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Original Article

Empirical Analysis of the Effect of Tourism Services Supply Chain on Sustainable Rural Development (Case Study: Baraghan Village, Alborz Province)

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Abstract

Purpose- tourist service chain is one of the concepts that all aspects of sustainable rural development are considered and by strengthening it, sustainable rural development can be achieved. the purpose of this study was to investigate the effect of tourism service chain on sustainable rural development in Baraghan village of Alborz province. the research method is descriptive - analytical which is used questionnaire.

Design/methodology/approach- The research employs a descriptive-analytical method using a questionnaire survey. The statistical population comprised 150 households, with 128 selected through systematic random sampling using a census approach. Data reliability was confirmed through Cronbach's alpha coefficient (α = 0.76), and validity was verified by 8 geography, rural planning, and tourism management experts. Data analysis utilized Spearman correlation, regression analysis, and factor analysis with principal component extraction and Varimax rotation.

Findings- The tourism services supply chain significantly impacts rural economy, though benefits primarily accrue to non-indigenous residents. Positive effects include increased sales of complementary products (dairy, handicrafts), improved transportation infrastructure, enhanced physical village aesthetics, and expanded advertising presence. However, challenges include rising prices, agricultural land degradation, noise pollution, solid waste management issues, urban-style construction threatening vernacular architecture, and limited local product distribution. Factor analysis identified five key components: local product sales (28.12%), rural improvement (18.18%), social relations enhancement (12.19%), institutional and public-private financing (10.21%), and communication services (9.9%), collectively explaining 83.4% of variance.

Research limitations/implications- The study focuses on a single village, limiting generalizability. Cross-sectional design captures current conditions without longitudinal tracking. Future research should examine multiple rural destinations and employ mixed-methods approaches.

Originality/value- This research provides empirical evidence on tourism service chain dynamics in an Iranian rural context, offering practical insights for policymakers and planners to enhance indigenous community benefits, address environmental concerns, and promote sustainable rural development through balanced tourism service management.

Keywords: Tourism service chain, Sustainable rural development, Rural tourism, Baraghan village.

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1.Introduction

With the development of human civilization and improving the level of global economy, the tourism industry has become the fastest growing industry in the world (Lozano et al., 2016). The people are keen on reducing life pressure and supporting more and more sustainable tourism by tourism (Galeazzo et al., 2020), while competition between tourism companies is growing increasingly to attract tourists. Poor experience of tourists from sustainable tourism, advertising and pricing of tourism products and sustainable development services can easily affect tourist purchasing behaviors and lead to the lack of smooth performance of tourism companies. Therefore, they have to invest in sustainable competitive service efforts to provide tourists with sustainable tourism products (Rahman and Soesilo, 2018), to make tourists more aware of sustainable tourism products, and to set tourist 's loyalty to products and brands (Moon & Han, 2018), and attractive retail prices for sustainable tourism products (Malekian & Han - Barzoki, 2019). More recently, researchers have become more interested in advertising and pricing in tourism management procedures (Jena & Meena, 2019; Khorshidvand et al., 2021). However, it should not be forgotten that for sustainable tourism products, sustainable services efforts of tourism companies and the tourist experience of sustainable tourism also play an important role in tourist demand (Jena & Meena, 2019; Sindhuri et al., 2017).

When the growth of tourism demand is strong and the future is promising, the selection of tourism companies to increase investment in human capital to improve the quality of services and innovation as the core of competitive strategy is not only a rational choice but also a source for corporate profits. all researchers have pointed out that one of the most effective ways for the tourism industry to effectively respond to the improvement and return of tourism demand in the post - epidemic Corona is improving its quality (Chen, 2021).

For this purpose, Iran has tourist attractions in terms of natural, cultural, ancient civilization and ancient and religious monuments that have the ability and ability to attract tourists. Therefore, tourism industry in many countries of the world is considered as a source of sustainable income, which in addition to its positive impact on economies of countries, is considered as an important and effective factor of employment and elimination of deprivation. the importance of Iran 's tourism services chain and its impact on the economic, social and cultural development of the country has caused many local and national planners and planners to plan and plan around the world to expand it. Iran is one of the countries that has diversified tourism attractions at the national and regional level that can be considered as one of the tourism destinations. The country is rich in the number and variety of historical, cultural, religious and natural attractions of the world. it is also due to the places of religious places and old relics of the past and the existence of beautiful landscapes has the ability to attract many tourists. For this purpose, with regard to the specific cultural - religious situation of the country among other countries, religious tourism has many development and development (Toshani et al., 2024).

Service chain systems have already taken a long way so far, the purpose of the supply chain is to support the performance of existing management and inventory control and cost of a complex so that the management of the organization is more effective and effective. Although the service chain management roots are referred to as suppliers or firms, most of the development that has occurred in this context (solutions, tools, and tools) around effective management of the service chain to meet customer demand is better, rapidly and effectively (Lan & Unhelkar, 2006).

The service chain of tourism product (as a service product) includes various components that are offered to tourists as a package or individual. the main and direct service chain of tourism services is pre - traveled and at the planning stage, followed by a variety of institutions and organizations that are mainly private. Reservations, reservation, accommodation, reception, gravity and tourist attractions and support services in the middle line provide tourism product. However, although from this middle line, there are a diverse set of services and industrial, private and governmental sectors that contribute to various industries in preparing, preparing and supplying tourism product (DEVCO & UNWTO, 2013).

Tourism supply chain is defined as a network of extensive activities in the field of rural sustainable development. In other words, tourism services

supply chain includes suppliers of all rural and services sectors in a specific destination. In other words, tourism services chain includes suppliers of all rural and service goods that are active in delivering tourism products to tourists (Ramezanian et al. 2012).

Sustainable rural development is a development that meets the needs of current and present generation without compromising the ability of the next generation to supply their own needs and therefore the tourism services chain is considered as an appropriate alternative to achieve sustainable development. The tourism service chain consists of a set of activities which sometimes provide a qualitative degradation and even destruction because of intensive use of nature, and in contrast, it has been able to preserve the environment. according to the role of rural sustainable development in the service chain, paying attention to both concepts and realization of rural tourism in two aspects of tourism services and sustainable rural development is necessary. Sustainable rural development has economic, social and environmental aspects that in all aspects of tourism services chain are the context for realizing the development of them. It should be noted that in the biological space of the village, the optimal realization of tourism services chain is related to that the negative outcome of tourism reaches to the minimum and its positive effects may reach the maximum that this point is hidden in the concept of sustainable development. Planning process in tourism services chain can be effective in sustainable rural development in economic dimensions (relationship between development with other economic sectors), society (participation in planning, education and employment) and environmental (conservation of important and scarce resources). As a result of the tourism services chain, it needs to apply certain guidelines and principles such as culture and training, accepting capacity, establishing participatory management, paying attention to maintaining the environment and taking advantage of indigenous knowledge (Pouratashi, 2000).

Baraghan village has diverse features of tourism which is important in terms of roundness and existence of historical monuments. There are also various economic activities such as manufacturing and selling handicrafts and types of residential and reception centers and many tourists come to the region. Also, this rural area has a variety of challenges in rural tourism economy including environmental and social and economic. Despite all these capacities and providing services including residential, welfare and supply of products, especially in the tourist seasons, there are many problems and some of the services offered to tourists will be discussed. Sometimes with the existence of suitable distribution facilities, there is no appropriate distribution or services provided to the tourist volume. Therefore, in this regard, in terms of diversity of all economic activities in a tourism chain, it is a good choice to evaluate the impact of tourism services on sustainable rural development. Therefore, this study aimed to investigate the effect of tourism services chain on sustainable rural development in Baraghan.

2. Research Theoretical Literature

Rural tourism has a particular type of tourism, which includes natural resources and residences, protected areas, unique landscapes, and diversity and culture (Paresishvili, et al, 2017). Rural tourism can be defined as a kind of tourism which is done in the village Context, or an economic activity that is dependent on the village and it uses it and offers something different from common tourism, rural tourism is related to the nature or the village (Peng & Lin, 2016). It can be said that rural tourism is not only a substitute for other types of tourism, but it is a kind of tourism in which tourists are actively looking for spaces outside of the city and rural life in contrast with urban life attracts tourists. (Kuzo & Kosar, 2017)

Today 's supply chain is complex and global networks that seek to provide appropriate products and services at the right place in the appropriate time (Kochan & Nowicki, 2018) without stability in global markets (Fiksel, 2010). Recent decades have been important for major changes in the supply chain and these changes have been caused by increasing the level of globalization and the higher rate of innovation (Kamalahmadi & Parast, 2016). Globalization is one of the most important factors in supply chain weakness, because it exposes the services to a broader spectrum of fluctuations and complexes (Maklan & Juttner, 2011). the service chain may have multiple interpretations, but in this research, one of the general, comprehensive and accepted definitions of this concept is used, network of institutes which are created by upstream and downstream communications, in the past few decades, there are prominent events and chronic problems, such as destructive earthquake, political challenges, fuel

hazards, diseases and terrorism, which severely impair the ability to produce and distribute productions.(Mandal, 2012; Sodhi et al., 2013; Chen et al. 2013; Sawik, 2013) and / or knowledge and information may occur by natural disasters such as floods, earthquakes, or disturbances that may occur as a result of loss of key suppliers, urban traffic, industrial challenges, and all can threaten the strength of supply chains (Pettit et al., 2010).

Tourism services chain consists of all suppliers (direct and indirect) of goods and services that satisfy the needs of tourists (Bay & Ran, 2022). The tourist service chain covers all aspects of economic, social and cultural dimensions of a tourist place and is equally sensitive to external developments as it plays an important role in rural tourism development.

2.1. Research background

Azizpour & Mazidi (2025) have argued that the spatial organization based on the capacity of villages - based on the capacity of villages - based on the capacity of villages - based on the tourism services chain, is the pattern of spatial organization based on the role of the two cities of Fazel Abad and Ali Abad toward the multi - core pattern with the role of villages - orientation. Marvi (2023) in this article entitled " supply chain resiliency model in promotion of marketing health and tourism services in Tehran" believes that the factors that use new technologies in supply chain, development of information system, creation of strategic relations with suppliers, empowerment and training of personnel, promotion of basic communication infrastructure are the most important factors affecting the resiliency of health tourism services in Tehran province. Toshani et al. (2023) believe that three dimensions of reception centers, stores and travel agents and tours in the first level and two dimensions of residential and environmental and energy in the second level and two dimensions of management and economic, information and communication at the fourth level and two aspects of management and economy are at the fifth level and finally security and safety at the sixth level.

Azizi et al. (2023) believe that all the spatial planning indices of the value chain governance of ecotourism settlements (case study: district 9 of land use Iran) believe that all of the spatial planning indices of the value chain of the ecotourism settlements are in undesirable condition. The results of the analysis of gray relation indicate that the studied villages are not equal in terms of spatial planning of the value chain of settlements in the region. Gharani et al. (2022) in an article entitled " the chain of services and development of rural economy " believes that one of the important industries of the village, handicrafts and tourism assistance to the growth of production, construction and sale in the village can improve the situation of rural economy and rural services chain.

Shaabani et al. (2021) believe that the results show that the two active components of this chain, namely producer and facilitator, have the highest direct and positive impact on rural tourism development and two activities of raw materials and completion (package) have negative and negative effects on the development of tourism economy. according to the results, the impact factor of the two levels of sales and retail stores is small and low value that in fact the physical presence of merchants and virtual and virtual stores, permanent and local markets and distribution and distribution networks in the region are weak and the necessity of using new technologies and electronic commerce for market development is obvious. Ghadiri Maasoum et al. (2019) in the paper entitled " evaluation of tourism services in the village of Egypt " believe that in the Egyptian village, five factors of transport, visitor information, accommodation, infrastructure and attractions have suitable performance and three factors of entertainment services, recreation and entertainment and shopping facilities have unsuitable performance in the tourism services chain of Egypt.

Shi et al. (2024) believe that retail price, service level, advertising level, and service chain profits are all increased by increasing service coefficient and advertising coefficient, and the speed of this increase for centralized model is more than other models. It is possible to provide valuable information for the companies in the service chain to develop collaborative strategies and promote the practices of tourism services chain management. Sinha & Mittal (2021) showed that the enablers are efficient and integrated, logistics and communication infrastructures, safe accommodation of the pilgrims, safe accommodation of the pilgrims, the infrastructure of health infrastructure, food, international pilgrims, government initiatives, personal safety. The results of the past researches show that so far, the supply chain of religious

tourism in Iran has not been addressed, so it is necessary to do so. Yang & Chen (2021) studied the impact of service level on the decisions of the supply chain in tourism supply chains. They built a travel service chain consisting of hotels and online travel agencies, where hotel rooms are reserved through reception of hotels and online travel agencies. They examine how hotel services influence the profit of the travel service chain under the three models. Jenna & colleagues (2019) discussed two tour operators offering tours and competing through a local operator on price and services in a paper titled " competition for price and services in the tourist service chain ".

Zhang et al (2021) say that a travel service chain consisting of a travel service chain consisting of a travel service chain consisting of a travel service provider of an uncertain demand and a travel service provider that invests in value - added services improving the service level of tourism products can improve the quality of tourism products, attract more tourists and improve the level of protection and protection of the pandemic in the area of improving product service level. therefore, improving the level of service for increasing the tourist product attracts more tourists and ensures the protection and safety of tourists.

3. Research Methodology

3.1 Geographical Scope of the Research

Baraghan village is located in Baraghan village, Chandar district of Savojbolagh county, west of Alborz province and is located in the heart of Alborz mountains at 1,650 m above sea level, between Karaj and Hashtgerd. the prosperity of the tourism industry in this village is due to the fact that it is directed to the kordan river; however, it should not be forgotten that the geographical location of Baraghan among the two rivers and shahrood is one of the main reasons for the development of this village. Geographical coordinates of Baraghan are 50 degrees and 56 minutes east and 35 degrees' north latitude.

Baraghan is located in northwest of Karaj and is located in the center of karaj 21 km (about 40 minutes of driving). the village is located in the capital city of Tehran about 68 km (1 hour and a half). About 470 people live in the village, according to the latest census in the year 95, and now, according to the region 's climate, the number will double in the first 6 months of the year, and in the end of the week, every home in the village is filled with residents. of course, the main texture of Baraghan village is about 52 hectares which in the past 1500 families and about 6000 people lived.

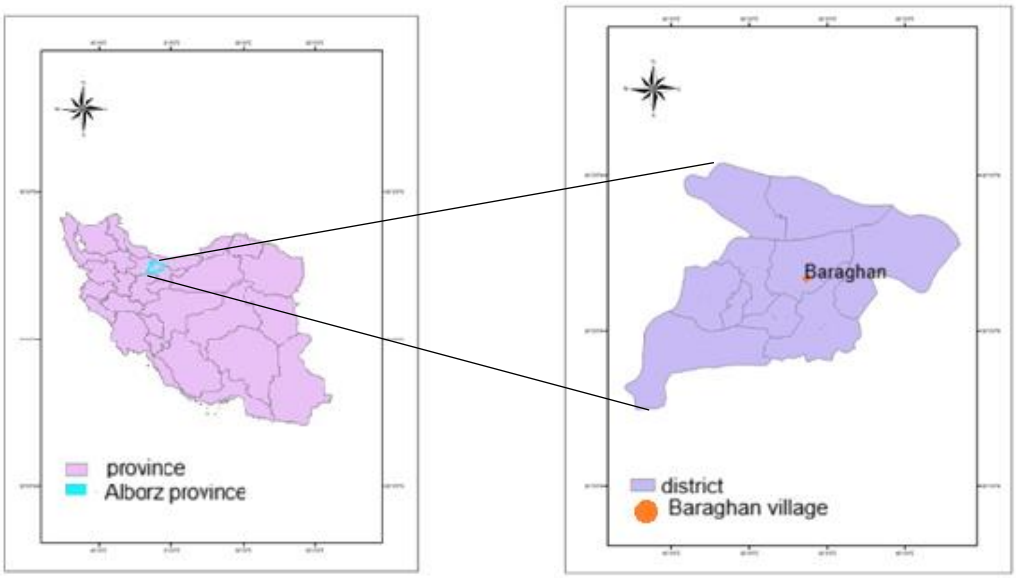


Figure 1. The study area

3.2. Methodology

the research method is descriptive - analytical which is used questionnaire. the family analysis unit. the statistical population consisted of 150 households that were selected as a sample of 128 households. the method of determining the sample size was census. the reason for choosing the census was that non - beneficiaries and practitioners of tourism, those who indirectly fall under the

auspices of tourism or even the benefit of tourism can also be considered in the study to use all the comments that agree or disagree on the field of tourism services. the sampling method was systematic random sampling. the reliability of the research was calculated 76.76 using Cronbach 's alpha formula (table 1), which indicates the suitability of the data and the validity of the research was confirmed by 8 experts of geography and rural planning and tourism management. the scale used Likert spectrum is 5 levels ranging from 1 to 5 very high. For the normality of the data, a single-sample Kolmogorov-Simronov test was used, which indicates the non-significance and normality of the data (Table 2).

