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Original Article

Analysis of the Impact of Smart Tourism on the Sustainable Development of Rural Businesses in Tafresh County, Iran

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Abstract

Purpose- Rural tourism is considered a potential solution for rural communities to overcome economic challenges; in this context, smart tourism can be viewed as a logical advancement from traditional tourism, providing a balanced approach to revitalizing rural settlements and creating new economic opportunities for farmers and local communities. Accordingly, given that smart tourism can play a significant role in the sustainable development of businesses and the overall economy of villages, the aim of this research is to analyse the impact of smart tourism on the sustainable development of rural businesses in the Tafresh County.

Design/methodology/approach- Therefore, this study is applied and employs a descriptive-analytical method, and from a paradigm perspective, it is classified as quantitative research. The required information was collected through both documentary-library and field methods. The statistical population of the study includes 28 villages in Tafresh County. In the field method, a researcher-made questionnaire was used. For data analysis, exploratory factor analysis, one-sample T-test, and the MARCOS multi-criteria decision-making model were utilized.

Findings - The results from the exploratory factor analysis indicated that among the five identified factors, social and infrastructural factors in smart tourism have the greatest impact on the sustainable development of rural businesses. The results from the MARCOS decision-making model also showed that the villages of Kookan, Khank, and Naqousan are in a more favorable position regarding the indicators of smart tourism in the sustainable development of rural businesses.

Keywords: Smart tourism, Rural businesses, Exploratory factor analysis, Infrastructural factor, Tafresh County.

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1.Introduction

Tourism industry is one of the largest sources of job creation and economic growth in regions, and its rapid growth leads to significant economic, social, and environmental changes (Meshkini et al., 2012). It can guide the flow of social, economic, cultural, and political activities and, with rational planning and management, can yield substantial profits for governments (Khosravi, 2007; Habibi Kaveshkouhi et al., 2019). In other words, tourism can be considered one of the phenomena of the present century that ranks as the third most important industry in the world after oil and automotive industries. Besides alleviating poverty, promoting justice, and creating employment opportunities, it generates high income and penetrates all aspects of human life (Milen Kawasaki, 2012). Accordingly, tourism can have a remarkable impact on economic, social, structural, and aesthetic frameworks (Stetic, 2012). In the meantime, studies indicate that Iran ranks among the top ten countries in terms of tourism potential (Vahidi Rad & Pasad, 2015). One important branch of tourism is rural tourism. Rural tourism is a combination of economic, social and environmental components of rural areas. It relates to people, space, and products while having unique impacts on the environment and economic growth (Yang et al., 2021).

Hence, considering the structural characteristics of Iran's rural settlements, it can be stated that rural residents face challenges such as unemployment, low agricultural productivity, increasing migration to cities, and urban marginalization (Azkia & Ghaffari, 2004). Developing tourism is one solution to overcome these issues in rural communities. Tourism can lead to the development of tourist destination areas, where millions of villagers live. The development of rural tourism has advantages such as increased employment opportunities; optimization of transportation; creation and increase in residents' income; protection of cultural heritage; real global potential for economic enhancement; influx of investment, implementation of projects facilitating innovative entrepreneurial initiatives; development of social infrastructure to remove unemployment and poverty; and ultimately helping create better living conditions for thousands residing in villages (Wang et al., 2020; Lopez-Sanz et al., 2021). In general terms, tourism can serve as a tool for developing rural areas since it can act as a new financial resource that improves local people's economic status while also being a means to alleviate poverty and increase job opportunities (Giaoutzi & Nijkamp, 2006; Breidenhann & Wickens, 2004; Fossati & Panella, 2000; Lee & Chang, 2008; Sebele, 2010). Given the undeniable role that tourism plays in employment generation, addressing unemployment issues as well as fostering businesses and entrepreneurship—and overall impacting the economy, society, and environment within rural settlements—it is essential to focus on sustainability across all dimensions of tourism. One of the approaches that significantly impacts the sustainability of tourism businesses is the development of new technologies in these enterprises (Rana, 2021). Accordingly, with the expansion of industries, information technology has rapidly infiltrated various aspects of human life and is considered one of the influential components in various business sectors, especially in tourism businesses (Dehdashti Shahrokh & Jamal Abad Shakiba, 2013). Therefore, in the present era, it is impossible to overlook various approaches and global transformations in the field of tourism. In fact, over the past few decades, tourism has experienced remarkable growth due to technology and innovation (Yang et al., 2021), necessitating technological development and, in other words, smartization. Smartization has gained strength in rural areas of developed countries over the past two decades and plays a crucial role in the sustainability of rural tourism (Zavratnik et al., 2020). Thus, it seems that the smart village approach can provide a pathway to overcome unsustainability and achieve sustainable development in rural areas. Neglecting technological changes—one of the pillars of a smart village—places a rural settlement efficiency at its lowest level for residents, especially educated individuals, leading to increased migration. Additionally, it negatively impacts any limitations regarding technology, employment, economy, and welfare for rural residents while exacerbating temporal and spatial constraints. Given these discussions, achieving sustainable development—especially in rural areas—requires studying and examining smart

village strategies and their indicators so that we can leverage the capabilities offered by this approach through analysis and application (Anabestani et al., 2024).

In this regard, tourist villages of Tafresh County possess high potential for attracting tourists due to their geographical location and natural attractions as well as historical-cultural features such as unique architectural styles due to mountainous location; numerous rivers and springs; special customs; unique agricultural, horticultural and livestock products; handicrafts; diversity of animal and plant wildlife; etc. today, rural tourism requires smartization and development of tourism infrastructure; therefore, developing rural tourism without paying attention to smartization or utilizing new technologies for enhancing tourism businesses is temporary and unsustainable. What is crucial for sustaining rural tourism is business sustainability and consequently ensuring job stability and income for villagers. Therefore, since Tafresh County has diverse resources both natural and human-made, adopting a smart rural tourism development approach leads to diversity of economic activities through development of tourism businesses at the village level while having positive impact on job creation and income for villagers. In this sense, the present study aims to examine the impact of smart tourism on developing rural businesses and regional economies; therefore, this objective could be effective in developing smart rural tourism and improving economic, social, and environmental conditions for villagers in Tafresh County.

