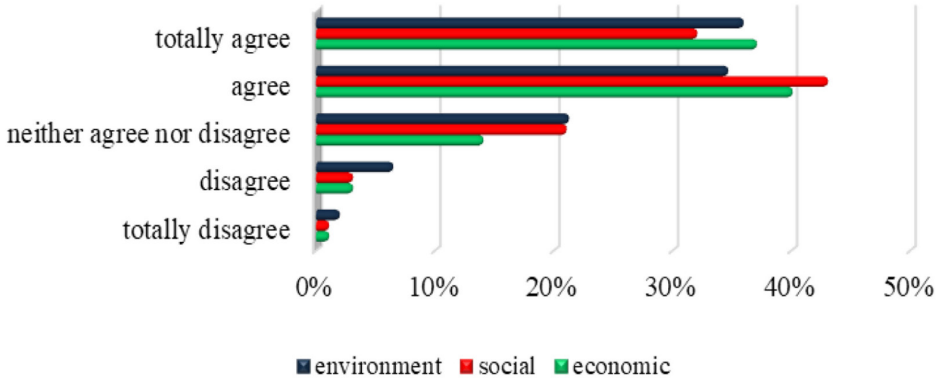

Figure 4. Positive effects as a result of the development of agritourism
Source: Own processing

Analyzing the possibility of the appearance of negative economic effects following the development of agritourism in the area, we notice that the majority of entrepreneurs of agritourism pensions interviewed place the most answers in the "disagree" area, namely 82%, 5% are "totally disagree", and 12% are found in the "neither agree nor disagree" range.

In relation to the negative social effects, the trend is maintained, 78% of the interviewees place themselves in the "disagree" area, 5% in the "totally disagree" area, and 17% in the "neither agree nor disagree" area, the situation being similar for the negative effects as well related to environmental protection as a result of the development of agritourism tourism with 77% of the interviewed population placed in the "disagree" area, 4% in the "totally disagree" area, and 19% in the "neither agree nor disagree" area (Figure 5).

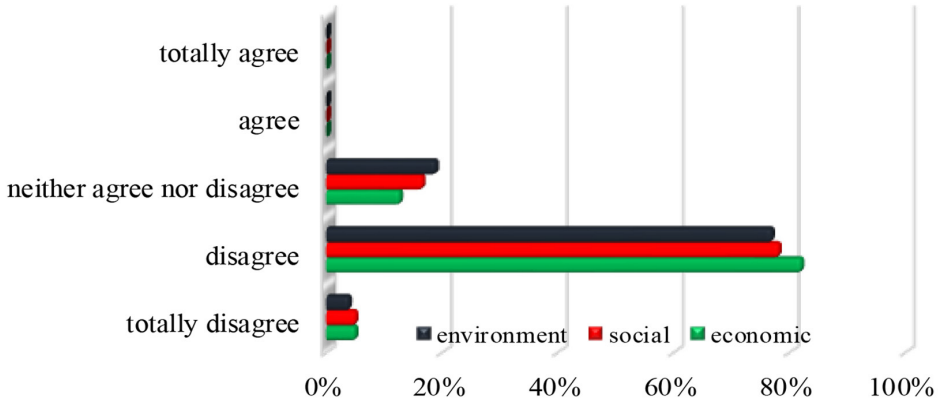

Figure 5. Negative effects as a result of the development of agritourism
Source: Own processing

The results of the analysis show, without a doubt, that those interviewed are of the opinion that there will be benefits in all sectors.