Table 1. reliability

Component	Reliability	Appropriate/unappropriated
economy	**0.78**	appropriate
social	**0.77**	appropriate
physical	**0.81**	appropriate
infrastructural	**0.72**	appropriate
tourism destinations	**0.79**	appropriate
settlement	**0.71**	appropriate
infrastructural	**0.72**	appropriate
advertising	**0.76**	appropriate
environment	**0.75**	appropriate
average	**0.76**	appropriate

Table 2. Normality test

Component	Do you mean	Degree of freedom	Statistics
economy	0.07	128	0.282
social	0.12	128	0.871
physical	0.16	128	0.921
infrastructural	0.18	128	0.933
tourism destinations	0.22	128	0.97
اقامتی	0.23	128	0.981
infrastructural	0.24	128	0.983
advertising	0.11	128	0.794
environment	0.08	128	0.313

Table 3 shows the variables of research.

Table 3. Research variables

Component	Variable
Economy	economic benefits, land degradation, selling agricultural crops, selling dairy products, selling handicrafts, selling handicrafts, selling rural shops, the shortage of raw materials in the village, increasing the income of villagers, developing tourism businesses.
Physical	increasing the prices of agricultural land, changes of agricultural land, lack of housing for new people, becoming more beautiful in rural structure, urban housing, reconstruction of rural houses, improvement of streets and streets, complete implementation of rural guide plan
Social and cultural	decrease of social challenges in rural, profit and benefit of all of tourism benefits, the most benefit of the indigenous people for non - native people, some moral problems in rural society, decrease of immigration, improved security in tourism
environment	people awareness, attention to the environment of the village, noise pollution, wastes challenge, consideration of environmental issues by tourists
Transportation	improving the rural taxi and bus routes, improving the road leading to the village,

Component	Variable
	improving the road to the village, improvement of road pavement, development of tourist buses in the village, suitable tourism tours, increasing the workshop in the village
Infrastructure	improving infrastructure, infrastructure development, improving the quality of infrastructure, private sector investment in rural affairs, improving the quality of mosques and libraries, improving the quality of mosques and libraries and ... in the village, improving the information and upgrading the Internet, increasing the tourism agencies.
Settlement	the existence of rural settlements, the quality of restaurants, development of shopping centers, diversity of local products, price of reception centers, price of residential centers
Tourist attractions	natural attractions in the village, village architecture, historical buildings in the village, culture of indigenous people, tourist events in the village, beauty of surrounding villages, entertainment facilities, religious attractions.
Administration	attention of local managers to tourism development, attention of province managers to tourism development, attention of private sector to tourism development, recognition of islamic council members to tourism development, village head village attention to rural tourism development.
Advertising	advertising for tourist training, distribution of brochures in the village, advertising on roads leading to village, development of internet sites, advertising of indigenous people for their village, history of village promotion in national media, advertising channels messengers

Source: Azizpoor & Mazidi, 2025; Toshani et al., 2023; Gharani et al., 2022; Ghadiri Maasoum et al., 1999; Shi et al., 2021; Sinha & Mittha, 2021; Yang & Chen, 2021; Jena & Meena, 2019.

4. Research Findings

Table 3 presents the economic attributes of the tourist service chain. Tourism has positive impact on the production of complementary products such as dairy products and handicrafts, but the benefits of the economy are small in general and most of the benefits of tourism toward non - indigenous people have been. the destruction of agricultural land is an important matter and new opportunities in the village have not been created, but the farmers have managed to marketing among tourists and sell some of their products directly (table 4).

Table 4. Economic dimension

Statements	Very low	Low	Medium	High	Very high	Mean	Attitude
Tourism brings us a lot of economic benefits.	7	55.5	37.5	0	0	2.30	low
Tourism damaged farmland	0	0	5.5	50.8	43.8	3.62	high
Sales of agricultural crops up	0	0	46.9	51.6	1.6	3.55	high
Sales of dairy products increased	0	0	0	64.1	35.9	4.36	high
Hand - made crafts	4.7	44.5	50.8	0	0	4.26	low
Rural shopkeepers selling more	0	0	47.7	28.9	23.4	3.76	high
The goods in the village are expensive	0	12.5	36.7	25.8	25	3.37	low
Early materials in rural tourism are low	7	43.8	49.2	0	0	2.58	low
The income of the peasants increased	7	55.5	37.5	0	0	2.3	low
Good business has been achieved by developing rural tourism.	43.8	50.8	5.5	0	0	1.62	low
Total						2.92	low

Very low…….5 very high

In terms of physical structure of the village, the structure of the village is more beautiful and investment in physical affairs has increased but there has been a great tendency to create buildings with patterns of cities that this problem has negative effect on vernacular architecture of the region. Another problem is the desire to buy second homes that cause housing in the village for newly married people (table 5).

Table 5. Physical dimension

Statements	Very low	Low	Medium	High	Very high	Mean	Attitude
Agricultural prices have increased	0	0	36.7	41.4	21.9	3.15	high
Agricultural land changes	0	51.6	0	0	48.4	1.52	low
Housing shortages for newly married people	0	0	48.4	48.4	3.1	3.45	high
The structure of the village is becoming more beautiful	54.7	43.8	1.6	0	0	1.47	low
Rural housing has been found in urban form.	0	25	75	0	0	3.25	high
Rural house gradually rebuilt	0	81.3	18.8	0	0	2.19	low
There were better streets, streets, streets	28.1	28.1	43.8	28.1	0	3	high
Rural guide plan fully implemented	0	49.2	50.8	0	0	2.51	low
Total						2.56	low

Tourism has led to more attention to security by local authorities and the situation of rural security is good, but some cultural and social challenges between tourists and the indigenous people have emerged from cultural and economic differences. of course, tourists have been able to reduce migration and tend to decrease migration (table 6).

Table 6. Social and cultural dimension

Statements	Very low	Low	Medium	High	Very high	Mean	Attitude
Social challenges in rural areas	0	53.9	43.8	0	0	3.41	high
All the benefits of tourism are the same.	74.2	1.6	0	0	0	1.27	low
Non - native people benefit more from tourism interests than indigenous people	0	46.9	24.2	3.9	3.9	3.57	high
Little moral dilemmas in rural society	0	18	1.6	0	0	2.21	low
migration is reduced	17.2	28.9	29.7	0	0	2.27	low
Good security for tourism in the village	6.3	38.3	4.7	50.8	50.8	3.41	high
Total						2.69	low

people 's attention to the environment has grown and authorities have increased some facilities, such as the waste surface and the development of garbage collection machines, but with so much noise pollution and the problem of solid waste is still a major concern in the region (table 7).

Table 7. Environment dimension

Statements	Very low	Low	Medium	High	Very high	Mean	Attitude
People 's awareness of the environment has grown	0.8	1.46	14.8	14.1	24.2	3.15	high
More environmental attention has been paid to the environment	49.2	3.1	6.3	41.4	0	2.4	low
There's a lot of noise pollution in the village	0	0	0	82	18	4.18	high
Wastes are the main challenge of the village	0	0	0.8	50	49.2	4.48	high
Tourists observe environmental issues	51.6	44.5	3.9	3.9	0	2.01	low
Total						3.24	high

With the development of tourism, transport facilities have increased which in addition to tourists of the indigenous people have the possibility of using it and this caused the transportation infrastructure to be improved. also, the garage has grown in the village, which is good for tourists and the local people (table 8).

Table 8. Transportation dimension

Statements	Very low	Low	Medium	High	Very high	Mean	Attitude
Taxi and village bus routes suit	0	47.7	27.3	27.3	25	2.77	low
Roads leading to village are appropriate	0	0	1.46	1.46	53.9	3.54	high

Statements	Very low	Low	Medium	High	Very high	Mean	Attitude
He went to the village	0	0	0	0	13.3	4.87	high
Pavement is convenient	0	14.8	19.5	19.5	65.6	3.51	high
Tourist buses available in village	2.67	32.8	0	0	0	1.33	low
Appropriate tour tours will be held	0	2.3	55.5	55.5	42.2	3.44	high
There's a workshop in the village	0	0	46.1	46.1	53.9	3.54	high
Total						3.77	high

With the development of tourism tendency to investment in infrastructure affairs has become more and more private sector has become more willing to invest in the village. Many tourist agencies have been formed to help tourists Even the infrastructure that usually offers services to locals such as mosques and libraries is also grown (table 9).

Table 9. Infrastructure dimension

Statements	Very low	Low	Medium	High	Very high	Mean	Attitude
Under construction of water, electricity, gas, etc.	0	0	48.4	43	38.6	3.6	high
Internet and telephone infrastructure and so on	0	5.5	81.3	13.3	0	3.08	high
Investment in the village infrastructure has grown	0	1.6	74.2	24.2	0	3.23	high
Government pays more attention to infrastructure development	0	0	69.5	30.3	0	3.30	high
Private sector to invest more in rural matters	1.6	85.2	13.3	0	0	2.12	low
The mosque, library, and ... have improved better in the village.	0	0	3.1	50.8	46.1	4.43	high
There are good news updates and websites in the introduction of the village.	0	0	50.8	49.2	0	3.49	high
There are good agents in the village for transporting tourists to the village.	0	0	45.3	50.8	3.9	3.59	high
Total						3.35	high

Residences and restaurants with acceptable quality have been developed in the villages. Shopping centers have been developed, but the price of some of these centers and products that are high and sometimes not suitable for local people (table 10).

Table 10. Residences and restaurants and reception rooms

Statements	Very low	Low	Medium	High	Very high	Mean	Attitude
There are good rural settlements in the village.	57.8	35.9	6.3	0	0	1.48	low
Restaurant quality is good	0	0	0	50.8	49.2	4.49	high
There are good shopping centers in the village.	0	0	50	50	0	3.50	high
Diversity of local products	52.3	43	4.7	0	0	1.52	low
Reception centers prices are appropriate	0	0	48.4	50.8	8	3.52	high
The prices of residential centers are appropriate	0	6.7	38.3	0	0	2.38	low
Total						2.81	low

The village has good tourist attractions that gradually become more investment and some of them have been rebuilt and there are many recreational facilities for tourists. Various tourist events have also been held in recent years (table 11).

Table 11. Tourist attractions

Statements	Very low	Low	Medium	High	Very high	Mean	Attitude
There are good natural attractions in the village.	4.7	89.8	5.5	0	0	2.01	low
The village is beautiful in architecture	0	0	12.5	83.6	3.9	3.9	high
There is a good historical background in the	0	100	0	0	0	2	low

Statements	Very low	Low	Medium	High	Very high	Mean	Attitude
village.							
Indigenous people 's culture is beautiful	0	0	0	52.3	47.7	4.48	high
There is good tourism in the village.	0	2.3	84.4	13.3	0	3.11	high
Villages have unique beauty to villages	0	0	0.8	73.4	25.8	4.25	high
There are good fun and entertainment facilities in the country.	0	0	0.8	67.2	32	4.31	high
There are good religious facilities for tourists in the village.	0	50.8	49.2	0	0	2.49	low
Total						3.32	high

The attention of local and provincial managers to investment in rural and sustainable rural development has become more and new plan and investment in the village has been done that led to rural development. Meanwhile, the private sector is gradually developing its investments in the region. However, it is felt that more investment should be made in the training of local managers than with the principles of tourism development (table 12).

table 12. Management

Statements	Very low	Low	Medium	High	Very high	Mean	Attitude
Local managers pay attention to rural tourism development	0	0	2.49	50.8	0	3.51	high
Provincial administrators pay special attention to tourism development	0	0	51.6	48.4	0	3.48	high
Need for management training to promote rural tourism	50	8	49.2	0	0	1.99	low
Private sector brings good managers to develop tourism	0	0	0	50.8	49.2	4.49	low
Islamic council members have found good understanding of rural tourism development	50.8	38.3	9.4	1.6	0	2.11	low
Village head village has created good programs for rural development.	0	0	38.3	61.7	0	3.62	high
Total						3.2	high

Tourism development was accompanied by the development of advertising. the advertisement has also led to the development of tourism and has created opportunities to familiarize investors with investment opportunities in the region. on the other hand, it has led to the reputation of the village (table 13).

Table 13. Advertisement

Statements	Very low	Low	Medium	High	Very high	Mean	Attitude
There are good advertising in the village to train tourists.	0	0	72.2	24.2	3.1	3.3	high
Good brochures are distributed in the village	2.3	43	54.7	0	0	2.52	low
There are good ads for the village on the road leading to the village.	50.8	49.2	0	0	0	1.49	low
appropriate internet site for introduction village	18	37.5	39.8	4.7	0	2.31	low
People indigenous people make good publicity for their village	0	0	49.2	50.8	0	3.51	high
There is a history of village advertising in national media.	0	0	50.8	46.1	0	3.95	high
There are good channels in the messengers to introduce the village.	0	0	73.4	26.6	0	3.27	high
Total						2.7	low

Spearman correlation coefficient is used to identify the factors affecting the tourism services chain. The results of table show that the performance of tourism services chain has meaningful relation with the above components. this correlation is direct, each of the components has an important role in the tourism service chain (table 14).

Table 14. the relationship between the performance of tourism services with component

Component	correlation coefficient	significant
Economy	0.295	0.0
Physical	0.747	0.0
Social	0.323	0.0
Biological environment	0.723	0.0
Transportation	0.686	0.0
Infrastructure	0.400	0.0
Administration	0.846	0.0
Advertising	0.679	0.0
Settlement	0.812	0.0

Regression is used to identify the most effective components in tourism services chain. The summary is as follows (table 15):

Table 15. Summary regression model

Value R	R square	Adjusted R square	Std error of estimate
0.85	0.73	0.70	0.173

The table of regression is as follows, which indicates the suitability of the model (table 16).

Table 16. Means of regression testing

	Sum of squares	Degree of freedom	Mean square error	F	Significant
Regression	9.5	10	0.951	31.922	0.0
Residual	3.48	117	0.030		
Total	12.99	127			

In this table, it is clear that the most important component in the tourism service chain is advertising and in the second place is economic and third order of tourism attraction. this shows how important it is in attracting tourists and should be effective programs in attracting tourists through advertising (table 17).

Table 17. Value of beta

Dimension	Unstandardized B	Coefficient Std error	Standard Coefficient Beta	T	Significant
Constant	5.061	0.819		6.18	0.0
Advertising	0.23	0.034	0.72	7.02	0.0
Economy	0.192	0.017	0.64	11.21	0.0
Physical	0.042	0.028	0.21	1.51	0.0
Social	0.083	0.024	0.42	3.4	0.0
Transportation	0.050	0.026	0.22	1.94	0.0
Infrastructural	0.099	0.031	0.54	3.22	0.0
Settlement	0.007	0.037	0.036	1.18	0.0
Tourist attractions	0.266	0.041	0.61	6.4	0.0
Administration	0.033	0.051	0.04	0.64	0.0

$$Y=5.061+1.72x_1+1.44x_2+0.21x_3+0.42x_4+0.22x_5+0.54x_6+0.036x_7+1.25x_8+0.64x_9$$

In the following, effective factors in the improvement of tourism services chain are identified. Therefore, factor analysis is used. The method used is principal component. The amount of K.M. O is 0.81 and Bartlett 's Bartlett test indicates the suitability of the data for factor analysis. Varimax rotation was used for data analysis. The method of data extraction is based on value line 1. the amount of variance explained is 83 percent (table 18).