2. Research Theoretical Literature

The growth and development of tourism as a strategy for rural development, is a relatively new concept, whose importance has been considered by local policymakers and planners. With this attitude, there is another belief that considers rural tourism as a certain solution for the development of rural areas (Roknodin Eftekhari, 2002). In this respect, one of the useful and effective ways to utilize rural tourism is the development of smart rural tourism which combines traditional rural culture with information and communication technology applications. Its goal will focus on balancing competitiveness with social and environmental sustainability (Shen & wang, 2018).

Smart tourism results from the development of modern information and technologies which we are recently connected to and leads to competitive advantage of a tourism destination compared to other tourism destinations. In smart tourism, information technology plays a significant role in integration of services provided to tourists (Nadali & Sefidchian, 2018). In this regard, developing smart tourism includes: utilizing smart technologies to enhance business innovations, and ultimately providing superior experiences to tourists and rural residents (Buonincontri & Micera, 2016). As an approach, smart tourism helps destinations in terms of facilitating and supporting its interactions with tourists and residents, its participations within and outside tourism domain, its commercial and physical environment, and tourism activities. The core philosophy of smart tourism is the innovative utilization of technology and strategic collection and management of information (Del Chiappa & Baggio, 2015). Smart rural tourism has been also shaped based on these concepts of smart tourism. As Rudwiarti et al., identified four main characteristics for smart tourism including: sustainability, participation, betterment of well-being, and implementation of information and communication technology (Rudwiarti et al., 2021).

Since sustainability is a significant issue in the development of rural tourism and active businesses in this field, sustainable rural tourism requires a holistic approach which takes the social, economic, and environmental impacts of tourism into consideration. Utilization of modern technology is another issue that plays a role in sustainability and growth of economy and tourism businesses. Tourism businesses must continuously be innovative in order to remain lasting and sustainable (Mishra, 2013). Hence, in the present era, the use of modern technologies has a remarkable impact on tourism industry, by basically converting the effectiveness and productivity of tourism organizations, their business methods and ways of interactions between customers and providers. Therefore, exploitation of modern technologies, is the key driver in tourism industry as well as rural tourism (Buhalis & Law, 2008). Thus, in order to sustain rural tourism businesses, it is necessary to pay more attention to villagers' capabilities in smartization of villages, focusing on valuable concepts such as local e-businesses, development of green technology, local marketing, etc. based on reducing the distance

between producers and consumers by enhancing technical knowledge, raising awareness and providing education. With this perspective, smart economy and businesses can serve as a transforming axis and one of the effective subcomponents in smartening villages through collaboration with other internal elements such as smart communities, smart governance, smart ecology, etc. which can accelerate achieving sustainable rural development (Moridsadat & Ma'malvand, 2018).

2.1. Research Literature

A review of different studies related to the subject of this research indicates that Iran has limited experiences in the field of smart villages. However, some domestic and international studies have been conducted on smart rural tourism and sustainable development of rural businesses which are summarized below. According to the research results of Anabestani & Javanshiri (2017), it was determined that rural creative economy indicators, with a weight of 0.534, human capital with a weight of 0.148, and economic indicators with a weight of 0.138 have the greatest impact on the formation of smart rural development. Zavratnik et al., (2018) consider smart villages as an essential approach to encounter the numerous challenges faced by today's societies. They have identified spatial differences as the most important criterion in their study on the conditions of smart villages in Slovenia. Ardito et al. (2019) studied big data in smart tourism including: challenges, issues, and opportunities. The results indicated that in the era of digital transformation, big data plays a crucial role in changing global travel patterns and creating challenges and remarkable opportunities for established companies and new entries into the tourism industry. All these companies can gain valuable information to predict tourist demand, ability to make better decisions, management of knowledge flows, interaction with customers, and providing best services in a more efficient and effective way. Aziza and Susanto (2020) presented a smart village model for rural areas including 6 dimensions: governance, technology, resources, services, life, and tourism. They believed that implementation of this model has been successful in Bonywangi region in Indonesia.

Zhao & Zhang (2021) conducted a study on revitalization of rural tourism from the perspective of smart tourism. This article examines opportunities for developing rural tourism through smart tourism, evaluates the status of rural tourism development within the framework of smart tourism, shapes rural tourism using internet information modes and eventually summarizes pathways for developing smart tourism. Balina (2020) in examining smart rural tourism experiences in Spain shows that smart rural tourism projects have been noteworthy, and support for them is recognized as the most important factor. Rural tourists value technological innovation in rural destinations, particularly those information and communication technology tools that enhance their tourism experience. Li & Zhang (2022) in a study on the development of smart tourism integration model to preserve the cultural heritage of ancient villages, concluded that, smartization is identified as one of the reliable approaches for the development of tourism in the region; developing infrastructure, government and private sector support and participation of local community play an important role in this field.

Ballina (2022) has studied the smart concept in rural tourism comparing two phases (2016- 2019). The results show the importance of smartphone in rural tourism, temporary growth in its tourist service use and most importantly, technological applications which improve enjoyable stay. The rural tourist does not abandon the use of information and communication technology (ITC) either before or after the trip. Specifically, planning to determine the rural status, is the core of smart rural tourism. Since it must focus on new technological tools for tourists. Ciolac and colleagues (2022) demonstrated in their study of smart tourism villages that in these villages, the components of technology, service delivery, education and comprehensive local awareness, participation, investment, infrastructure improvement, and innovation in businesses have been effective in strengthening and growing smart tourism. Amrullah et al., (2023) examine the impact of business innovations and sustainable smart tourism on the performance of managers in tourist destination villages. This research has been conducted to analyze the impact of innovation and competitive advantages on managerial performance in sustainable tourist villages. Priatmoto et al., (2023) analyzed the complexities of rural businesses. Moradi et al., (2023) conducted a study on spatial explanation of tourism clusters

with a focus on small rural businesses in Tabas area. The results emphasized on the importance of developing tourism clusters and creating required infrastructure for small businesses and analyzed tourism clusters in villages with high potential as well. The results of the research by Anabestani et al. (2023) indicated that there are numerous possible scenarios regarding the impact of smart villages on the sustainability of peri-urban settlements in the metropolitan area of Tehran, specifically within the Islamshahr County. Among these, 14 scenarios exhibit weak compatibility, while only 1 scenario demonstrates strong and sustainable compatibility (zero incompatibility). The first scenario, which is a positively oriented scenario, has a total interaction effect score of 733 and a compatibility value of 13.