Table 2. Digital Tool Adoption and Support Needs Among Tourism Stakeholders

ID	Digital Tools Used	Digital Tools Help Attract Tourists (1–5)	Main Barriers (Open-Ended)	Support Needed (Multiple Choice + Text)
P1	Website, Facebook	5	Lack of time, low digital skills	Training, mentoring
P2	Facebook only	4	No internet in the area	Infrastructure, funding
P3	Booking.com, Google Maps	5	High platform fees	Own website support
P4	Instagram, TikTok	4	Time-consuming	Social media training
P5	None	1	Technological fear	Beginner digital literacy courses
P6	Website, payments	5	Maintenance costs	Financial support
P7	Google Ads	4	Too complex	Digital marketing consultant
P8	TripAdvisor, Facebook	5	Review management	Reputation strategy tools
P9	Excel	3	No integration with bookings	CRM systems
P10	WhatsApp	3	Not professional-looking	Email and website building
P11	Instagram	4	Limited audience	Cross-platform promotion
P12	Website, PMS	5	Setup difficulties	Technical assistance
P13	Facebook, Messenger	3	Low client interaction	Marketing campaign help
P14	None	2	Don't know where to start	Introductory workshops
P15	Google My Business	4	Hard to update	Quick-use guides
P16	Booking platforms	5	Dependence on third parties	Platform independence tools
P17	Online reviews	4	Negative feedback handling	Reputation management
P18	Facebook, Google Drive	3	Hard to manage content	Support staff
P19	Airbnb, Booking.com	5	Calendar sync issues	Channel manager software
P20	Email marketing	3	Low response	Campaign training
P21	YouTube	4	Content creation difficulty	Video editing courses
P22	Website + SEO	5	Don't understand SEO	SEO training
P23	None	1	Afraid of fraud	Safe tool guidance
P24	Facebook + SMS	3	Poor phone signal	Mixed strategy approach
P25	Instagram, Reviews	4	Language barriers	Translation templates

Source: Own processing

To better understand the level of digital adoption and the needs of agritourism stakeholders, a structured questionnaire was applied to 25 respondents. The instrument included both closed and open-ended questions, covering four main dimensions: digital tools currently used, perceived benefits of digitalization, encountered barriers, and types of support required for future development. Table 1 presents a summarized version of the responses, highlighting individual variations and common themes relevant to the implementation of digital technologies in the agritourism sector.

In the context of Society 5.0, where digital transformation aims to create a human-cantered and sustainable society, agritourism represents a promising sector for integrating innovation with rural development. However, the adoption of digital tools in small agritourism businesses remains inconsistent and under-researched. This study was initiated to gain a deeper understanding of the current level of digital readiness among agritourism stakeholders, explore the benefits they perceive from adopting digital solutions, and identify the main barriers and support needs they encounter. By using a structured questionnaire, the research aims to capture both quantitative trends and qualitative insights that can guide future policies, capacity-building initiatives, and targeted interventions to accelerate digital transformation in rural tourism contexts.

Although the research is geographically limited to Gorj County, the findings offer **valuable and context-specific insights** into the digital transformation processes within rural agritourism. The **mixed-method approach,** while basic in its structure, is clearly articulated and effectively applied. The combination of quantitative and qualitative data has allowed for a **comprehensive understanding** of the digital readiness, perceived benefits, and support needs of local agritourism stakeholders. The results are particularly revealing for this case study, highlighting not only infrastructural and educational barriers but also the **strong potential for targeted interventions** in similar rural contexts. Thus, this study contributes new knowledge to the emerging literature on sustainable tourism in the digital era and provides a **replicable framework** for further research in other regions.

One limitation of this study is the **response rate:** out of 50 agritourism pensions contacted, only **25 provided complete responses** to the questionnaire and interviews. While this sample size is adequate for a **qualitative case study**, it may limit the representativeness of the findings. The results should therefore be interpreted with caution when considering broader generalizations beyond **Gorj County.** Non-responses may reflect a lower level of digital engagement or interest, potentially skewing the data toward more active or digitally aware participants. As such, the study provides **valuable exploratory insights,** but further research with a larger and more diverse sample would be needed to validate and expand upon these findings in different regional or national contexts.

Despite awareness of digital tools, several **practical barriers** hinder their implementation. These include the **high initial investment costs** for platforms and hardware, the **need for staff training,** and **resistance to change** from business owners unfamiliar with technology. In remote areas, poor internet connectivity further complicates the digital transition.

4. FUTURE RESEARCH DIRECTIONS

Future research should investigate the specific factors influencing technology adoption within agritourism pensions. Factors such as geographical location, available resources, and the unique challenges faced by each establishment merit thorough investigation. Conduct a detailed examination of specific factors influencing technology adoption, such as size, resources, and adaptability. Develop targeted strategies to support pensions at different readiness levels, fostering a more cohesive and technologically advanced agritourism sector. Undertake a longitudinal study to track the progression of technology adoption and organizational capacity over time, providing dynamic insights.