Table 18. the effective factors on sustainable rural development in the tourism service chain

Components	Variables	Weight
Selling local products	economic benefits, sales of agricultural products, sales of dairy products, sales of handicrafts, sales of rural shops, rural income, development of good business	28.12
Rural development	the beauty of the physical structure of the village, the reconstruction of rural houses, improvement street and streets, implementation of rural guide plan, improvement of road routes and bus routes, improvement of roads leading to village, improvement of roads leading to village, improvement of roads leading to tourism, development of tourism tourism tours	18.18
Improving social relations	reducing social challenges in the village, taking advantage of the interests of the people, indigenous to reduce moral problems, decreased immigration, improving security, improving awareness, paying attention to the environment of the village, paying attention to the tourists of environmental issues, improving the transportation to the village,	12.19
Agencies and improving public and non - governmental financing	improving the infrastructure of rural tourism, private attention to the development of infrastructure, public attention to the development of infrastructure, public attention to tourism development, attention of the local managers to the development of rural tourism, attention of the village head to rural tourism development.	10.21
Communication services and notification	development of information and internet websites, good advertising in the village for tourist training, advertising brochures, advertising on roads, internet sites, advertising in the national media, the presence of good channels in the messengers to introduce the village	9.9
Increasing commodity and service cost and pollution	land degradation, gravity of domestic goods, increasing the prices of agricultural land, changing agricultural land, increasing voice pollution, waste challenge	4.8
Total		**83.4**

5. Discussion and Conclusion

The service chain of tourism services is all economic and social processes affecting rural tourism affecting sustainable rural development. The findings show that the economic impact of tourism in the tourism services chain is limited and, in most cases, non - native people have benefited from tourism. in the physical view of roads and street, it is better to move the rural structure toward urbanization and lose its local nature. Socially, some social challenges and social conflicts have increased. in terms of management, attention is paid to local and provincial managers and more investment in infrastructure and residential affairs will be done. On the other hand, tourism leads to the spread of advertising and informing in the villages and the village has been raised largely. Among the extraction factors, important regression has the role in rural tourism development. the results of factor analysis show that four components of local products sale, improvement of rural areas, improvement of social relations, institutions and improving public and non - governmental and communication services are effective.

In response to the research question, it can be concluded that tourism services chain has a positive impact on sustainable rural development

and has provided conditions for development. for example, environmental challenges such as waste and noise pollution are among the concerns. also lack of sufficient interest of indigenous people from tourism services chain benefits is another challenge. price rises including goods and services and land price are among other concerns.

This research, like Azizpoor and Mazidi (2025), believes that the supply chain of tourism is not only in the village but also in relation to urban and rural settlements and non - native people have found many villages with villages to attract tourism interests. This article, as by Toshani et al (2023), believes that all aspects of advertising, economic, physical, social, transport, infrastructural and residential are effective in tourism services. This study, like Azizi and et al (2022), believes that catering and accommodation facilities require more investment to improve their facilities. Also, this research like the century (2022) concluded that handicrafts could be a good contribution to earning income in the services of tourism services for villagers. The study, like innocent Ghadiri Maasoum et al. (1999), believes that transportation, visitor information, stay, infrastructure and attraction have appropriate performance. Similar to shi et al. (2024), this study believes that retail price, service level, advertising level, and tourism service chain profit have all increased. The findings of this study, as Sinha and Mittal (2021), believe that an efficient and integrated information system, and updating and promotional information for tourism development is essential. as young and Chen (2021), the study believes that residential services have an important role in quality and performance of tourism services chain and sustainable rural development. As in Jena & Meena (2019), the role of agencies and tours in rural tourism development and optimal performance of tourism services are important. On the other hand, this study, like Zhang et al. (2021), believes that improving the service level of tourism products can improve the quality of tourism products and sustainable rural development leading to improved environment.

finally, according to the above - mentioned topics, the following suggestions are presented:

1. Based on the findings of research, tourism benefits in the services of tourism services to the benefit of non - native people. Although these inter and external relationships can lead to sustainable rural development, it should be managed in such a way that indigenous people have more roles.
2. Environmental challenges such as noise pollution and wastes are among the concerns that should be reduced by the development of sanitary and environmental infrastructure such as waste and garbage collection tools.
3. Becoming a city is an important concern for the local culture of the region. In this regard, educational and cultural programs should be used to preserve local values.

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Conflict of interest

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Original Article

تحلیل تجربی اثر زنجیره تأمین خدمات گردشگری بر توسعه پایدار روستایی (مطالعه موردی: روستای برغان، استان البرز)

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چکیده مبسوط

۱.مقدمه

سیستمهای زنجیره خدمات با هدف پشتیبانی از عملکرد مدیریت موجود و کنترل های هزینه حمل موجودی و هزینه های انجام آن مطرح شده است، به طوری که مدیریت موجودی کارآمدتر و اثربخش تر باشد. با اینکه ریشه های مدیریت زنجیره خدمات به مدیریت تأمین کنندگان یا ورودیها به یک فرایند یا شرکت برمی گردد. به توسعه جوامع و رشد اقتصادی و اجتماعی، صنعت گردشگری به سریع‌ترین صنعت در حال رشد در جهان تبدیل شده مردم مشتاقند از طریق گردشگری، فشار زندگی را کاهش دهند و بیشتر و بیشتر از گردشگری پایدار حمایت می‌کنند. در همین حال، رقابت بین شرکت‌های گردشگری برای جلب توجه گردشگران، روز به روز شدیدتر می‌شود. تجربه ضعیف گردشگران از گردشگری پایدار، تبلیغات و قیمت‌گذاری محصولات گردشگری و تلاش‌های خدمات توسعه پایدار به راحتی بر رفتارهای خرید گردشگران تأثیر بگذارد و منجر به عدم عملکرد روان شرکت‌های گردشگری شود. بنابراین، باید در تلاش‌های خدمات پایدار رقابتی سرمایه‌گذاری کنند تا محصولات گردشگری پایدار رقابتی‌تری را برای گردشگران ارائه دهند. با وجود تمام این قابلیت ها توزیع و تهیه خدمات اعم از اقامتی، رفاهی، عرضه محصولات به ویژه در فصول گردشگری با مشکلات زیادی روبرو است و بعضا نارضاتی از خدمات ارائه شده به گردشگران مطرح می شود. گاهی با وجود امکانات توزیع مناسبی صورت نمی گیرد یا خدمات ارائه شده متناسب با حجم گردشگران نیست. لذا از این نظر این منطقه به لحاظ اینکه تنوعی از تمامی فعالیت های اقتصادی موجود در یک زنجیره گردشگری را داراست انتخاب مناسبی برای ارزیابی تاثیر زنجیره خدمات گردشگری بر توسعه پایدار روستایی باشد. بنابراین این تحقیق با هدف بررسی تاثیر زنجیره خدمات گردشگری بر توسعه پایدار روستایی در برغان انجام گرفت. بنابراین این تحقیق با هدف بررسی تاثیر زنجیره خدمات گردشگری بر توسعه پایدار روستایی در برغان انجام گرفت.

۲. روش تحقیق

روش تحقیق توصیفی تحلیلی است که از ابزار پرسشنامه استفاده شده است. واحد تحلیل خانوار بوده است. جامعه آماری شامل ۱۵۰ خانوار است که نمونه ای بالغ بر ۱۲۸ خانوار انتخاب شد. روش تعیین حجم نمونه سرشماری بوده است. علت انتخاب سرشماری این بود که غیر از ذی نفعان و شاغلان گردشگری، افرادی که به طور غیرمستقیم تحت تاثیرگرشگری قرار می گیرند یا حتی منفعتی از گردشگری نمی برند نیز در تحقیق لحاظ شوند تا از تمامی نظرات موافق و مخالف در زمینه زنجیره خدمات گردشگری استفاده شود. روش نمونه گیری به صورت نمونه گیری تصادفی سیستماتیک بوده است. پایایی تحقیق با استفاده از فرمول آلفای کرونباخ برابر با میانگین ۰/۷۶ بوده است که حاکی از مناسب بودن داده ها دارد و روایی تحقیق با استفاده از نظر ۸ نفر از متخصصان جغرافیا و برنامه ریزی روستایی و مدیریت جهانگری تایید شد.

۳. یافته‌های تحقیق

منافع اقتصادی زنجیره خدمات خدمات گسترده بوده است. گردشگری بر تولید محصولات مکملی همچون محصولات لبنی و صنایع دستی تاثیر مثبتی گذاشته و فروش آن ها را بیشتر کرده است اما بیشتر منافع گردشگری به سمت افراد غیربومی رفته است. تخریب زمین های کشاورزی زیاد بوه است و فرصت های جدیدی در روستا به وجود نیامده است اما کشاورزان توانسته اند در بین گردشگران بازاریابی کنند و برخی از محصولات خود را به طور مستقیم به آن ها بفروشند. به لحاظ کالبدی ساختار روستا زیباتر شده و سرمایه گذاری در امور کالبدی بیشتر شده است اما تمایل زیادی برای ایجاد ساختمان هایی با الگوگیری از شهرها ایجاد شده است که این مساله بر معماری بومی منطقه اثر منفی گذاشته است.

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همچنین گردشگری سبب شده تا مساله امنیت توسط مسئولان محلی بیشتر مورد توجه قرار گیرد از نظر زیست محیطی هم توجه مردم به محیطزیست بیشتر شده است و مسئولان برخی امکانات مثل سطح زباله و توسعه ماشین‌های جمع آوری زباله را بیشتر کرده اند اما منطقه دچار آلودگی ناشی از پسماندها شده است و همچنین سر و صدا و آلودگی صوتی از جمله نگرانی‌ها است. در عین حال با توسعه گردشگری امکانات حمل و نقل بیشتر شده که علاوه بر گردشگران مردم بومی هم امکان استفاده از ان را دارند. همچنین با توسعه گردشگری تمایل به سرمایه‌گذاری در امور زیربنایی توسط مسئولان محلی و دولتی بیشتر شده است و بخش خصوصی تمایل بیشتری به سرمایه گذاری در داخل روستا پیدا کرده است. در برغان اقامتگاه‌ها و رستوران های زیادی با کیفیت قابل قبول در روستاها توسعه یافته اند. مراکز خرید گسترش یافته است اما قیمت برخی از این مراکز و محصولاتی که می فروشند زیاد است و بعضا مناسب افراد بومی نیست. از دیگر اتفاقاتی که در روستا افتاده است توجه مدیران محلی و استانی به سرمایه گذاری در روستا و توسعه پایدار روستایی است و برنامه ریزی ها و سرمایه گذاری های جدیدی در روستا صورت گرفته است که منجر به توسعه روستا شده است. در کنار این موارد توسعه گردشگری همراه با توسعه تبلیغات بوده است. این تبلیغات هم منجر به توسعه گردشگری شده است و هم فرصت‌هایی برای آشنایی سرمایه‌گذاران با فرصت های سرمایه گذاری در منطقه پدید اورده است. برای شناسایی عوامل موثر در زنجیره خدمات گردشگری از ضریب همبستگی اسپیرمن استفاده می شود. نتایج جدول نشان می دهد که عملکرد زنجیره خدمات گردشگری رابطه معنی‌داری در سطح ۰/۰۱ با مولفه های فوق داشته است. این همبستگی مستقیم است هر یک از مولفه ها نقش مهمی در زنجیره خدمات گردشگری دارند.

۴. بحث و نتیجه‌گیری

این تحقیق نشان داد که زنجیره خدمات گردشگری منجر به توسعه گردشگری و خدمات رسانی به روستاییان شده است و تمامی ابعاد توسعه روستایی را تحت تاثیر قرار داده است. ۵ مولفه که در زنجیره خدمات گردشگری موثر هستند شامل فروش محصولات محلی، بهسازی نواحی روستایی، بهبود روابط اجتماعی، نهادها و بهبود سرمایه گذاری های دولتی و غیر دولتی، خدمات ارتباطی و اطلاع رسانی و افزایش هزینه های کالا و خدمات و آلایندگی است. البته مورد آخر برخلاف موارد دیگر منفی است و نشان می‌دهد که این زنجیره فقط تاثیرات مثبت نداشته و تاثیرات منفی بر روستا گذاشته است. افزایش هزینه ها و قیمت ها و آلودگی محیط زیست از جمله تبعات منفی زنجیره خدمات گردشگری روستایی هستند که بایستی مورد توجه قرار داد و از اثرات منفی آن کاست. در کنار این موارد حمایت دولت و نهادهای غیر دولتی می توانند بستر های توسعه زنجیره خدمات گردشگری را ایجاد کنند و به توسعه روستایی و توسعه گردشگری روستایی کمک کنند.

کلیدواژه‌ها: زنجیره خدمات گردشگری، توسعه پایدار روستایی، گردشگری روستایی، روستای برغان.

تشکر و قدردانی

مطالعه حاضر حامی مالی نداشته و حاصل فعالیت علمی نویسنده (گان) است.

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Original Article

Future Research of Sustainable Rural Planning based on Information and Communication Technology in East Azerbaijan Province

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Abstract

Purpose- Rapid advancements in Information and Communication Technology (ICT) present complex uncertainties for rural planning, with traditional methods often insufficient for navigating these ambiguities. This study aims to identify key drivers and plausible future scenarios for sustainable rural development based on ICT in East Azerbaijan Province, a region currently seeking to optimize its developmental position.

Design/methodology/approach- This applied research utilizes a descriptive-analytical method based on a future study approach. Data were collected through citation review and a researcher-made questionnaire completed by a panel of 31 experts. Structural analysis was performed using a 23×23 cross-impact matrix (MICMAC software) to identify key drivers, followed by scenario analysis (Scenario Wizard) to determine consistent future situations for a 10-year horizon (2033).

Finding- The analysis of the dispersion plane indicates that the system is unstable. Out of 23 initial variables, 7 key drivers were identified as the most critical factors affecting the system. The variable "execution of intra-village research with the cooperation of village residents to adapt ICT-based development principles to regional conditions" ranked first in terms of direct and indirect influence. Based on these drivers, 21 possible situations were designed. Ultimately, 8 scenarios with high consistency were extracted. he results suggest that the most consistent and favorable scenarios for the horizon of 2033 rely on "Creating sites related to villagers' affairs with content adapted to local culture" and "Directing extension programs to explain the necessity of ICT development." These findings provide a strategic roadmap for policymakers to transition from static planning to dynamic, future-oriented rural development.

Research limitations/implications- The study is limited to East Azerbaijan Province and relies on expert panel judgments, which may introduce subjective bias. Future research could expand the geographical scope and incorporate quantitative indicators for validation.

Originality/value- This study contributes to the literature by applying a foresight approach to ICT-based rural planning in Iran, providing a strategic roadmap for policymakers to transition from static planning to dynamic, future-oriented rural development.

Key words: Future Study, Rural Planning, Sustainable Development, ICT, East Azerbaijan.

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1. Introduction

We live in the era of communications and information, or, the revolution of communications or the revolution of information. (Ghorbani et al., 2019). Information and communication technology (ICT) as a new paradigm governing development, has become the main focus of all aspects of development and progress by influencing the way of thinking and acting and changing work and life patterns, and is considered both the cause and sign of development (Zarrabi et al., 2016. The appropriate recognition and the use of the new opportunities that this paradigm governing development presents, as the most powerful instrument of empowerment and equalization in the field of sustainable development, in order to advance economic, social, political goals, etc., to form the future era, requires awareness and adjustment with the revolutionary wave because with little negligence, we will lose the opportunities (Zarrabi et al., 2014). With the development of the Third Wave Theory by Toffler that outlined technological revolution (Jain, 2014), global communities started to learn, develop the transfer of experiences and information and zone their communication so that they can play a role and make changes for their own benefits in macro, economic, social, political and cultural fields that are directly related to the globalization process (Heddeghem et al., 2014). The use of information and communication technology can motivate the empowerment and conscious influence of this forgotten group in the process sustainability of the rural environment of Iran, and considering the ICT (FAVA) education can be effective in sustainable rural development from different dimensions (Mousazadeh et al., 2021). However, ICT (FAVA) is known as a tool for sustainable rural development in order to mitigate poverty, close the digital gap and prevent the indiscriminate migration of villagers to cities, and it is a complex issue and its development requires simultaneous interaction (Razavi Mashauf et al., 2018).

ICT (FAVA) has brought social, environmental and economic development worldwide, as the availability of the market and market information has made it possible among the rural residents to enhance their income (Khodapanah, 2021). Today, the debate of ICT (FAVA) has become a necessity for policy makers, planners and actors of rural development, and the important issue is that the proper utilization of this technology brings important achievements to promote the development of rural communities (Sorani et al., 2012). Indeed, as sustainable development in the current world is based on knowledge, the management of sustainable rural development in Iran should also emphasize on knowledge (Hajinejad et al., 2011). ICT (FAVA) centers increase productivity and mitigate living costs for villagers by providing access to the required services (Farahani et al., 2012). By using these technologies, it is possible to provide knowledge related to rural communities and enhance and increase the employment and income of villagers in structural frameworks, and strengthen the creation of new economic knowledge by villagers (Zahrani et al., 2021). It is worth to mention that despite the introduction of ICT (FAVA) in many villages of Iran, many of the capabilities of this technology in the rural sector have not received much attention due to the lack of adequate knowledge about promoting and inhibiting factors, and it has also not been properly employed (Sorani et al., 2014). It should be mentioned that access to information and communication technology will lead to the economic, social and cultural development of rural areas. Information and communication technology presents the access to the benefits and infrastructure of development for people, and to the same extent, the lack of access to information and communication technology makes a challenge in achieving the goals of sustainable development for the rural community (Movahedi et al., 2017). On the other hand, it should be stated that the investigation of many developments in today's villages and planning for their future is not imagined without considering the role and importance of ICT development. For this reason, today, the regulation of ICT development policies and strategies has become an important issue for many countries, especially third world countries (Seidiy and Hedayati Moghadam, 2012).