Safri Aliakbari (2022) concluded in his analysis of the smart tourism context in targeted tourist villages and the challenges ahead in the Paveh County that traditional structures in villages, particularly in the realm of rural tourism, remain intact, and there is no tangible and planning-based framework for smart tourism in these villages. Bahadori Amjaz et al., (2022) examined the role of the main components of the formation of the smart growth strategy in sustainable development of rural settlements (Case study: Jiroft County). The obtained results based on PLS structural model, the dimension of transportation and communication (0.723) had the highest impact on the formation of smart growth within the studied area. The next indicators were improvement of physical context, improvement of environmental quality, sustainability of local community, stability of local economy, improving the quality of housing, and intensive density and development with values of 0.715, 0.707, 0.706, 0.704, 0.626, and 0.459, respectively. The results of spatial analysis show that, the highest ranks of rural settlements in terms of benefiting from smart growth indicators belong to the villages of Aliabad, Dowlatabad, Dobaneh, Hosseinabad Dehdar, Esmaieli Sofla, Golab Soufian, and the lowest ranks belong to the villages of Tarj, Konar, Sandal, Narjou, and Saghdar.

Mirzaei Rezqabad et al., (2024) also evaluated the tourism destination villages in Qom Province in terms of smart village components and concluded that, improvement and utilization of smart components can accelerate the growth and development of tourism in villages and the concept of smart village must be comprehensively developed in various aspects. The results of the research by Anabestani and Barani Alikabari (2024) indicate that the concept of smart rural tourism is the result of a set of indicators including smart economy, smart governance, smart infrastructure, smart people, smart connectivity, and smart education. The results of the one-sample t-test showed that among the indicators of smart rural tourism, the indicators of smart governance, smart people, smart economy, and smart education were identified as the most important indicators of smart rural tourism in the studied villages, with means of 3.95 and 3.90, respectively.

The review of existing studies indicates that no research has been conducted on the subject of this study so far. It can be concluded that, considering smart tourism and its impact on business development in rural settlements, the present study is a new and significant research, which aims to analyse the components of smart rural tourism formation and its impact on the development of rural businesses in tourist destination villages of Tafresh County.

3. Research Methodology

The present theoretical research is conducted with applied purposes using the descriptive-analytical method. Also, the current study has a quantitative approach in terms of its paradigm. Data collection for information related to research literature was done through library method; field method and researcher-made questionnaire were also used. The questionnaire was designed in the form of a Likert scale (very low, low, average, high, and very high). The statistical population consists of 28 sample villages of Tafresh County. This County has a central part and four villages named Bazarjan, Roudbar, Kharazan, and Kouh panah. According to 2016 census there were 2231 households in the studied villages. Therefore, using Cochran's formula, 216 households were determined as the sample size. Simple random sampling method was used to select sample households. Validity of the questionnaire was confirmed by five professors and Cronbach's alpha was used to determine its reliability which was calculated to be 0.96, indicating an extremely high validity of the research tools. The collected data were analyzed using SPSS software. Descriptive and inferential statistics were used. Descriptive statistic such as mean, frequency, and frequency percentage were

used to examine individual characteristics. Exploratory factor analysis, and one sample T-test were used to evaluate the impact of smart tourism on the development of rural businesses, and finally, MARCOS decision-making model was employed to perform spatial analysis and rank the studied villages. Table (1) indicates the information related to households, population, and sample size of the studied villages.

Table 1. demographic information and sample size of the studied villages

Row	Village	Household	Population	Sample Size
1	Shahrab	172	389	11
2	Joftan	154	382	10
3	Naqousan	110	233	9
4	Kahak	110	292	9
5	Khanak	108	248	9
6	Fark	102	227	8
7	Ghezeljeh	101	289	8
8	Zarjin	82	189	8
9	Koloo Olya	82	174	8
10	Haftan Olya	82	234	8
11	Koryan	78	242	8
12	Abreh dar	77	133	8
13	Koohin	71	148	7
14	Bazarjan	68	172	7
15	Kandej	68	137	7
16	Koloo sofla	67	152	7
17	Fesengan	65	160	7
18	Kabouran	63	136	7
19	Dinjerd	63	224	7
20	Joraqin	62	132	7
21	Qaraja Qieh	62	191	7
22	Kangaran	60	133	7
23	Gazavand	59	168	7
24	Asiab Jalal sofla	57	174	7
25	Koukan	53	226	7
26	Nobahar	53	152	7
27	Azadin	52	108	7
28	Alvijan	50	127	7
	Total	2231	5572	216