5. CONCLUSION

As we draw conclusion from the digital readiness analysis of agritourism pensions in Gorj County, it is imperative to situate these findings within the broader context of Society 5.0, where the fusion of technology and societal needs shapes a human-centric future. The evolution of agritourism in this digital era becomes not just a local phenomenon but a microcosm of societal transformation, reflecting the principles and aspirations of Society 5.0. the dominance of agritourism pensions at the beginner level of technology adoption echoes the foundational principle of ensuring technology serves human needs. This signifies a starting point where digital tools should align with the unique characteristics and aspirations of agritourism, contributing to the betterment of both the sector and the local community. Society 5.0 emphasizes inclusivity, ensuring that technological advancements benefit all layers of society.

In the context of agritourism, interventions should go beyond technology adoption and encompass comprehensive digital literacy initiatives. These initiatives should be tailored to the varying readiness levels identified, fostering inclusivity and empowering stakeholders across the spectrum. One of the pillars of Society 5.0 is the creation of collaborative ecosystems where diverse entities collaborate for mutual benefit. Agritourism establishments, ranging from beginners to front-runners, can form a collaborative ecosystem where knowledge, expertise, and resources are shared. This collaborative spirit not only accelerates the technological learning curve but also creates a resilient and interconnected agritourism network.

While the study provides descriptive statistics (frequencies and percentages) to illustrate key trends among the respondents, no **inferential statistical tests** (e.g., significance testing, correlations) were applied due to the **exploratory nature and small sample size** (n = 25). The intention was not to generalize findings to a larger population, but rather to **identify patterns and raise hypotheses** for further research. Nevertheless, future studies could benefit from including **inferential analyses**, such as **chi-square tests** for association between variables (e.g., type of digital tool used vs. perceived effectiveness) or **correlation coefficients** to assess relationships (e.g., between digital readiness and support needs).

The findings, especially the prevalence of agritourism pensions in the process of enhancing organizational readiness, indicate a collective movement toward sustainable technological integration. Future interventions should prioritize solutions that align with environmental sustainability, promoting practices that enhance both technological innovation and ecological balance. Agritourism pensions at the proficient and expert levels represent the vanguard of future-ready entrepreneurs. These establishments are well-positioned to lead not only in technological adoption but also in demonstrating how technology can be harnessed for societal benefit. They serve as examples, illustrating the possibilities when technology aligns with the societal fabric.

The majority of agritourism pensions are at the beginner level, emphasizing the need for focused efforts to enhance technological integration. A considerable percentage is actively improving organizational readiness, while others present opportunities for targeted interventions. Small percentage of agritourism pensions are identified as front-runners, serving as exemplars for the industry. The implementation of technologies and the introduction of digitization in the agritourism sector have been met with an overwhelmingly positive perception. Local communities and stakeholders have confidently embraced digital innovations, recognizing their benefits in improving the quality of life and efficiency in agricultural and tourism activities. Increased efficiency in agricultural practices, sustainable resource management, and enhanced collaboration have

contributed to the solidification of this positive perception. This digital transformation not only brought about positive economic impact through the promotion of tourism and access to global markets but also acts as a catalyst for long-term sustainable development. Successful experiences serve as a model for expanding similar initiatives in other regions and economic sectors, reinforcing the vision of a human-centred Society 5.0 that strikes a balance between economic progress and addressing social challenges.

While this study identifies key opportunities and barriers related to digitalization in agritourism, the **practical implementation of proposed solutions** warrants further elaboration. Future work should integrate **concrete case studies** that showcase how similar businesses have successfully adopted digital tools—such as dynamic pricing through booking platforms, targeted marketing via social media, or the use of automated property management systems (PMS). For example, agritourism pensions in other EU regions have benefited from partnering with regional digital innovation hubs, participating in EU-funded upskilling programs, or integrating online booking systems with local tourism networks. Including such best practices would not only validate the relevance of the proposed tools but also provide **actionable guidance** for stakeholders in Gorj County and beyond. This practical dimension is essential for turning awareness into adoption and for advancing sustainable rural development in line with Society 5.0 objectives.

The digital readiness analysis of agritourism pensions in Gorj County serves as a foundational exploration, laying the groundwork for informed decision-making and strategic planning. The insights gained from this study extend beyond numbers and percentages; they represent the potential for growth, collaboration, and sustainable development within a unique sector. As the agritourism industry navigates the digital era, the fusion of technology, organizational capacity, and a spirit of innovation will be instrumental in shaping a resilient and thriving future.

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