In examining the effects of foresight in policymaking, future study is regarded as an intelligent strategic tool. This name indicates the necessity of evaluating the position of foresight in the policy system and the methods to improve its effects. Also, the requirement for the successful

design of foresight activities is a clear perception of the effect of foresight on policy-making (Namdarian, 2017) and it can play a crucial role in the development and application of proper policies in the planning structure of the region. In order to achieve sustainable rural development based on information and communication technology, different strategies should be taken: understanding the internal relations between the economic, social, environmental and political sectors, find solutions about the dangers we encounter, good and continuous control of the stakeholders and, finally, future study for designing policies and effective programming and create an understanding of the future in case of multiple and unstable developments in rural communities (Khaleghi, 2024).

Some studies have been performed by various researchers such as Grimes (1992), Ajani (2014), Krishna et al. (2015), Alam and Wagner (2016), El Bilali (2017), Kusakina et al. 2018), Aldosari (2019), Zhu et al. (2021) on IT. A review of the literature reveals that while the role of ICT in rural development has been discussed, the application of a foresight approach to identify future scenarios in this field has received less attention. The results of various researches show that neglecting the role and importance of foresight and the process of future developments of information and communication technology and the path in which villages will be positioned will lead to encountering serious barriers, imposing pressure on future generations and ultimately strategic neglect. Under such conditions, the importance and role of foresight approach in sustainable rural development is evident based on information and communication technology. Using this approach, it is possible to know the future developments of sustainable rural development and strive for improvement, stability, reconstruction and modernization of rural society based on new ideas and beliefs, as well as creating healthy communities, considering the advantages of modern information and communication technologies.

2. Research Theoretical Literature

The latest ranking status of Iran in terms of the ICT (FAVA) development index, which was published by the World Telecommunication Union by 2017, indicates that Iran assigns the 81st place among 167 countries around the world, and based on this report, Iran is lower than the global average in the sub-index of the use of ICT. However, according to official statistics by the 2015, Iran was ranked 15th in the region and 89th in the world in terms of development of communication and information technology. Despite its improvement among the countries of the region and the world, Iran has not reached an acceptable rank among the countries of the region and the world, and there is a big gap between Iran and the global average in this field (Zeinalzadeh et al., 2021). Despite its historical and cultural significance in the field of communication and the extensive measures taken in the field of infrastructure, East Azerbaijan still has not found its real position in the country and is on the path of progress. With the new measures of institutions related to communication and with the development of the province's planning and development document, it is hoped that East Azerbaijan will become the leading and prominent province of Iran in terms of employment and internet business and production support in the future. The implementation of communication and information projects of the province has made good progress compared to other aspects of the planning and development document, so that the Internet coverage has been predicted in one thousand and 122 villages, all of which have been realized and more than this number have been covered. The rural communication development plan of optical fiber has been announced with the aim of developing broadband in rural areas and strengthening the broadband core of the rural communication network. In this regard and considering the necessity of the research problem, the present study attempts to analyze and evaluate the process of prioritization and the importance of ICT influence indicators and the process of the effect of economic and social components from these areas and the components of this approach using structural effects analysis in East Azerbaijan province as a study field. The conceptual model of this research is based on the structural analysis of cross-impacts (MICMAC). In this model, the primary factors (23 variables) are ultimately reduced to 7 key factors (main drivers), and their relationships are examined within the framework of an unstable system.

Table 1. Conceptual Model Elements and Key Drivers

Main Elements of the Model	Definition Based on Research	Key Variables (Future Drivers)
Input (Drivers)	Influential and Strategic Factors for the future of ICT-based rural development in East Azerbaijan province.	Execute intra-village research, Increase the interaction of ICT development research system, create sites related to the affairs of villagers, strengthen feedback loops, Hold specialized ICT training courses, Use the experience and innovations of rural communities in different countries, Direct extension programs.
Process (Structural Analysis)	The complex, bidirectional, and unstable relationship among the key factors	Analysis of direct/indirect effects (23x23 matrix) and determination of plausible scenarios (8 scenarios with high consistency).
Output (Ultimate Goal)	Achieving Sustainable Rural Development through the use of ICT.	Advancing economic, social, and political goals, etc., in the rural areas of East Azerbaijan.

3. Research Methodology

3.1 Geographical Scope of the Research

The geographical area of the research is East Azerbaijan province. East Azerbaijan with an area of 45,490.89 square kilometers occupies 2.76 % of the country's area. According to the latest political divisions in 2017, East Azerbaijan province has 21 cities, 46 districts, 63 cities and 144 villages. Also, out of 3077 villages of East Azerbaijan province, 88.04 % (2079 villages) have inhabitants. According to the results of the census of 2016, the population of East Azerbaijan Province has reached 3,909652 people with an average annual growth of 0.97 compared to 2011, of which 1989400 are men and 1920252 are women. Accordingly, the gender ratio of the province's population is 104 (Figure 1).

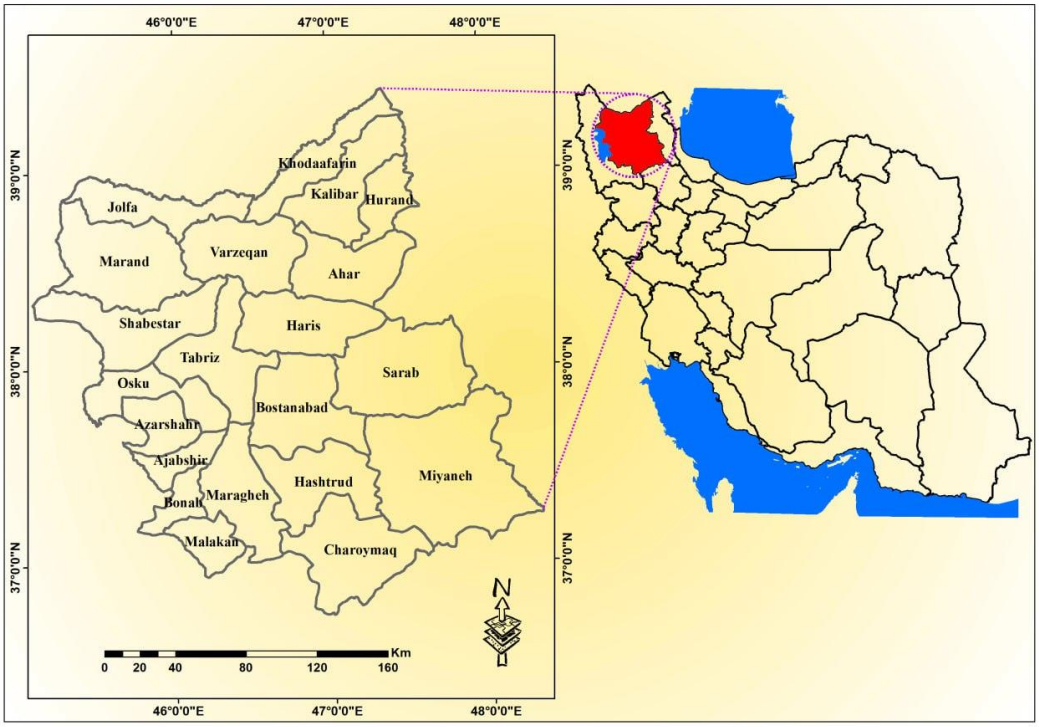


Figure 1. Map of the study area

3.2. Methodology

The present research is applied based on the purpose and descriptive-analytical type in terms of

nature and method and it is based on the future study approach from the time dimension. The reason for grouping forecasting tools is that all of these tools, regardless of whether they are quantitative or qualitative, have some inherent and inevitable ontological and epistemological assumptions. These assumptions indicate how we view the future as imaginary or objective and at the same time as something that reveals or constructs the future. The results of the citation survey to identify the key factors effective in the future of rural communication and improvement technology in East Azerbaijan province in the form of a mutual effects analysis matrix (influence rate from 0 to 3) have been provided to the respondents for analysis in MICMAC software as a researcher-made questionnaire. At this stage, 31 experts have been identified. The participants include expert university professors, experts in the governorate, cooperative, agricultural jihad, governorate, district administration, and researchers in the field of rural and regional planning and agricultural development and extension. Figure 2 demonstrates the characteristics of the respondents.

To calculate the validity, content and face validity methods and techniques have been employed. Cronbach's alpha method was also used to measure the reliability of the research questionnaire. Cronbach's alpha coefficient for structural effects analysis is 0.83.

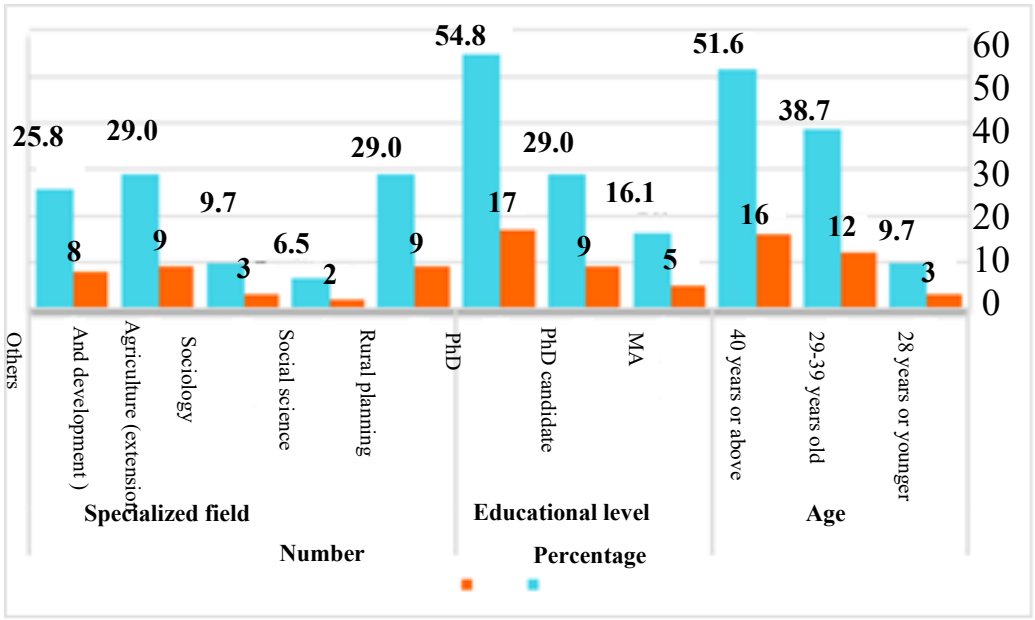


Figure 2. Specifications of respondents

4. Research Findings

The MICMAC software method is such that first, important variables and components are identified in the desired field, then they are entered in the influence analysis matrix, and the degree of connection between these variables and the relevant field is determined by experts. The variables in the rows influence the variables in the columns; thus, the variables in the rows are influential and the variables in the columns are dependent (Godet, 2006; Godet & Durance, 2011). This matrix is known as MDI or matrix of direct influence, and each MDIij represents the influence of each variable i on variable j, which can be expressed as quantitative numbers from zero to 3 (Godet, 2006). Zero indicates the absence of relationship between the variables, 1 indicates weak relationship, two is an average relationship and three indicates a strong relationship, so if the number of identified variables is n, an n*n matrix is obtained in which the influences of the variables on each other are determined. In general, the present study identified 22 variables as primary factors and analyzed with MICMAC software. In the cross matrix, the sum of the row numbers of each factor, the amount of influence and the column sum of each factor demonstrates its influence from other factors. 23 primary key factors to form the matrix of cross effects in order to identify the future of sustainable rural planning based on information and communication

technology (ICT) in the form of hardware and software dimensions are displayed in Table 3.

Table 3- Foresight of sustainable rural development based on information and communication technology

Dimension	Variable	Code
Hardware	Execution of intra-village research with the cooperation of villagers in order to adapt ICT-based development principles to the conditions of the region	Hard01
	Increase the interaction of ICT development research system with rural development researchers	Hard02
	ICT network security	Hard03
	Create sites related to the affairs of villagers and coordinating the content of the sites to the culture of villagers	Hard04
	Localize and produce software and applications in accordance with the conditions of rural areas	Hard05
	Supply equipment according to the needs of villagers	Hard06
	Strengthen feedback loops between researchers and with other stakeholders to identify technologies required by villagers	Hard07
	Strengthen information and communication infrastructures to transfer ICT knowledge to villagers	Hard08
	Wider access of rural residents to information and communication tools	Hard09
Software	Adopt appropriate policies to strengthen the physical, information and communication infrastructure	Soft01
	Adopt policies to provide human resources and training of ICT experts	Soft02
	Use the capacity of the private sector and public institutions in the development of ICT in rural areas	Soft03
	Increase villagers' trust and use of ICT in agricultural businesses	Soft04
	Making local managers, experts and rural extension authorities familiar with the concepts, principles and benefits of using ICT	Soft05
Software	Revise and reform laws related to ICT development with the approach of sustainable rural development	Soft06
	Hold specialized ICT training courses for rural experts and extension authorities	Soft07
	Use the experience and innovations of rural communities in different countries in the field of ICT	Soft08
	Allocate the credit budget for the implementation of development programs based on ICT	Soft09
	Develop a strategic and operational plan for the development of ICT in the rural areas	Soft10
	Direct extension programs in order to explain the necessity of ICT development among the villagers	Soft11
	Perceive the economic, social and environmental advantages of ICT by policy makers	Soft12
	Identify the information needs of villagers regarding each of the principles of information and communication technologies	Soft13
	Coordinate between programs of government and non-government institutions and organizations related to ICT	Soft14

Source: (Research findings, 2022) using the theoretical basics of research

23 factors were extracted in two hardware and software dimensions. In the second stage, the factors entered into the cross-impact matrix to determine the level and amount of their influence on each other and on the future process of sustainable rural development planning based on information and communication technology. The number of identified variables N should form an N×N matrix. The degree of this influence is from 0 to 3. Zero indicates no effect, 1 indicates weak effect, number 2 indicates moderate effect, and 3 indicates high effect. After determining the degree of influence of the factors, the matrix was entered into the MICMAC software to extract the key factors. The dimensions of the matrix are 23 x 23, and the degree of saturation of the matrix is 93.194, which shows that the factors have influenced each other in more than 93%. Out of the total 493 possible relationships in this matrix, 36

relations indicate zero, 86 relations show 1, 230 relations indicate 2 and 177 relations show 3.