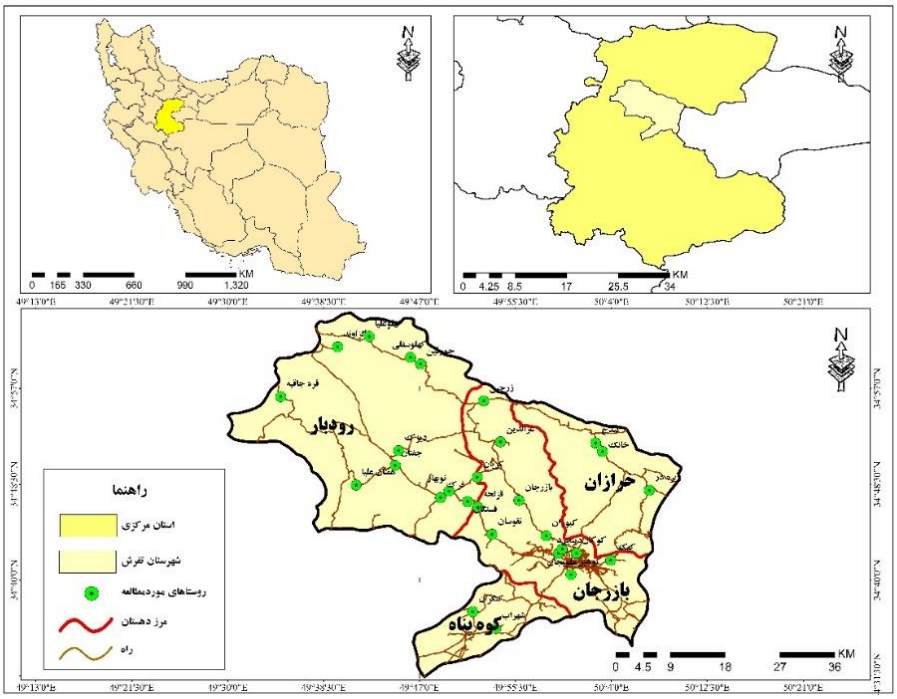

Figure 1. location of the study area

4. Research Findings

4.1. Demographic Characteristics of the Respondents

Descriptive findings of the study show that, most respondents were male with a frequency of 141 people (65.3%) and 37% of them were in the age group of 41 to 50 years. 88% of the respondents, that is, most of them were married. In terms of educational status, most of them (30.1%) had a bachelor's degree and higher. Considering employment status, most respondents, that is 31.9%, were employees and finally, most respondents (42.6%) had an income between 10 to 20 million TOMAN. Table 2 indicates the results of descriptive findings.

Table 2. Demographic Characteristics of Respondents

Description	**Frequency**	**Percentage**
Gender	**Women: 75 Men: 141**	**Women: 34.7 Men: 65.3**
Age	21 to 30: 26 31 to 40: 67 41 to 50: 80 51 to 60: 35 Above 60: 22	21 to 30: 5.6 31 to 40: 31 41 to 50: 37 51 to 60: 16.2 Above 60: 10.2
Marital Status	Single: 26 Married: 190	Single: 12.1 Married: 88
Educational Status	Illiterate (able to read Qoran): 18 Primary education: 23 Middle school education: 32 High school: 24 Diploma and higher: 54 Bachelor degree and higher: 65	Illiterate (able to read Qoran): 8.3 Primary education: 10.6 Middle school education: 14.8 High school: 11.1 Diploma and higher: 25 Bachelor degree and higher: 30.1
Job	Former: 54 Rancher: 16 Employee: 69 Worker: 26 Freelance jobs: 30 Other: 21	Former: 25 Rancher: 7.4 Employee: 31.9 Worker: 12 Freelance jobs: 13.9 Other: 9.7

Description	Frequency	Percentage
Gender	**Women: 75 Men: 141**	**Women: 34.7 Men: 65.3**
Income	Less than 5 million TOMANS: 32 5 to 10 million TOMANS: 76 10 to 20 million TOMANS: 92 More than 20 million TOMANS: 16	Less than 5 million TOMANS: 14.8 5 to 10 million TOMANS: 35.2 10 to 20 million TOMANS: 42.6 More than 20 million TOMANS: 7.4

4.2. Factor analysis of smart tourism indicators

In the present study, the statistical test of exploratory factor analysis was used to evaluate the impact of each of the indicators of smart tourism on sustainability of rural businesses. In exploratory analysis the researcher is trying to examine the experimental data to identify indicators and also the relationships between them. In the current research, 42 factors were identified as smart tourism indicators which affect the sustainability of rural businesses; these indicators were selected based on the previous studies. In this regard, to ensure the internal consistency of the variables and the appropriateness of their number for factor analysis, Bartlett's test and KMO were used. According to table (3), the KMO value, which is equal to 0.837, is greater than 0.5; thus, the number of respondents is sufficient for factor analysis. The significance level (sig value) is less than 0.05, indicating the correlation and suitability of the variables in question for conducting factor analysis.

Table 3. Values of KMO and Bartlett

KMO value	0.837
Bartlett value (Bartlett Test):	8441.249
Degree of Freedom	861
Significance Level	0.000

In the next step, the factors were categorized; the most related factors were placed in the same category. Therefore, as observed, based on exploratory factor analysis, factors were divided into 5 categories. As mentioned above, factors with the highest correlation were placed in the same category and factors whose factor load was less than 5% were removed from items. 29 out of 42 factors had a factor load more than 5% and the rest were removed. The remained factors were labeled based on the contents of each category. The results indicate that, among the extracted factors which one has the greatest impact on the sustainability of rural businesses.

According to table (4) among 5 identified factors, social factor has the greatest impact on the sustainability of rural businesses. In agreement with findings, social factor explains 21.02% of total variance. Among the 7 social variables of smart tourism, the variables "social trust in the internet platform and the data published on it" (factor loading 0.79), "educating people about online platforms and e-government" (factor loading 0.78), and public awareness of smart tourism platforms" (0.73) have the greatest impact on the sustainability of rural tourism businesses, respectively.

The second factor mentioned as infrastructural factor explains 19.5% of the variance related to the impact of smart tourism on sustainability of rural businesses. Among infrastructural indicators, "the existence of communication and infrastructure and suitable electronic facilities in the village" with a factor load of 0.71, "having a smart guide system in the village" with a factor load of 0.69, "high quality internet access and benefiting from proper bandwidth in the village" with a factor load of 0.67 have the greatest impact on the sustainability of rural businesses.

Administrative institutional factor is the third indicator that explains 19.5% of the total variance. Among 5 variables of this factor, "providing government services to villagers on the platform of smart (internet)" with a factor load of 0.63, "coordination between the government and the local community (strengthening E-government)" with a factor load of 0.60 have the highest impact on the sustainability of rural businesses.

The next factor is tourism potential which explains 11.5% of total variance and among its 6 loaded variables, "online access to village information (tourist destination villages)" with a factor load of 0.66, "virtual tourism experience in tourist destination villages" with a factor load of 0.61 and

"the number of visitors to tourist attractions (annually)" with a factor load equal to 0.59 have the greatest impact on the sustainability of rural tourism.
And finally, economic factor with explaining 7.9% of variance has the lowest impact on the sustainability of rural tourism. However, among its variables, "current role of tourism in rural economy" with a factor load of 0.63, and "the rate of tourism employment for the residents of the villages" with a factor load of 0.61 have the highest impact on the sustainability of rural tourism.
The identified factors, special values, and variance percentages of each factor and factor loads of each indicator can be observed in table (4).

Table 4. Identified factors, special values, variance percentages, and factor loads of research variables

Factors	Special values & variance percentages	Variables	factor loads
Social	Special value: 9.2 Variance percentage: 21.02	People's awareness of smart platform of tourism	0.729
		Educating people about online platforms and e-government	0.785
		Social trust in internet and published data on it	0.799
		Community participation in the field of tourism	0.682
		People's belief in online access to tourism services	0.511
		Access to social and communicative media in the village	0.603
		Ability of people to use the online platform in the village	0.642
Infrastructural	Special value: 7.4 Variance percentage: 19.5	Easy access to SMS and multimedia services in the village	0.605
		Active social networks (virtual) in the village	0.630
		Access to high quality internet and benefiting from proper bandwidth in the village	0.675
		Benefiting from electronic infrastructure of bank transactions in the village	0.635
		Having smart guide system in the village	0.698
		Having communicative infrastructure and proper electronic installations	0.712
Administrative Institutional	Special value: 5.8 Variance percentage: 14.4	Local institution's activity to create smart tourism platform	0.523
		Active private sector in the field of tourism	0.568
		Coordination between government and local community (strengthening E-government)	0.601
		Providing government services to villagers on smart platform (internet)	0.630
		Government's financial support in the field of rural tourism	0.523
Tourism potential	Special value: 4.6 Variance percentage: 11.5	The power of rural tourist attractions to attract tourists	0.513
		The number of visitors to tourist attractions (annually)	0.595
		virtual tourism experience in tourist destination villages	0.613
		Online access to village information (tourist destination villages)	0.663
		Creating a database of tourist attractions in the village	0.543
		Establishing electronic security in the village	0.557
Economic	Special value: 3.3 Variance percentage: 7.9	People's financial capability to create tourism businesses	0.554
		The rate of tourism employment for rural residents	0.612
		Benefiting from bank credits in the field of rural tourism	0.581
		Annual income status of rural households from tourism	0.578
		Tourism's current role in rural economy	0.632

The findings of table (5) indicates that, the calculated mean of research dimensions has been measured with the hypothetical mean and the true mean of respondents' opinions was less than (3) in all dimensions. This, indicates that achieving sustainability in rural businesses requires management and planning and creating necessary infrastructure to develop smart tourism in the studied villages. Among research dimensions, infrastructural dimension has the highest mean

2.39 and the lowest mean belongs to economic dimension (1.83). considering the obtained significant level, the value of(sig,) is significantly less than 0.05 in all dimensions which is applicable to the society.

In the following, considering the research factors which were categorized into 5 dimensions, one sample T-test was used to evaluate the impact of smart tourism on the sustainability of rural businesses.

According to the results, the value of t-statistic is negative in all dimensions. The mean is also less than the hypothetical mean (3); therefore, it can be said that, currently, smart tourism has little effect on the sustainability of rural businesses in the studied villages.

Table 5. Examining the research variables using one sample t-test

Factors	t-statistic	mean	Standard deviation	Significance level	Degree of freedom	Confidence interval at the 95% level	
						Lower limit	Upper limit
Social	-13.60	2.31	0.745	0.000	215	-0.79	-0.59
Infrastructural	-12.10	2.39	0.743	0.000	215	-0.71	-0.51
Administrative Institutional	-17.74	2.17	0.684	0.000	215	0.92	-0.73
Tourism potential	-14.69	2.36	0.641	0.000	215	-0.73	-0.56
Economic	-26.36	1.83	0.655	0.000	215	-1.26	01.09

Source: research findings, 2024.

4.3. Spatial analysis of research variables at the level of rural settlements of the studied area

In the present study multi-criteria decision-making models were used to spatially analyse the research variables at the level of sample villages. Multi-criteria decision making models (MARCOS) are among decision making methods which were presented in 2019. MARCOS stands for "measurement of alternatives and ranking according to compromise solution". MARCOS is a powerful method for making decisions in complicated situations. Implementing and utilizing this method allows researchers to evaluate options that have multiple criteria and indicators, ultimately prioritizing them and determining the most suitable option among the available choices. This method was introduced by Steve wicks et al., (2019). The steps of this method are outlined below.

Step one: formation of decision matrix

In the MARCOS technique, options are evaluated using n criteria; therefore, each option is assigned a score based on each criterion. These scores can be based on quantitative and real values or quantitative and theoretical values. In any case, a decision matrix of size m*n must be formed.

Step two: determination of ideal and anti-ideal

In this section, the ideal values (AI) and anti-ideal values (AAI) are determined in accordance with equations (1) and (2). The statement B refers to criteria that have a profit aspect, while C refers to criteria that have a cost aspect.

$$AI = \max_i x_{ij} \quad if\ j \in B \quad and \quad \min_i x_{ij}\ if\ j \in C \tag{1}$$

$$AAI = \min_i x_{ij} \quad if\ j \in B \quad and \quad \max_i x_{ij}\ if\ j \in C \tag{2}$$

Step three: normalization In this section, both criteria with benefit and cost aspects are normalized using equations (3) and (4).

$$n_{ij} = \frac{x_{aj}}{x_{ij}} \quad if \quad j \in C \tag{3}$$

$$n_{ij} = \frac{x_{ij}}{x_{aj}} \quad if \quad j \in B \tag{4}$$

obtained the weighted matrix.