Table 4. Direct and indirect influence of variables on each other

N	Variable	Influence	Dependence	N	Variable
1	Execute intra-village research with the cooperation of villagers in order to adapt ICT-based development principles to the conditions of the region	55	56	120795	123030
2	Increase the interaction of ICT development research system with rural development researchers	54	51	118338	112275
3	ICT Network Security	36	46	81052	101321
4	Create sites related to the affairs of villagers and coordinating the content of the sites to the culture of villagers	55	52	120631	113750
5	Localize and produce software and applications in accordance with the conditions of rural areas	43	48	96068	105701
6	Supply equipment according to the needs of villagers	39	46	86401	101580
7	Strengthen feedback loops between researchers and with other stakeholders to identify technologies required by villagers	50	53	110100	116060
8	Strengthen information and communication infrastructures to transfer ICT knowledge to villagers	48	37	106346	82903
9	Wider access of rural residents to information and communication tools	37	45	80798	99152
10	Adopt appropriate policies to strengthen the physical, information and communication infrastructure	40	48	89496	106717
11	Adopt policies to provide human resources and training of ICT experts	39	54	88015	118691
12	Use the capacity of the private sector and public institutions in the development of ICT in rural areas	39	39	85791	87089
13	Increase villagers' trust and use of ICT in agricultural businesses	43	43	94011	94130
14	Making local managers, experts and rural extension authorities familiar with the concepts, principles and benefits of using ICT	41	49	92098	108533
15	Revise and reform laws related to ICT development with the approach of sustainable rural development	59	46	128477	101904
16	Hold specialized ICT training courses for rural experts and extension authorities	50	48	109104	106358
17	Use the experience and innovations of rural communities in different countries in the field	53	53	116526	116613

N	Variable	Influence	Dependence	N	Variable
	of ICT				
18	Allocate the credit budget for the implementation of development programs based on ICT	45	49	101591	108824
19	Develop a strategic and operational plan for the development of ICT in the rural areas	50	38	110455	85118
20	Direct extension programs in order to explain the necessity of ICT development among the villagers	53	41	115501	90054
21	Perceive the economic, social and environmental advantages of ICT by policy makers	57	51	124313	113289
22	Identify the information needs of villagers regarding each of the principles of information and communication technologies	43	41	97003	90739
23	Coordinate between programs of government and non-government institutions and organizations related to ICT	48	43	107785	96864

It should be mentioned that the changes in the results of the analysis of direct and indirect effects are little, and based on the results of the first ranks, both in direct and indirect effects, there is not much difference from each other, and the variables with a high effect are repeated in the same way with a few rows of displacement. Thus, the number of the first 7 indicators of both groups is almost the same (Figure 3)

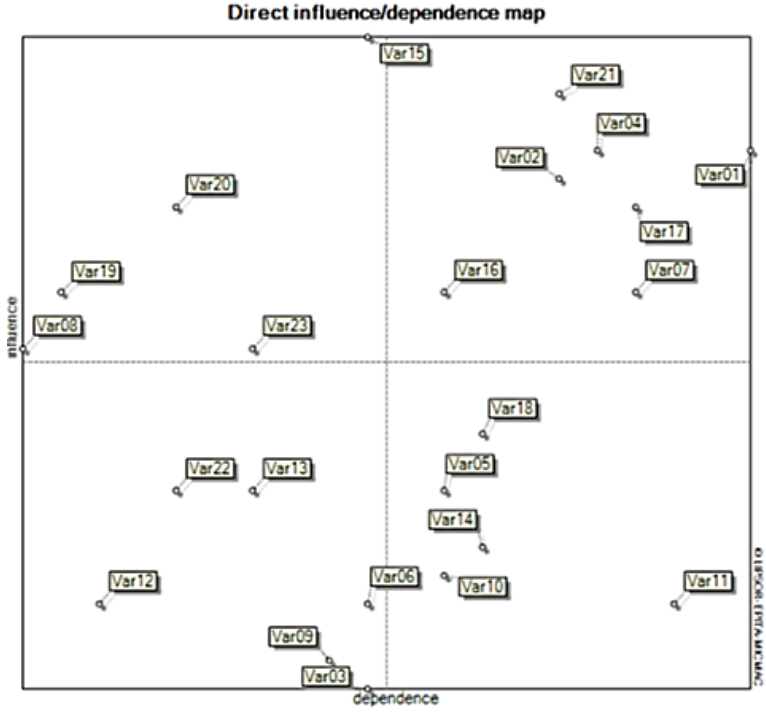


Figure 3. Dispersion of variables based on direct effects in terms of influence and dependence

The method of the dispersion of the factors on this graph shows the state of the system. Whether it is stable or unstable? This basic understanding of the state of the system affects how to analyze the factors. In stable systems, the dispersion of factors is L-shaped, which means that some factors are highly influential and some are highly dependent. Therefore, in stable systems, there are three categories of influencing factors, dependent and independent factors. On the other hand, in unstable systems, the situation is more complicated than in stable systems. In these systems, the factors are scattered around the diagonal axis of the plane, and the factors are in an intermediate state most of the time (Godet, 2006). Based on the state of the dispersion plane of the effective variables, we can understand about the state of instability of the system. Most of the variables are dispersed around the diagonal axis of the plane. Except for a few limited factors that show that they have a high influence in the system, the rest of the variables have a similar status to each other. Therefore, the variables in Table 6 can be identified according to the instability of the system.

Table 6. Different types of identified variables

Variable type	Distribution method
Variables of district 1 (Bidirectional, strategic or surprising)	Implementation of intra-village research with the cooperation of villagers for the adaptation with the ICT-based development principles to regional conditions
	Increase the interaction of ICT development research system with rural development researchers
	Create sites related to the affairs of villagers and adjust the content of the sites to the culture of the villagers
	Strengthen feedback loops between researchers and with other stakeholders to identify technologies required by villagers
	Hold specialized ICT training courses for rural experts and extension authorities
	Take advantage of the experience and innovations of rural communities in different countries in the field of ICT
	Direct extension programs in order to explain the necessity of ICT development among the villagers

Bidirectional variables have two common characteristics of high influence and highly dependent, any change in these variables will cause changes in other variables. The drivers of district 1 are the most influential indicators. Influence graph variables indicate the relationships between variables and how they influence each other. This graph is shown with red and blue lines; the end of each line is indicated by an arrow and shows the direction of the variable effect. The red lines indicate the strong influence of the factors on each other, and the blue lines, with differences in thickness, indicate moderate to weak relationships (Figure 4).

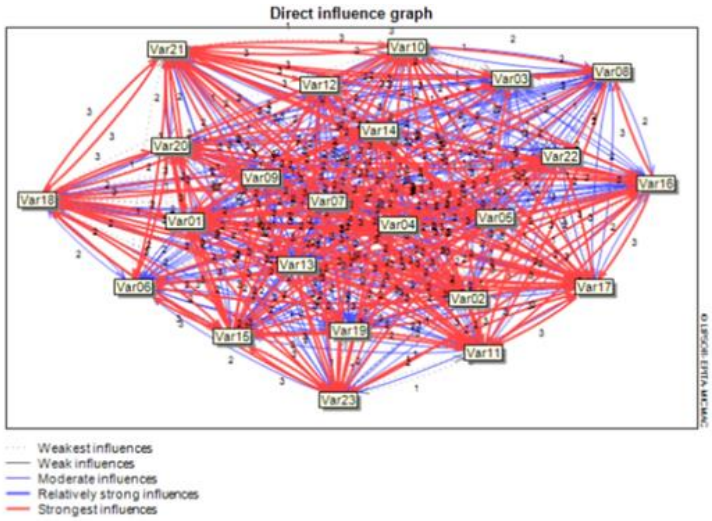


Figure 4. Direct effect cycle graph

All the factors have double effects and the dependent factors on the other hand have high influence. For this reason, the same 7 influential factors in direct and indirect influence have been repeated in the same way (Figure 5). This indicates the validity, accuracy of calculations and its reliability.

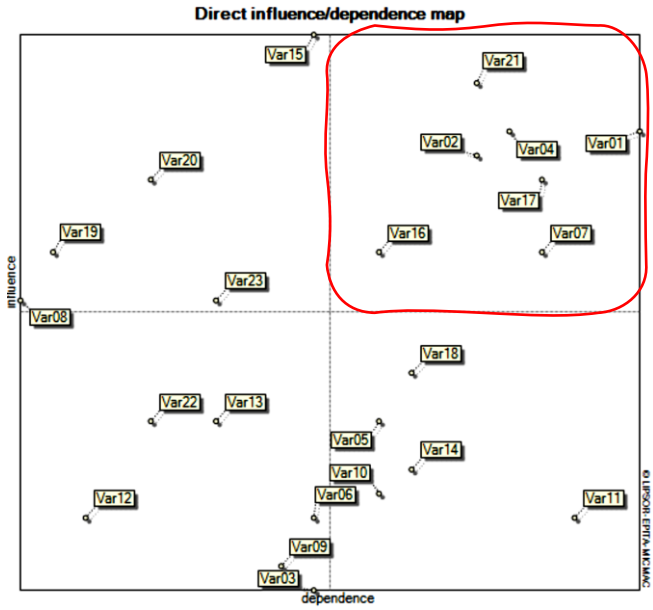


Figure 5. Direct influence-dependence map

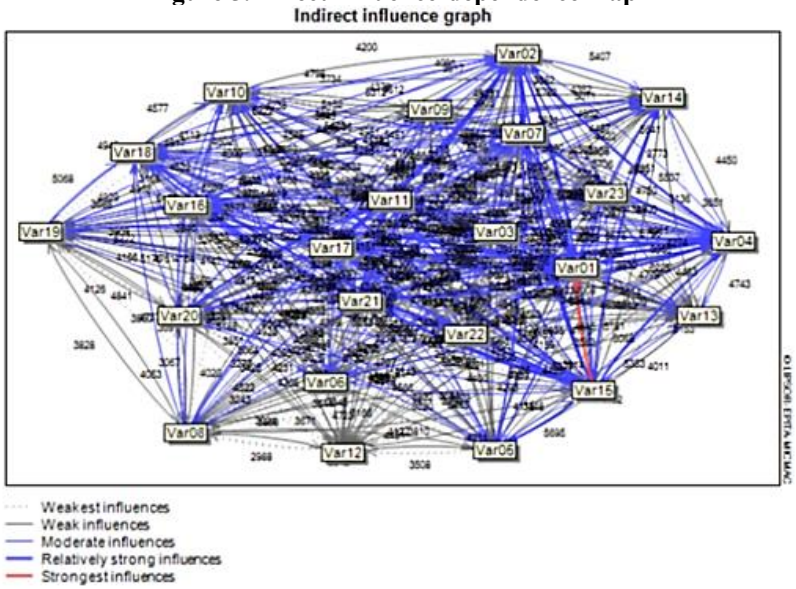


Figure 6. Indirect influence cycle graph

To make a final conclusion to determine the effective key drivers on the local planning approach of rural settlements, based on the results of two methods, including "the rank of variables in each of the states" and "the total effect of variables in all states", the key and effective factors have been selected as described in Figure 7. Therefore, the key and effective drivers that can be considered in this research for the future approach of sustainable rural planning based on information and communication technology



Figure 7. Final ranking of key factors affecting the system

The process of structural analysis of cross effects of factors on each other was formed with a matrix that their dimensions (23 x 23) were obtained via interviews with the panel. The results indicated that the matrix based on statistical indicators with two data rotations has a 99% desirability, which demonstrates the high validity of the responses. Examining the state of the dispersion plane of the effective variables showed the instability state of the system. Most of the variables were dispersed around the diagonal axis of the plane, except for a few limited factors that show that they have a high influence in the system, the rest of the variables had almost the same status to each other. Totally, 7 key drivers for the future approach of sustainable rural planning based on information and communication technology (ICT) were determined and identified.

Based on possible future situations, in total, 21 different situations have been designed for 7 key factors, which include a range of favorable to unfavorable conditions, and the number of conditions for each factor is composed of three possible situations (Table 7).

Table 7. Key factors and possible future scenarios for ICT-based sustainable rural planning

Key factors		Desirability degree	Uncertainties	Code
A	Implementation of intra-village research with the cooperation of villagers to adapt ICT (FAVA)-based development principles to the conditions of the desired region.	Good	Coherent and efficient planning to implement intra-rural research with the cooperation of villagers to adapt ICT (Fava)-based development principles to the conditions of the region	A1
		Intermediate and static	Inadequate attention to the implementation of intra-village research with the cooperation of villagers in order to adapt ICT-based development principles to the conditions of the region	A2
		Undesirable	Not considering intra-village research with the cooperation of villagers in order to adapt ICT-based development principles to the conditions of the region	A3
B	Increase the interaction of ICT development research system with rural development	Desirable	Increase the interaction of ICT development research system with rural development researchers	B1

Key factors		Desirability degree	Uncertainties	Code
	researchers	Intermediate and static	Relative increase in the interaction of the ICT development research system with rural development researchers	B2
		Undesirable	Reduce interaction of FAVA development research system with the rural development researchers	B3
C	Create sites related to the affairs of villagers and adjust the content of the sites to the culture of the villagers	Desirable	Investment and planning to create the relevant sites with the affairs of villagers and coordinating the content of sites with the culture of villagers	C1
		Intermediate and static	Inadequate attention in identifying information and communication needs in creating sites related to the affairs of villagers and adjusting the content of the sites to the culture of villagers	C2
		Undesirable	Lack of a specific program to create sites related to the affairs of villagers and coordinating the content of the sites to the culture of the villagers	C3
D	Strengthen feedback loops between researchers and with other stakeholders to identify technologies required by villagers	Desirable	Coherent and efficient planning to strengthen the feedback loops between researchers and other stakeholders to identify the technologies required by the villagers	D1
		Intermediate and static	Relative strengthening of feedback loops between researchers and other stakeholders to identify technologies needed by villagers	D2
		Undesirable	Lack of specific planning to strengthen feedback loops between researchers and other stakeholders to identify technologies needed by villagers	D3
E	Hold specialized ICT training courses for rural experts and extension authorities	Desirable	Planning and efficient management for the organization of FAVA specialized training courses for rural experts and extension authorities	E1
		Intermediate and static	Limited cooperation to hold specialized ICT training courses for rural experts and extension authorities	E2
		Undesirable	Lack of coordination and cooperation to hold specialized FAVA training courses for rural experts and extension developers	E3
F	Use the experience and innovations of rural communities of different countries in FAV	Desirable	The use of experience and innovations of rural communities in different countries in the field of Fava	F1
		Intermediate and static	Restricted use of the experience and innovations of rural communities in different countries in the field of FAVA	F2
		Undesirable	Intermediate and static use of the experience and innovations of rural communities in different countries in the field of FAVA	F3
G	Direct the extension programs	Desirable	Not using the experience and innovations	G1

Key factors		Desirability degree	Uncertainties	Code
	to explain the necessary of FAVA development among the villagers		of rural communities in different countries in the field of FAVA	
		Intermediate and static	Directing extension programs in order to explain the necessity of Fava development among the villagers	G2
		Undesirable	Directing extension programs in order to explain the necessity of Fava development among villagers	G3

Based on the obtained results, 1 scenario has high probability. Weak scenarios include 1536 scenarios and the scenarios with high consistency include 8 scenarios. As a result, based on the results of the scenario wizard method, 8 scenarios with high consistency have been selected and considering that each of the key factors has 3 possible situations, each of the scenarios is divided into 3 categories, desirable, static and critical. Table 8 discusses the scenarios in details.

Table 8. State of plausible scenarios

Scenario 8	Scenario 7	Scenario 6	Scenario 5	Scenario 4	Scenario 3	Scenario 2	Scenario 1
Inadequate attention to the implementation of intra-village research with the cooperation of villagers in order to adapt ICT-based development principles to the conditions of the region		Coherent and efficient planning to implement intra-rural research with the cooperation of villagers to adapt ICT (Fava)-based development principles to the conditions of the region	Inadequate attention to the implementation of intra-village research with the cooperation of villagers in order to adapt ICT-based development principles to the conditions of the region	Coherent and efficient planning to implement intra-rural research with the cooperation of villagers to adapt ICT (Fava)-based development principles to the conditions of the region	Inadequate attention to the implementation of intra-village research with the cooperation of villagers in order to adapt ICT-based development principles to the conditions of the region		
Increase the interaction of ICT development research system with rural development researchers						Relative increase in the interaction of the ICT development research system with rural development researchers	Increase the interaction of ICT development research system with rural development researchers
Investment and planning to create the relevant sites with the affairs of villagers and coordinating the content of sites with the culture of villagers		Inadequate attention in identifying information and communication needs in creating sites related to the affairs of villagers and adjusting the content of the sites to the culture of villagers	Investment and planning to create the relevant sites with the affairs of villagers and coordinating the content of sites with the culture of villagers	Inadequate attention in identifying information and communication needs in creating sites related to the affairs of villagers and adjusting the	Investment and planning to create the relevant sites with the affairs of villagers and coordinating the content of sites with the culture of villagers		

Scenario 8	Scenario 7	Scenario 6	Scenario 5	Scenario 4	Scenario 3	Scenario 2	Scenario 1
				content of the sites to the culture of villagers			
Coherent and efficient planning to strengthen the feedback loops between researchers and other stakeholders		Relative strengthening of feedback loops between researchers and other stakeholders				Coherent and efficient planning to strengthen the feedback loops between researchers and other stakeholders	
Lack of coordination and cooperation to hold specialized training FAVA courses	Planning and efficient management to organize holding specialized training courses of FAVA	lack of coordination and cooperation to hold specialized training courses of FAVA					
Not using the experience and innovations of rural communities of different countries		Restricted use of experience and innovations of rural communities of different countries		Suitable use of experience and innovations of rural communities of different countries			
Directing the extension programs to explain the necessity of developing FAVA among villagers							

In the following sections, descriptors are discussed based on cross impact judgments. In other words, two scenarios "Investment and planning to create sites related to the affairs of villagers and adjusting the content of the sites to the culture of the villagers" and "Directing extension programs in order to explain the necessity of Fava development among the villagers" are reported as consistent scenarios.