Step four: weigh down
In this section, using equation (5), the weights of the criteria are multiplied by the normal matrix to

$$V_{ij} = n_{ij} \times W_j \quad (5)$$

Step five: the degree of desirability of options
In this section, the ideal (K+) and anti-ideal (K-) desirability of options are calculated based on the equations (6) and (7).

$$K_i^+ = \frac{S_i}{S_{ai}} \quad (6)$$

$$K_i^- = \frac{S_i}{S_{aai}} \quad (7)$$

In the above equations S_i=(i=1,2,\ldots,m) is the sum of the values of each row in weighted matrix which is obtained from the equation (8).

$$S_i = \sum_{j=1}^{n} V_{ij} \quad (8$$

Step six: determining options' optimal performance In this section optimal performance of each option is calculated based on equation (9).

$$f(K_i) = \frac{K_i^+ + K_i^-}{1 + \frac{1 - f(K_i^+)}{f(K_i^+)} + \frac{1 - f(K_i^-)}{f(K_i^-)}} \quad (9)$$

In the above equation, $f(K_i^-)$ is the anti-ideal desirability performance and $f(K_i^+)$ is the ideal desirability performance, both being obtained from equations (10) and (11).

$$f(K_i^-) = \frac{K_i^+}{K_i^+ + K_i^-} \quad (10)$$

$$f(K_i^+) = \frac{K_i^-}{K_i^+ + K_i^-} \quad (11)$$

Step seven: ranking options: In this section, ranking is done through using values obtained from equation (11) which are options' desirability performances. The option with the greatest value of desirability performance receives the highest rank.

In the present study, weighing down has been conducted, using MEREC technique. This method utilizes a new idea for weighting criteria which was presented by Keshavarz Qarabaie et al., under the title "Method Based on the Removal Effects of Criteria". This technique is similar to methods such as Shannon's Entropy, IDOCRIW, and Critic.

Table-6. The results obtained from MARCOS decision making model

Village	Si	F(K)	Rank	Village	Si	F(K)	Rank
Asiab Jalal	2.311	0.680	4	Qezeljeh	1.397	0.411	25
Abreh dar	1.566	0.461	24	Kabouran	1.618	0.476	21
Alvijan	1.810	0.533	15	Koryan	1.629	0.479	20
Bazarjan	1.762	0.519	17	Kandej	1.959	0.577	11
Joftan	1.755	0.516	18	Kangaran	2.085	0.614	9
Joraqin	1.601	0.471	23	Kahak	1.912	0.563	13
Khanak	2.402	0.707	2	Kolousofla	1.907	0.561	14
Dinjerd	1.003	0.295	28	Kolouolya	1.702	0.501	19
Zarchin	2.202	0.648	6	Koukan	3.156	0.929	1
Shahrab	1.604	0.472	22	Kouhin	1.779	0.524	16
Azadin	1.916	0.564	12	Gazavand	1.101	0.324	27
Fark	2.160	0.636	7	Naqousan	2.331	0.686	3
Fesengan	1.295	0.381	26	Nobahar	2.214	0.652	5
Qarajaqieh	2.158	0.635	8	Haftanolya	2.021	0.595	10

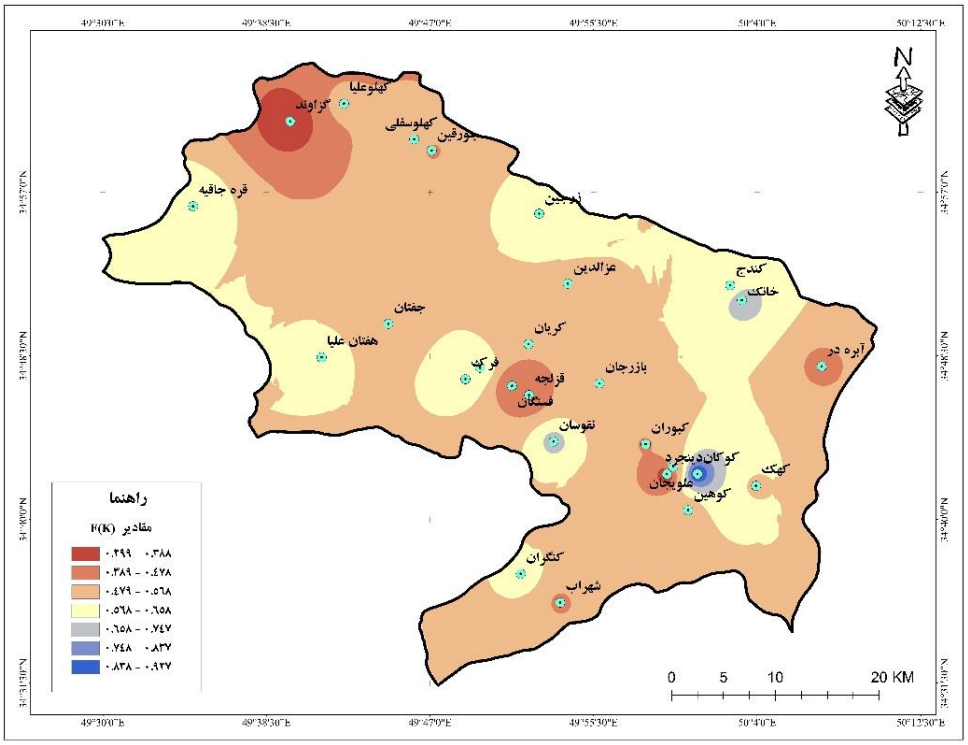

Figure 2. Changes in the impact of smart tourism on rural business development

The results obtained from ranking studied villages show that, there is not much difference between them in terms of the impact of smart tourism on the sustainable development of rural businesses. According to table (6), villages of Koukan, Khanak, and Naqousan with f(k) values of 0.93, 0.71, and 0.69 are ranked first to third, respectively, indicating that, smart tourism had the greatest impact on the sustainability of rural businesses in these villages. Dinjerd, Gazavand, and Fesengan villages with f(k) values of 0.29, 0.32, and 0.38 are ranked in the last places respectively. Compared to other villages, the villages that are placed in the last ranks, require more serious planning to provide infrastructure and allocating public and private capital for the development of smart tourism and as a result sustainable development of rural tourism.

5. Discussion and Conclusion

The present study has been conducted to examine the impact of smart tourism on the development of rural businesses. In such manner, in order to evaluate the impact of smart tourism on the

sustainability of rural tourism in Tafresh County, 42 effective factors were identified based on previous studies. The mentioned factors were reduced to 29 factors after conducting exploratory factor analysis and the remained factors were placed in 5 categories and were labeled as social factor, infrastructural factor, administrative institutional factor, tourism potential factor and finally, economic factor. Among these five factors, social and infrastructural factors of smart tourism had the highest impact on the sustainability of rural businesses. The results of one sample t-test indicated that, infrastructural and tourism potential factors with means of 2.39 and 2.36 were the most important dimensions of sustainability of rural businesses. The results obtained from spatial analysis of studied villages, using MARCOS decision making model, indicated that, among 28 villages under study, the villages of Koukan, Khanak, and Naqousan with values of 0.93, 0.71, and 0.69 were ranked first to third, respectively and the lowest scores belonged to Dinjerd, Gazavand, and Fesengan villages with values of 0.29, 0.32, and 0.38, respectively. According to research findings, it can be concluded that, for the sustainability of rural businesses, it is essential to pay special attention to the social and infrastructural factors of smart tourism. Informing, educating, and building trust regarding the use of online platforms to access tourism services and develop rural businesses, as well as training people on how to utilize these online platforms, can play a remarkable role in the development of rural enterprises. Furthermore, to achieve this goal, necessary infrastructure and suitable electronic facilities in villages, having a smart guide system in place, and ensuring access to high-quality internet with adequate bandwidth are the most important factors influencing the sustainability of rural businesses. In this regard, the results of this study are consistent with the results of the research conducted by Li & Zhang (2022). It is also in line with the results of the study conducted by Moradi et al., (2023) in terms of infrastructural factor.

In general, according to the results, smartization is one of the most important factors influencing the sustainability of rural businesses in tourist destination villages; smartening tourist villages requires adequate infrastructure and most importantly, villagers' acceptance and their trust in modern technologies and finally, educating them on how to use these technologies have great impact on the sustainability of rural businesses. Hence, significant planning is necessary to apply technology in tourism industry.

Based on the research findings, the following suggestions are provided to strengthen the smart tourism infrastructure in order to ensure the sustainability of businesses in the tourist destination villages of Tafresh County:

- Increasing people's awareness about capabilities and benefits of utilizing modern technologies and online platforms to develop tourist businesses;
- Eliminating existing restrictions to access virtual and online networks;
- Holding training classes on how to use online platforms for marketing and advertising village products;
- Developing required infrastructure to smarten rural businesses in tourist villages including access to high quality internet;
- The effort of local institutions such as district municipality to create smart tourism platform in the village.

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Authors' contributions

The authors equally contributed to the preparation of this article .

Conflict of interest

The authors declare no conflict of interest.

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Original Article

تحلیل تأثیر گردشگری هوشمند بر توسعه پایدار کسب‌وکارهای روستایی در شهرستان تفرش، ایران

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چکیده مبسوط

۱.مقدمه

از آنجایی¬که در عصر حاضر گردشگری روستایی نیازمند هوشمندسازی و توسعه زیرساخت¬های گردشگری می¬باشد، بر این اساس توسعه گردشگری روستایی بدون توجه به مبحث هوشمند سازی و استفاده از فناوری¬های جدید جهت توسعه کسب¬و¬کارهای گردشگری امری موقتی و ناپایدار است در حالی¬که آنچه در پایداری گردشگری روستایی حائز اهمیت است، پایداری کسب وکارها و بالطبع آن پایداری اشتغال، درآمد روستاییان می¬باشد؛ بنابراین با توجه به اینکه شهرستان تفرش دارای منابع متنوع از حیث منابع طبیعی و انسانی می¬باشد رویکرد توسعه گردشگری هوشمند روستایی باعث تنوع بخشیدن به فعالیت¬های اقتصادی از طریق توسعه کسب¬و¬کارهای گردشگری در سطح روستاها گردیده و آثار مفیدی در ارتقا شغل و درآمد روستانشینان خواهد داشت. بر این اساس هدف تحقیق حاضر، بررسی نقش و تاثیر گردشگری هوشمند در توسعه کسب و کارهای روستایی و اقتصاد منطقه می¬باشد؛ لذا این هدف می¬تواند در راستای توسعه گردشگری هوشمند روستایی و بهبود وضعیت اقتصادی، اجتماعی و زیست¬محیطی روستاییان شهرستان تفرش موثر واقع شود.