About the descriptor "creating sites related to villagers' affairs and adjusting the content of the sites to the culture of the villagers", the hypothesis "investment and planning in order to create sites related to the affairs of the villagers and adjusting the content of the sites to the culture of the villagers" has been selected. None of the other elements of the scenario contradict this assumption. Briefly, this hypothesis shows an impact score of +13 (Figure 8). Therefore, the selected hypothesis can be evaluated as consistent.

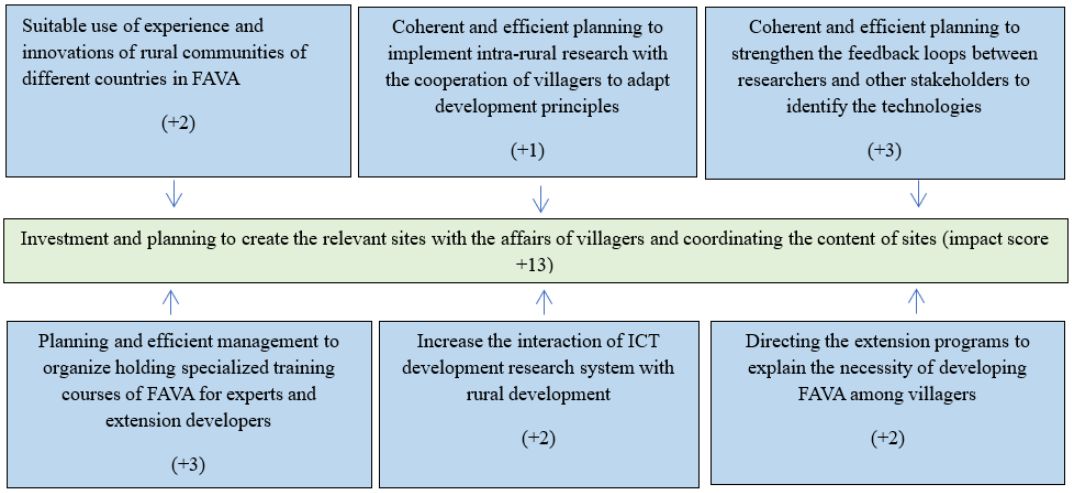


Figure 8. Implementation of intra-village research with the cooperation of villagers to adjust Fava-based development principles to the region conditions

None of the other possible assumptions shows a better balance between the followers and opponents. Briefly, none of the alternative hypotheses is more acceptable than the selected hypothesis "investment and planning to create sites related to the affairs of the villagers and the adaptation of the construction of the sites with the culture of the villagers". Regarding the descriptor "Directing extension programs in order to explain the necessity of Fava development among villagers" the assumption "Directing extension programs in order to explain the necessity of Fava development among villagers" has been selected. None of the other elements of the scenario contradict this assumption. Briefly, this hypothesis indicates an impact score of +13 (Figure 9). Thus, the selected hypothesis can be evaluated as consistent.

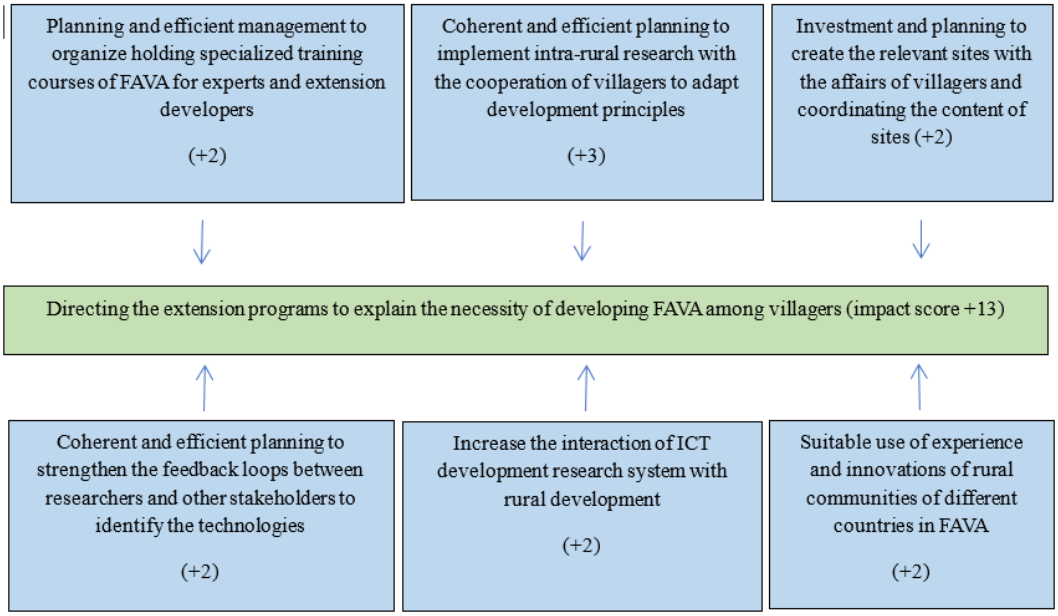


Figure 9. Directing extension programs in order to explain the necessity of Fava development among the villagers

This scenario consists of weak impact assumptions. Thus, the construction of the scenario should be described as internally inconsistent.

5. Discussion and Conclusion

This research attempts to conduct a foresight analysis of the identification of future scenarios of sustainable rural planning based on information and communication technology (ICT) in East Azerbaijan province for a 10-year horizon (2033) via the construction of different scenarios with foresight analysis. According to the future study approach, the data analysis in this research was a multi-stage process; thus, the "structural-cross impacts on the ICT-based sustainable rural planning process" were analyzed.

In this section, it was attempted to extract the key factors influencing the future trend of the system by identifying the primary factors influencing the future trend of ICT-based sustainable rural planning in East Azerbaijan province with the generalizability approach. Theoretical citation was used to identify the primary effective factors. 23 factors were extracted in two dimensions, hardware and software. In the second stage, the factors were entered into the cross-matrix to determine the level and amount of their influence on each other and on the process of the subject. The dimensions of the matrix were 23 x 23, and the saturation degree of the matrix was 93.194, which indicated that the factors influenced each other in more than 93%.

Out of the total of 493 possible relations in this matrix, 36 were zero relationships, 86 relations showed 1, 230 relations indicated two and 177 relations indicated 3. It was found that the matrix based on statistical indicators with the two data rotations has a 99% desirability, which indicates the high validity of the answers. By examining the state of the dispersion plane of the effective

variables, the system is unstable. In total, 7 key drivers for the future approach of sustainable rural planning based on information and communication technology (ICT) were determined and identified.

Comparison with Previous Studies In order to validate and position the findings of this research within the existing literature, the results were compared with similar studies. The identification of "Holding specialized ICT training courses" and "Directing extension programs" as key drivers in this study aligns with the findings of Mousazadeh et al. (2021) and Sorani et al. (2014). They emphasized that without education and addressing inhibiting factors, the mere existence of technology cannot lead to sustainable development. Furthermore, the emphasis of the present study on "Creating sites related to villagers' affairs and adapting content to culture" confirms the results obtained by Movahedi et al. (2017) and Alam and Wagner (2016), who argued that access to ICT must be accompanied by culturally and economically relevant content to bridge the digital gap effectively. Additionally, the necessity of a "Foresight approach" to avoid strategic neglect, which was a core premise of this research, is consistent with the work of Talabi Fard (2020), who utilized a similar methodological framework for Jiroft city. Finally, while some previous studies focused heavily on infrastructure, the identification of "Feedback loops" and "Interaction of research systems" as key drivers in this research highlights the importance of the co-evolution of technology and social systems, a concept also supported by Zhu et al. (2021) in the context of Taobao villages.

Scenarios and Recommendations According to the obtained results, 1 scenario with a high probability of occurrence is not considered among the best and desirable scenarios because it is not operational and the results are far from expected, and it cannot be used as the best scenario. Therefore, the scenario with high consistency is considered, which is 8 based on the obtained results. As a result, according to the results of the scenario wizard method, 8 scenarios with high consistency have been selected. The descriptor "Creation of sites related to the affairs of villagers and adjusting the content of the sites to the culture of the villagers" and "directing extension programs in order to explain the necessity of FAVA development among the villagers" were introduced as two selected hypotheses as consistent scenarios.

According to the research and applied goals of the research and the proposed scenarios, the following recommendations (stable and consistent research scenarios) are presented for use in the future planning of rural sustainable development planning based on information and communication technology at the macro level:

- Invest and plan in order to create sites related to villagers' affairs and adapting the content of the sites to the villagers' culture.
- Direct the extension programs in order to explain the necessity of FAVA development among the villagers.
- Coherent and efficient planning to implement intra-village research with the cooperation of villagers in order to adapt the development principles based on FAVA to the conditions of the region.
- Increase the interaction of the FAVA development research system with rural development researchers.
- Coherent and efficient planning to strengthen feedback loops between researchers and other stakeholders to identify technologies needed by villagers.
- Efficient planning and management to organize FAVA specialized training courses for rural experts and extension developers.
- Appropriate use of the experience and innovations of rural communities in different countries in the field of FAVA.

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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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آینده‌پژوهی برنامه‌ریزی روستایی پایدار مبتنی بر فناوری اطلاعات و ارتباطات در استان آذربایجان شرقی

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چکیده مبسوط

۱. مقدمه

ما در عصری زندگی می‌کنیم که به عصر ارتباطات و اطلاعات و یا به تعبیر بهتر انقلاب ارتباطات و یا انقلاب اطلاعات مشهور است. فناوری اطلاعات و ارتباطات (فاوا) به‌عنوان پارادایم جدید حاکم بر توسعه، با اثرگذاری بر نحوه تفکر و عمل و تغییر الگوهای کار و زندگی، محوریت تمامی جنبه‌های تحول و پیشرفت قرار گرفته و درواقع هم علت توسعه و هم نشان توسعه‌یافتگی محسوب می‌شود. شناخت و بهره‌گیری صحیح از فرصت‌های جدیدی که این پارادایم حاکم بر توسعه، به‌عنوان نیرومندترین ابزار توانمندسازی و برابر سازی درزمینه توسعه پایدار، جهت پیشبرد اهداف اقتصادی، اجتماعی، سیاسی و... برای شکل بخشیدن به عصر آینده ارائه می‌دهد مستلزم آگاهی و همراهی با این موج انقلابی است چراکه اندکی غفلت فرصت‌ها را به دیگران خواهد سپرد. با مطرح شدن نظریه موج سوم توسط تافلر با عنوان انقلاب فناوری مجامع جهانی اقدام به یادگیری، بسط انتقال تجارب و اطلاعات و حوزه‌بندی ارتباطات خود نموده تا از این طریق بتوانند در حوزه‌های کلان، اقتصادی، اجتماعی، سیاسی و فرهنگی که به‌صورت مستقیم با فرایند جهانی شدن در ارتباط می‌باشد نقش‌آفرینی کرده و تحولات را به نفع خود رقم بزنند. بهره‌گیری از فناوری اطلاعات و ارتباطات می‌تواند سبب توانمندسازی و تأثیرگذاری آگاهانه این قشر فراموش‌شده در روند پایداری محیط روستاهای کشور گردد و توجه به آموزش‌های فاوا می‌تواند از ابعاد مختلف در توسعه پایدار روستایی مؤثر واقع شود؛ و این در حالی است که فاوا ، به‌عنوان یک ابزار توسعه پایدار روستاها در راستای کاهش فقر، کاهش شکاف دیجیتالی و جلوگیری از مهاجرت بی‌رویه‌ی روستاییان به شهرها شناخته شده است و مقوله‌ای پیچیده بوده و توسعه آن، مستلزم تعامل همزمان است.

۲. مبانی نظری تحقیق

برای دست‌یابی به توسعه پایدار روستایی مبتنی بر فناوری اطلاعات و ارتباطات ضروری است راه‌های مختلفی چون درک ارتباطات درونی بین بخش‌های اقتصادی، اجتماعی، زیست‌محیطی و سیاسی؛ چاره اندیشیدن در مورد خطراتی که با آن‌ها مواجه هستیم؛ نظارت خوب و مستمر ذینفعان و درنهایت آینده‌نگاری جهت طراحی سیاست‌ها و برنامه‌ریزی مؤثر و ایجاد درکی از آینده در مقابل تحولات متعدد و ناپایدار در جوامع روستایی موردتوجه قرار گیرد.

آخرین وضعیت رتبه‌بندی ایران ازنظر شاخص توسعه فاوا که تا پایان سال ۲۰۱۷ از سوی اتحادیه جهانی مخابرات منتشر شده است، نشان می‌دهد ایران در میان ۱۶۷ کشور دنیا جایگاه ۸۱ را به خود اختصاص داده و بر اساس این گزارش ایران در زمینه زیرشاخص استفاده و کاربری از فاوا از متوسط جهانی پایین‌تر است. درحالی‌که بر اساس آمارهای رسمی تا پایان سال ۲۰۱۵ ایران در زمینه توسعه ارتباطات و فناوری اطلاعات از رتبه ۱۵ منطقه و ۸۹ جهان برخوردار بوده است. علیرغم ارتقای جایگاه کشور در میان کشورهای منطقه و جهان، ولی به نقطه قابل قبولی در میان کشورهای منطقه و جهان نرسیده است و شکاف زیادی بین ایران و متوسط جهانی در این زمینه وجود دارد. آذربایجان شرقی باوجود صبغه تاریخی و فرهنگی در عرصه ارتباطات و به‌رغم اقدامات وسیع انجام شده در حوزه زیرساخت‌ها، هنوز جایگاه واقعی خود را در کشور نیافته و در میانه‌های راه است. با اقدامات جدید نهادهای مرتبط با ارتباطات و با تدوین سند تدبیر و توسعه استان امید می‌رود در سال‌های آینده، آذربایجان شرقی تبدیل به استان پیشتاز و مطرح کشور از جهت اشتغال و کسب‌وکار اینترنتی و پشتیبان تولید شود. اجرای طرح‌های ارتباطات و اطلاعات استان نسبت به دیگر هسته‌های سند تدبیر و

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توسعه پیشرفت خوبی داشته طوری که پوشش اینترنت در یک هزار و ۱۲۲ روستا پیش‌بینی شده که همگی محقق شده و بیش از این تعداد نیز زیر پوشش قرار گرفتند. طرح توسعه ارتباطات روستایی (تار) فیبر نوری با هدف توسعه پهن باند در مناطق روستایی و تقویت هسته پهن باند شبکه ارتباطات روستایی ابلاغ شده است. در این راستا و با توجه به ضرورت مسأله پژوهش؛ در مطالعه حاضر سعی گردیده در استان آذربایجان شرقی به‌عنوان بستر موردمطالعه فرایند اولویت پذیری و اهمیت شاخص‌های تأثیرگذاری ICT و فرایند تأثیرپذیری مؤلفه‌های اقتصادی و اجتماعی از این حوزه‌ها و مؤلفه‌های این رویکرد با استفاده از تحلیل اثرات ساختاری مورد تحلیل و ارزیابی قرار گیرد.

۳. روش تحقیق

با توجه به رویکرد آینده‌نگاری، تجزیه‌وتحلیل داده‌ها در این تحقیق فرایندی چندمرحله‌ای بود، بنابراین به تجزیه‌وتحلیل «تحلیل اثرات متقابل - ساختاری بر روند برنامه‌ریزی روستایی پایدار مبتنی بر (ICT) » پرداخته شد. در این بخش سعی شد تا با شناسایی عوامل اولیه تأثیرگذار بر روند آینده برنامه‌ریزی روستایی پایدار مبتنی بر (ICT) در استان آذربایجان شرقی با رویکرد قابلیت تعمیم، فاکتورهای کلیدی تأثیرگذار بر روند آینده سیستم را استخراج شود. برای شناسایی فاکتورهای اولیه مؤثر از استناد نظری استفاده شد. تعداد ۲۳ عامل در دو بعد سخت افزاری و نرم افزاری استخراج شدند. در مرحله دوم، عوامل وارد ماتریس متقابل شده تا سطح و مقدار تأثیرگذاری آن‌ها بر یکدیگر و بر روند موضوع مشخص شود. ابعاد ماتریس ۲۳×۲۳ بوده و درجه پرشدگی ماتریس نیز ۹۳/۱۹۴ بود که نشان داد عوامل در بیش از ۹۳ درصد بر یکدیگر تأثیرگذار بوده‌اند. از مجموع ۴۹۳ رابطه ممکن در این ماتریس،۳۶ رابطه عدد صفر، ۸۶ رابطه عدد یک، ۲۳۰ رابطه عدد دو و ۱۷۷ رابطه عدد سه می‌باشند. نتایج نشان داد ماتریس بر اساس شاخص‌های آماری با تعداد دو بار چرخش داده‌ای از مطلوبیت ۹۹ درصدی برخوردار است که نشان از روایی بالای پاسخ‌هاست. آنچه از بررسی وضعیت صفحه پراکندگی متغیرهای مؤثر حاصل شد، وضعیت ناپایداری سیستم است. بیشتر متغیرها در اطراف محور قطری صفحه پراکنده بودند. به غیر از چند عامل محدود که نشان می‌دهند دارای تأثیرگذاری بالایی در سیستم هستند، بقیه متغیرها از وضعیت تقریباً مشابهی نسبت به یکدیگر برخوردار بودند. درمجموع تعداد ۷ پیشران کلیدی برای رهیافت آینده برنامه‌ریزی روستایی پایدار مبتنی بر فناوری اطلاعات و ارتباطات (ICT) تعیین و شناسایی شد.

۴. بحث و نتیجه‌گیری

با توجه به اهداف پژوهشی و کاربردی تحقیق و سناریوهای مطرح، پیشنهادات ذیل (سناریوهای استوار و سازگار پژوهش) جهت استفاده در برنامه‌ریزی آتی برنامه‌ریزی توسعه پایدار روستایی روستایی مبتنی بر فناوری اطلاعات و ارتباطات در سطح کلان ارائه می‌گردد:

- ❖ سرمایه‌گذاری و برنامه‌ریزی در جهت ایجاد سایت‌های مرتبط با امور روستاییان و تناسب سازی محتوای سایت‌ها با فرهنگ روستاییان؛
- ❖ جهت‌دهی برنامه‌های ترویجی در راستای تبیین ضرورت توسعه فاوا در بین روستاییان؛
- ❖ برنامه‌ریزی منسجم و کارآمد جهت اجرای تحقیقات درون روستایی با همکاری روستاییان جهت سازگاری اصول توسعه مبتنی بر فاوا با شرایط منطقه؛
- ❖ افزایش تعامل نظام تحقیقات توسعه فاوا با محققان توسعه روستایی؛
- ❖ برنامه‌ریزی منسجم و کارآمد برای تقویت حلقه‌های بازخوردی بین محققان و با سایر ذینفعان جهت شناسایی فناوری‌های موردنیاز روستاییان؛
- ❖ برنامه‌ریزی و مدیریت کارآمد جهت سازمان‌دهی برگزاری دوره‌های آموزشی تخصصی فاوا برای کارشناسان و مروجان روستایی؛ و
- ❖ بهره‌گیری مناسب از تجربه و نوآوری‌های جوامع روستایی کشورهای مختلف در زمینه فاوا.

کلیدواژه‌ها: آینده‌پژوهی، برنامه‌ریزی روستایی، توسعه پایدار، فناوری اطلاعات و ارتباطات، آذربایجان شرقی.

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Original Article

Assessment of Rural Landscape Aesthetics on the Basis of the Values of the Natural Environment (Case Study: Selected Villages in North Khorasan Province)

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Abstract

Purpose- This study aims to evaluate the natural rural landscapes of North Khorasan Province by examining their environmental, ecological, and socio-cultural characteristics. Rural natural landscapes and cultural heritage are increasingly and inevitably influenced by global environmental changes such as climate change, depletion of natural resources, and biodiversity loss. These transformations diminish aesthetic, ecological, and symbolic values, gradually weakening residents' emotional attachment, identity, and sense of place within rural communities.

Design/methodology/approach- A mixed-method approach was employed, integrating questionnaires, structured and semi-structured interviews, and qualitative field observations to investigate villagers' perceptions, attitudes, and experiences concerning their surrounding natural environments and everyday landscapes. The selected rural landscapes were analyzed based on three key indicators: landscape diversity, perceived naturalness, and sense of place, which together reflect both the ecological integrity and perceptual dimensions of the rural setting.

Finding- The findings reveal that conserving natural elements—such as vegetation, water resources, landforms, and traditional architectural patterns—significantly enhances people's sense of belonging, identity, and overall quality of life. Conversely, landscape degradation contributes to social alienation, cultural erosion, and reduced environmental satisfaction. The chosen villages were selected according to settlement characteristics (density, size, and spatial distribution), ecological and landscape diversity (climate, land use, and accessibility), and socio-economic and cultural indicators representing population scale, livelihood structure, and heritage context.

Practical implications- Identifying priority areas for conservation not only supports sustainable rural development but also provides a scientific foundation for long-term landscape management. Through the active participation of local communities in planning and decision-making, this approach establishes a practical and adaptable framework for preserving natural and cultural heritage while enhancing the well-being of rural societies across North Khorasan Province.

Keywords- Rural landscape assessment, Landscape diversity, Perceived naturalness, Sense of place, North Khorasan Province.

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1. Introduction

Rural landscapes contain a range of ecological, cultural, and social values that require integrated assessment and protection for their safeguarding and sustainable development. The purpose of this study is to further investigate the usefulness of rural landscape assessment in improving sustainable planning practices by drawing on various scientific sources.

At the global level, demographic change, structural transformation, and ecological deterioration are identified by the International Council of Monuments and Sites (ICOMOS, 2017) as the root causes of numerous challenges currently faced by rural landscapes. These challenges pose threats not only to the physical integrity of rural landscapes, but also to their cultural heritage and long-term continuity (Abbaszadegan, 2017). In this regard, Pentz and Albert (2023) note that many cultural and historical habitats in rural landscapes have been erased in recent years and argue that proactive habitat conservation is necessary. Furthermore, landscape assessment can serve as a significant tool for recognizing and conserving the distinctive natural and cultural aspects that define rural landscapes (Pentz & Albert, 2023).

International frameworks have also emphasized the importance of systematic landscape appraisal and preservation. The European Landscape Convention (2000) and the 1964 Wilderness Act place strong focus on systematic landscape appraisal and conservation. However, Swetnam et al. (2017) argue that developing a comprehensive framework for the appraisal of both subjective and objective aspects of rural landscapes remains an important research gap. While such international frameworks provide valuable guidance, national strategies in Iran also play a crucial role in promoting sustainable landscape management.

Within Iran, the preservation of multiple values in rural landscapes faces several challenges. According to experts in Iran, these issues can be related to the invasion of urban culture into villages, climate change and other environmental pressures, changes in livelihoods and socio-economic approaches, and shortcomings in the residential context of villages (Rezaei, 2024; Naseri, 2021; Jahangirpour and Bakhshoodeh, 2010). These conditions indicate that rural landscape assessment in Iran should consider both the natural environmental values of villages and the perceptions and experiences of local residents.

At the national level, Iran has developed several policy frameworks that address spatial equity, environmental protection, and rural sustainability. The National Spatial Planning Document (Supreme Council for Urban Planning and Architecture of Iran, 2020) provides the overarching vision for balanced regional development. The Comprehensive Rural Development Bill (Center for Development and Foresight Studies, 2023) emphasizes strengthening rural identity and integrating socio-cultural and environmental values into rural planning. In addition, the National Strategy and Policy Framework for Biodiversity Conservation in Iran (Department of Environment of Iran, 2020) highlights the importance of conserving natural diversity and ecosystem services. Together, these frameworks outline Iran's growing commitment to sustainable rural landscape management and correspond closely with the conceptual objectives of this study.

This research examines rural landscape evaluation by integrating objective measures of environmental values, such as land cover types and natural landscape elements, with subjective measures of landscape preference. Landscape preference can play a pivotal role in determining the direction of rural development and planning. Following the postulates of evolutionary psychology and social science, scholars such as Ulrich (1993), Dutton (2003), Fry et al. (2009), Özgüner (2011), Kaplan and Kaplan (1989), and Buijs et al. (2009) have explained the complex coexistence of global and cultural dimensions of landscape preference, which are conditioned by individual and cultural contexts and shaped by both aesthetic and value-based dimensions.

In this regard, the three key concepts of naturalness, diversity, and sense of place have been emphasized to better explain the ecological, cultural, and historical values of rural landscapes—concepts that have been widely recognized in numerous studies as fundamental dimensions of rural landscape assessment (Kalinauskas et al., 2021; Keong & Onuma, 2021; Hermes et al., 2018; Tenerelli et al., 2017; Frank et al., 2012; Ode et al., 2009; Erikstad et al., 2008; Ode et al., 2008; Tveit et al., 2006). In this study, diversity refers to the spatial and visual heterogeneity of landscape elements such as vegetation, land cover, and built forms, reflecting

both ecological richness and human land-use variety (Tveit et al., 2006; Ode et al., 2008). Perceived naturalness represents the degree to which the landscape appears to be free from human disturbance and maintains its ecological integrity and authentic natural character (Ode et al., 2009; Hermes et al., 2018). Sense of place denotes the emotional and symbolic attachment that individuals develop toward their living environment, shaped through identity, dependence, and experience (Williams & Vaske, 2003; Brown & Raymond, 2007).

With an emphasis on the significance of naturalness, diversity, and sense of place, this study attempts to evaluate how people in rural areas view and assess their surrounding landscapes in order to explore the interaction processes that underlie landscape preference. To move from the general discussion of rural landscape assessment to a specific local context, this research focuses on ten selected villages in North Khorasan Province, Iran. The province provides a suitable case because its rural landscapes include different environmental settings, such as mountain, forest, and plain villages, in which natural environmental values, settlement patterns, and residents' sense of place can be compared. In order to accomplish this, data were collected from ten villages in North Khorasan Province and analyzed using SPSS software.

In particular, this study aims to respond to the following research questions:

(1) Which components and indicators can be used to assess rural landscape aesthetics on the basis of natural environmental values?

(2) How do residents of the selected villages in North Khorasan Province evaluate diversity, perceived naturalness, and sense of place within their surrounding rural landscapes?

(3) Which villages and environmental settings show stronger or weaker aesthetic and place-based values, and how can these findings contribute to more sustainable and conservation-oriented rural planning strategies?

This paper outlines a pathway for improving our comprehension of rural landscapes at high-resolution scales by combining objective data with subjective landscape assessments. This approach can ultimately support more sustainable and context-sensitive planning strategies that protect the environmental and archaeological integrity of rural settlements.

2. Research Theoretical Literature

2.1. Literature Review

Domestic studies- Domestic research on rural landscape, rural development, and place-based planning in Iran has increasingly emphasized the interaction between physical form, cultural identity, environmental resources, and local livelihood systems. In the Journal of Research and Rural Planning, Faezi et al. (2018) examined the impact of rural housing rehabilitation on rural landscape and showed that physical interventions can influence aesthetic, functional, and environmental indicators. Hosieni et al. (2019) investigated landscape identity components in tourist villages with valuable textures and emphasized visual, historical, cultural, environmental, and semantic dimensions of rural identity. Ghorbanzadeh and Niloufar (2019) classified villages in North Khorasan in terms of entrepreneurial ecotourism indicators, confirming the importance of environmental and cultural capacities in village differentiation. Einali et al. (2019) demonstrated the role of creative tourism in sustainable development of historic-cultural villages, while Anabestani et al. (2022) highlighted the challenges of physical planning in Iranian villages, especially in relation to Hadi plans. These studies show that rural landscape aesthetics cannot be separated from identity, livelihood, physical planning, and environmental capacity.

International studies- Internationally, rural landscape assessment has moved from purely biophysical description toward integrated approaches that combine ecological quality, visual perception, cultural ecosystem services, and public participation. Studies on landscape character assessment, perceived naturalness, landscape diversity, and place attachment indicate that aesthetic value is produced through both measurable landscape attributes and lived human experience (Tveit et al., 2006; Ode et al., 2008; Ode et al., 2009; Frank et al., 2012; Hermes et al., 2018; Kalinauskas et al., 2021). This body of work supports the use of diversity, perceived naturalness, and sense of place as three complementary dimensions for evaluating rural landscape aesthetics on the basis of natural environmental values.

Research gap- Although previous domestic and international studies have examined rural development, landscape identity, naturalness, and ecosystem-service-related aesthetics, fewer studies have integrated residents' perception of natural

environmental values with village-level comparison across mountain, forest, and plain settings. The present study addresses this gap by applying a mixed-method and perception-based framework to selected villages in North Khorasan Province and by linking the results to practical rural landscape planning and conservation.

2.2. Theoretical Framework

Within this study, we built a theoretical framework for rural landscape appraisal on the basis of natural environmental values. Although other authors have taken into account the qualitative nature of these values, we have made the effort of taking it yet one step higher through the utilization of advanced interactions between ecosystem services and cultural environment values with quantitative analysis.

We applied the cultural ecosystem services approach in bridging landscape aesthetic and environmental values and benefits. We applied indicators of naturalness, diversity, and sense of place, all of which are from landscape aesthetics within cultural ecosystem services. In the course of this activity, through strategic planning, we wish to know more about natural environmental values under rural landscape appraisal (see Figure 1).

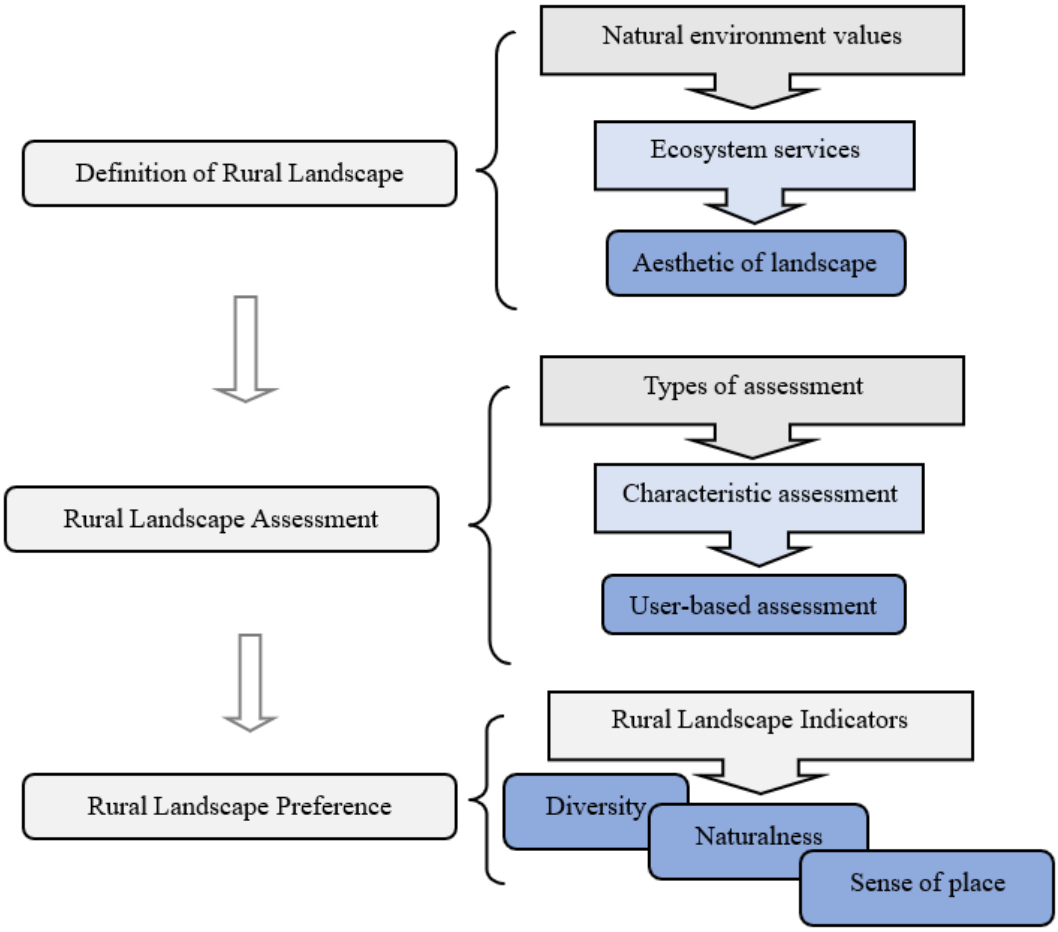


Figure 1. Theoretical Framework of Rural Landscape Assessment. Source: Authors' own construction

2.2.1. Rural landscape concept

Rural Landscape Research (RLR) has changed fundamentally, transforming from reductionist one-dimensional theories based on geography and ecology to adopting multidisciplinary studies. This has been marked by paradigm shift towards dynamic conceptualizations acknowledging rural landscapes as multi-faceted cultural ecosystems. Notably, European landscape policies like the Common Agricultural Policy (CAP) and the

European Landscape Convention (ELC) have helped shape the direction of RLR, directing research agendas into six wide directions: quantifying ecosystem cultural services, protecting ecosystem integrity, advancing landscape design to reconcile with natural environments, evaluating the effects of landscape structure on biodiversity, examining the implications of intensified agricultural land use intensity on biodiversity, and applying Geographic Information Systems (GIS) and other emerging geographic technologies to evidence-based decision-making and management (Plieninger et al., 2016; Gottero & Cassatella, 2017; Xie et al., 2022).