۲.مبانی‌نظری تحقیق

گردشگری هوشمند حاصل توسعه اطلاعات و فناوری‌های به‌روزی است که امروزه با آن‌ها در ارتباط هستیم و باعث افزایش مزیت رقابتی یک مقصد در مقایسه با سایر مقصدهای گردشگری می‌شود. در گردشگری هوشمند، فناوری اطلاعات نقش بسیار مهمی دارد که موجب یکپارچگی خدمات ارائه‌شده به گردشگر می‌شود. در این راستا توسعه گردشگری هوشمند شامل بهره‌گیری از فناوری‌های هوشمند برای تقویت نوآوری‌های تجاری و در نهایت ارائه تجربیات برتر به گردشگران و ساکنان است. گردشگری هوشمند به عنوان یک رویکرد به مقاصد کمک می‌کند تا در زمینه تعاملات خود با گردشگران و ساکنان، مشارکت‌های خود در داخل و خارج از گردشگری، و محیط تجاری و فیزیکی خود و فعالیت‌های گردشگری تسهیل و حمایت کنند. هسته اصلی فلسفه گردشگری هوشمند، استفاده نوآورانه از فناوری و جمع‌آوری و مدیریت استراتژیک اطلاعات است. بگونه‌ای که برای گردشگری هوشمند چهار مشخصه اصلی را ذکر نموده‌اند که عبارتند از پایداری، مشارکت، بهبود رفاه و پیاده‌سازی فناوری اطلاعات و ارتباطات. گردشگری هوشمند روستایی نیز بر پایه همین مفاهیم گردشگری هوشمند شکل گرفته است.

۳. روش تحقیق

پژوهش حاضر از نظر هدف از نوع کاربردی و از لحاظ روش از نوع توصیفی تحلیلی است. جهت گردآوری داده‌ها از روش کتابخانه‌ای برای اطلاعات مربوط به ادبیات تحقیق و از روش میدانی و ابزار پرسشنامه محقق ساخته بهره گرفته شد. جامعه آماری تحقیق شامل ۲۸ روستای نمونه در شهرستان تفرش که براساس سرشماری سال ۱۳۹۵ جمعیت خانوارها در روستاهای موردمطالعه ۲۲۳۱ خانوار بوده است. جهت تعیین حجم نمونه از فرمول کوکران تعداد ۲۱۶ خانوار و جهت انتخاب خانوارهای نمونه از روش نمونه‌گیری تصادفی ساده استفاده شد. روایی پرسشنامه با استفاده از نظر ۵ تن از اساتید و جهت تعیین پایایی از روش آلفای کرونباخ استفاده شد و مقدار آن ۰/۹۶ محاسبه شد که بیانگر پایایی بسیار بالای ابزار پژوهش می‌باشد. برای بررسی ویژگی‌های فردی از آمار توصیفی مانند میانگین، فراوانی و درصد فراوانی استفاده شد. جهت بررسی تاثیر گردشگری هوشمند بر توسعه کسب‌وکارهای روستایی از تحلیل عاملی اکتشافی، آزمون T

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تک نمونه‌ای استفاده شد و در نهایت از مدل تصمیم‌گیری MARCOS برای انجام تحلیل فضایی و رتبه‌بندی روستاهای مورد مطالعه بهره گرفته شد.

۴. یافته‌های تحقیق

برای ارزیابی میزان تاثیر گردشگری هوشمند بر پایداری کسب¬و¬کارهای روستایی در شهرستان تفرش ۴۲ عامل موثر براساس مطالعات پیشین شناسایی شدند. عوامل مذکور بعد از انجام تحلیل عاملی اکتشافی به ۵ دسته تقسیم و به نام عامل اجتماعی، عامل زیرساختی، عامل نهادی مدیریتی، عامل پتانسیل¬های گردشگری و در نهایت عامل اقتصادی نام¬گذاری شدند. در بین ۵ عامل، عامل اجتماعی و عامل زیرساختی گردشگری هوشمند بیشترین تاثیر را در پایداری کسب¬و¬کارهای روستایی دارد. نتایج آزمون T تک نمونه¬ای نشان داد که از میان ابعاد گردشگری هوشمند که در پایداری کسب¬و¬کارهای روستایی موثرند ابعاد زیرساختی و پتانسیل¬های گردشگری با میانگین¬های ۲/۳۹ و ۲/۳۶ مهم¬ترین ابعاد پایداری کسب¬و¬کارهای روستایی می¬باشند. نتایج حاصل از تحلیل فضایی روستاهای موردمطالعه که با استفاده از مدل تصمیم-گیری MARCOS انجام گرفت، نتایج نشان داد از میان ۲۸ روستای موردمطالعه روستاهای کوکان، خانک و نقوسان به ترتیب با امتیازهای ۰/۹۳، ۰/ ۷۱ و ۰/۶۹ در رتبه اول تا سوم قرار گرفتند و کمترین امتیاز (به ترتیب با امتیازهای ۰/۲۹، ۰/۳۲ و ۰/۳۸) به روستاهای دینجرد، گزاوند و فسنگان اختصاص دارد.

۵. بحث و نتیجه‌گیری

به طور کلی براساس نتایج تحقیق می‌توان بیان کرد یکی از عوامل بسیار موثر در زمینه پایداری کسب‌وکارهای روستایی در روستاهای مقصد گردشگری این است که در بخش گردشگری هوشمندسازی صورت پذیرد و جهت هوشمندسازی روستاهای گردشگری بایستی زیرساخت‌های کافی وجود داشته باشد و از همه مهم‌تر نیز پذیرش روستاییان، اعتماد آنان به فناوری‌های نوین و در نهایت آموزش آنان در زمینه استفاده از فناوری‌های نوین تاثیر زیادی در پایداری کسب‌وکارهای روستایی دارد. بنابراین ضروریست برنامه‌ریزی قابل توجه‌ای در جهت به کارگیری فناوری در صنعت گردشگری صورت گیرد. براساس نتایج تحقیق پیشنهادهایی جهت تقویت بستر هوشمند گردشگری در راستای پایداری کسب‌وکارهای روستاهای مقصد گردشگری شهرستان تفرش به شرح ذیل ارائه می‌گردد:

- ✓ افزایش آگاهی مردم روستایی از قابلیت‌ها و مزایای استفاده از فناوری‌های نوین و بسترهای آنلاین در جهت توسعه کسب و کارهای گردشگری؛
- ✓ از بین بردن محدودیت‌های موجود در جهت دسترسی به شبکه‌های مجازی و آنلاین؛
- ✓ و غیره.

کلیدواژه‌ها: گردشگری هوشمند، کسب‌وکارهای روستایی، تحلیل عاملی اکتشافی، عامل زیرساختی، شهرستان تفرش.

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