Rural landscape is according to the European Landscape Convention (2000), an active correlation of human exploitation and nature process that shapes such sites. Porteous (2013) describes rural landscapes as "middle landscapes," residing between the wilds and urbanized sites in holding objective and subjective aspects in collaboration to further make their value inherent. With regard to increasing pressures and population demands, the need for wise land use practices becomes ever more evident, as put forth by Salvati and Zitti (2012). Rural and environmental planners emphasize a comprehensive concept of rural landscapes, including nature, man-made structures, and human activity, all of which play a part in defining and function in characteristic ways in such systems (Šťastná & Vaishar, 2020). Being natural, environmental, and cultural reservoirs which are non-replaceable, rural landscapes occupy a pivotal role in biodiversity conservation and soil conservation against the hazards of the modern world (Balestrieri, 2015).

Rural landscape function- By thorough observation of rural landscape resources, it is evident that the rural landscape serves three various functions: cultural landscape, ecological landscape, and productive landscape, each with its own contribution and implication (Ghorbanzadeh et al, 2023; Xie et al, 2022). The cultural landscape is not just a question of maintaining historic heritage (Mahmoodi et al., 2016) but also creating a deep sense of place at the local, regional, and national levels, frequently generating significant tourism rewards for the local community. Conversely, the ecological landscape is geared more towards preserving ecosystems and their functions for maintaining biodiversity, as well as human health, with large trade-offs and synergies to the productive landscape (Law et al., 2021). The productive landscape, however, is crucial to food security and government, agricultural revenue support, and rural employment. Since these varied landscape functions have synergies, effective landscape planning requires a shift toward holistic management practices, promoting effective strategies to take advantage of the multifunctionality of rural landscapes (Badiani et al., 2017; Israel & Wynberg, 2018).

Rural landscape assessment- Rural landscape assessment comprises diverse paradigms and techniques from science disciplines such as geology, ecology, geography, history, archaeology, and landscape architecture that emphasize different elements of the landscape at specific scales in space and time (Wascher, 2005; Mücher et al., 2010; Sayer et al., 2013). These methods have typically been identified as natural science-based and art- and humanities-based methods (Simensen et al., 2018). Spatial evaluations of landscapes are typically categorized into two categories: user-dependent subjective opinions and user-independent formal opinions (Lothian, 1999; Daniel, 2001; Tveit et al., 2006). Subjective methods, which are based on local user preferences and opinions, include approaches such as interviews, questionnaires, and observations, whereas formal measurements rely on public preferences and expert opinions (Hermes et al., 2018). Contemporary landscape studies still make a difference between biophysical evaluations in line with natural science and landscape character evaluations in line with art and human sciences (Simensen et al., 2018). Whereas the former focuses on physical landscape structures, which employ statistical analysis more frequently (Bastian, 2008), the latter focuses on human interpretation and sociocultural relations with the landscape (Jones et al., 2007; Erikstad et al., 2015). In parallel, recent research has increasingly applied machine learning algorithms—such as Random Forest, Support Vector Machines, and deep learning models—to analyze demographic dynamics, structural transformations, and ecological changes in land-use patterns (Sedighkia & Datta, 2023; Ul Din & Mak 2021; Malinić et al., 2025; Otieno et al., 2025). While these data-driven approaches provide valuable quantitative insights, the present study

emphasizes the perceptual and participatory dimensions of landscape evaluation.

The landscape character assessment (LCA) method was chosen for this study because it has been proven to integrate effectively in landscape planning, design, and management, especially in relation to the provisions of the European Landscape Convention (ELC). The process that defines specific landscape identities and enables public involvement in environmental decision-making is known as a decision-making framework (European Landscape Convention, 2000; Teh et al., 2018). Landscape day–to-day rhythms in places provided will be charted to allow stakeholders to actively participate in decision-making that affects their local environment (Teh et al., 2018). This alternative emphasizes the potential of integrated landscape analysis in enhancing sustainable landscape management practices and encouraging the participation of people (Fagerholm et al., 2012).

Consequently, landscape character assessment is now a conventional practice in the development of landscape policy. Created in the 1990s, the process was introduced as a way of describing and classifying landscapes (Swanwick, 2002; Tudor, 2014). This process emphasizes the values of the landscape and contrasts one landscape's values with those of another landscape. Originally quantitatively oriented, it subsequently included qualitative and perceptual approaches, emphasizing landscape values and their comparison across landscapes. The aim of landscape character assessment is to identify and define the elements that constitute the uniqueness of a landscape, emphasizing the variety of landscape characteristics and evaluating landscapes at different scales (Alparslan et al., 2019; Zhuang et al., 2022). The main uses of landscape character assessment include biodiversity conservation, habitat quality analysis, urban landscape pattern analysis, water quality estimation, landscape aesthetic evaluation, and management planning (Statuto et al., 2018; Zhuang et al., 2022).

2.2.2. Natural environmental values in rural landscapes

The term "values" for individuals and the environment has increased in momentum in environmental management, from research to policy (Tadaki et al., 2017). This is echoed in global debates around biodiversity and ecosystem services, urging the need to make values clear to inform environmental policies and management plans (Diaz-Christiansen et al., 2016). Value assessment provides for essential natural and cultural heritage management processes such as land use planning, environmental impact appraisals, and site selection, which require standardization and calibration of assessment indicators to ensure reproducibility and reliability across appraisals (Erikstad, 1997; Erikstad et al., 2008). It is important to value the multidimensional character of environmental values with multiple origins and meanings (Reser & Bentrupperbäumer, 2005). Brown et al. (2005) developed a landscape value model that comprises environmental, cultural, spiritual, educational, scientific, and entertainment values, all of which are inextricably intertwined with human-landscape connections. Like ecological value, environmental value is a major indicator of the conservation of landscapes (Erikstad et al., 2008). O'Neill et al. (2008) also grouped environmental values into ecological, historical, cultural, economic, ethical, and aesthetic values, illustrating the intricate way in which people perceive and interact with their environment. These values, from subjective experience to objective measurement, shape people's relationships with and perceptions of the environment (Reser & Bentrupperbäumer, 2005; Erikstad et al., 2008). This value typology has been utilized by researchers in all planning disciplines, under such headings as ecosystem values, environmental values, or social values (Brown & Brabyn, 2012).

Landscape values are the perceived attributes of a landscape, which arise from complex human–environment relationships (Brown et al, 2005). People engage with landscapes in an active manner, giving meaning and value to certain locations through their ideas, feelings, and actions. As humans use and view landscapes, they receive information, which results in the attribution of varied values, although there is variation among people in their structure and harmony (Brown & Weber, 2012). Rural environments also have a distinct value system, which is a component of a

place's character and is shaped by cultural forces (Šťastná & Vaishar, 2020). Although traditional rural values are predominantly associated with agriculture, modern rural environments have a more extensive value system encompassing postproduction lifestyles, tourism, beauty, diversity, etc., all combined to create the character of the place (Šťastná & Vaishar, 2020). Environmental value appraisal in rural settings is closely aligned with protection and conservation goals, with a focus on value appraisal as essential to the management of cultural and natural heritage. Its importance lies in the application of such an appraisal for intelligent decision-making within land use planning, environmental assessment, and site selection (Erikstad et al., 2008; De Groot et al., 2010).

2.2.3. Aesthetic Values in Landscape Assessment: Integrating Environmental and Ecosystem Perspectives

In landscape geographical research, environment landscape architecture, and environmental science, intrinsic and aesthetic landscapes have been widely studied, which has broadened our understanding of their environmental value (Tveit et al., 2006; Ode et al., 2009; Hermes et al., 2018; Kalinauskas et al., 2021). Zhuang et al. (2022) view aesthetics as an integral part of the landscape character that becomes increasingly important over time.

In addition, the human value of nature's beauty from genetic or biological sources guides behavior and attitudes toward nature and underscores the inherent interconnections among aesthetics, human well-being, and environmental stewardship (Swaffield & McWilliam, 2013; Cooper et al., 2016).

There is ongoing international literature that has connected landscape assessment more closely with ecosystem services, identifying the central contribution of landscape features to providing such services (Šťastná & Vaishar, 2020; Pinto-Correia et al., 2016; Frank et al., 2012; De Groot et al., 2010).Of interest for this study, Ridding et al. (2018) pointed to the role of landscape features in maintaining the cultural services of ecosystems that are vital to human well-being and survival. Although intangible, cultural ecosystem services such as aesthetics have significant effects on land management decisions and human health, attempts still grapple with measurements and integrate them into resource management policy and spatial planning (Milcu et al., 2013; Kalinauskas et al., 2021; Hermes et al., 2018). The incorporation of aesthetic values into measurement systems of ecosystem services can take a long way toward achieving and sustaining such valuable landscape elements. The study in this instance uses an all-embracing theoretical framework for the objective as well as subjective environmental value aspects of aesthetic theory on which Tveit et al. (2006), Ode et al. (2008), and cultural ecosystem services are built.

2.2.4. Aesthetic indicators for rural landscape assessment

As mentioned above, environmental values, the aesthetic value of a landscape is not only determined by its objective attributes but also by subjective experience, where the former involves physical attributes and the latter involves human experience and interpretation. The aesthetic value of a landscape has been proven by several studies to be very much correlated with the configuration, composition and land cover types. In addition, Fry et al. (2009) highlight the strong relationship between visual and environmental landscape elements, emphasizing how these interconnected features contribute to the complexity of landscape aesthetics. Similarly, Frank et al. (2012) support this view by demonstrating that aesthetic appreciation is influenced by both visual perception and ecological characteristics.

Naturalness, diversity and sense of place are found to be good determinants that affects landscape aesthetic by several research studies (e.g. Tveit et al., 2006; Tenerelli et al., 2017; Keong & Onuma, 2021). The choice of these indicators in this study is predicated on two broad criteria: their applicability across the objective and subjective elements of the landscape and their conformity with the aesthetic elements inherent in the definition of cultural ecosystem services (Ode et al., 2009; Kalinauskas et al., 2021). In addition, their widespread focus across the literature serves to highlight their significance, a reflection of the growing recognition of the aesthetic value of landscapes. The current study attempts to offer a holistic method to rural

landscape assessment based on naturalness, diversity and sense of place as chief indicators. This by providing indicators that are both physical as well as perceptual in kind.

Diversity- Diversity in the pattern, form, and layout of landscape characteristics is an outcome of ecosystem processes driven by natural forces such as climate and socioeconomic drivers (Ode et al., 2008). Consequently, under the Biophilia hypothesis, which emphasizes the diversity of nature, the same holds true for species and landscape categories (Kellert & Wilson, 1993; Green et al., 2006). In particular, landscape diversity can be described as the number of land cover classes within a landscape, usually measured via intensive land cover mapping methods (Ramezani, 2019).

In addition to ecological factors, landscape diversity strongly influences human preferences and perceptions (van Zanten et al., 2016; Hermes et al., 2018). The diversity of vegetation interpreted through classification facilitates the capture of landscape change and enhances appreciation, particularly in agricultural landscapes (Herbst et al., 2009). In addition, the presence of water bodies is of particular utility in landscape beauty (Palmer, 2004). Operationally, diversity in this study was assessed through the number and variety of land cover classes, vegetation types, and spatial configurations observed in each village. This approach, adapted from Ode et al. (2008) and van Zanten et al. (2016), was refined to reflect the ecological and visual characteristics of rural landscapes in North Khorasan Province, capturing both natural and human-induced heterogeneity perceived by residents.

Naturalness- Naturalness describes the extent to which a landscape is free from the impression of human intervention and the closer its resemblance is to natural states. Naturalness as a term used in studies of landscape preference is essential for gauging how much a landscape fulfills perceptions of naturalness (Ode et al., 2009) and are not the same as ecological naturalness (Tveit et al., 2006). Ecological aesthetes and environmental psychologists concur that naturalness is an important component of visual quality (Tveit et al., 2006).

Evidence indicates that the interaction between naturalness and preference may not be necessarily direct, where perceived naturalness is a prevalent factor in affecting visual preferences, especially with vegetation (Purcell & Lamb, 1998; Tveit et al., 2006). Research repeatedly indicates a preference for natural over constructed environments (Kaplan & Kaplan, 1989), although the comparison between them could be limited by context and scope of settings researched. Perceived natural environments are greatly prized for their beauty and recreational value (Hermes et al., 2018).

The examination of naturalness often involves subindicators such as perceived land cover naturalness, which measures the degree of human alteration in landscapes via the Hemeroby index (cf. Walz and Stein, 2014; Rüdisser et al., 2012). Originally used in ecological research, the Hemeroby index is currently a common indicator in landscape aesthetic quality evaluation (Frank et al., 2013; Paracchini et al., 2014). This method takes human perception of naturalness into account instead of its ecological significance, where deciduous forests are usually perceived as more natural than coniferous forests or mixed forests are, and surface waters are given the second highest score (Walz and Stein, 2014).

The naturalness evaluation in this research is conducted through classification on the basis of the Hemeroby index, with emphasis on natural features such as vegetation, water bodies, and features of both natural and constructed environments. This scientific method of classification not only provides a scientific way of assessing naturalness but also enables us to better comprehend human perception from various cultures.

Operationally, perceived naturalness was evaluated using residents' ratings of landscape authenticity and degree of human alteration. The assessment followed sub-indicators such as vegetation cover, presence of water bodies, and use of vernacular architectural materials, adapted from Tveit et al. (2006) and Walz & Stein (2014) to fit the rural environmental context of North Khorasan Province.

Sense of Place- The sense of place has long been a focus of geographical and environmental psychology studies and refers to the attachment or emotional connection that people develop toward a

specific location, or the meanings they attribute to it (Williams & Vaske, 2003; Brown & Raymond, 2007). Attachment to a place, as proposed by environmental psychologists, is considered equivalent to geographers' interpretation of sense of place. The place attachment scale developed by Williams and Vaske (2003) is among the first validated instruments designed to measure this construct across different land-use contexts, structured around two core dimensions: place identity and place dependence (Brown & Raymond, 2007). According to Tuan (1977), individuals who are rooted in a place tend to act responsibly toward their environment (Kudryavtsev et al., 2012). Moreover, people in communities with stronger place attachments enjoy a higher quality of life and more readily identify landscape values and distinctive features within their communities (Brown et al., 2005; Mohammad-Moradi et al., 2022).

In the Iranian context, several studies have applied and validated this theoretical framework, confirming its cultural relevance and adaptability within local socio-spatial conditions (e.g., Falahat, 2006; Mohammad-Moradi et al., 2022; Samadpour shahrak et al., 2020). These works demonstrate that the constructs proposed by Williams and Vaske can be effectively operationalized in both urban and rural Iranian environments. Accordingly, the present study builds upon the original theoretical model of Williams and Vaske, integrating insights from its localized validation to ensure conceptual consistency and cultural appropriateness for North Khorasan's rural communities.

Place attachment, or the human–place bond (Altman & Low, 2012), has been widely discussed in academic discourse since the 1990s, and its application across different contexts and cultures continues to expand (Falahat, 2006; Montazerolhodjah & Sharifnejad, 2023). However, the psychometric properties of the scale have not always been assessed in proportion to its widespread use. Some authors (e.g., Williams & Vaske, 2003; Budruk, 2010) emphasize that contextual factors are essential for understanding and measuring individuals' place attachment, and that more research is needed to examine conceptual equivalence and measurement reliability across cultural and environmental settings (Wynveen et al., 2018). The assumption of item equivalency, as noted by Budruk (2010), may pose challenges when comparing data collected from different socio-physical contexts. Place conceptualization varies among individuals with diverse experiences and cultural backgrounds (Kyle & Johnson, 2008; Trentelman, 2009), and minor differences in local practices or meanings may not always be captured by standardized scales (Wynveen et al., 2018).

Operationally, sense of place was measured through residents' responses to items capturing place identity, place dependence, and emotional attachment, adapted from the validated scale of Williams & Vaske (2003) and related studies (Brown & Raymond, 2007). These measures were contextualized to reflect the sociocultural characteristics of Iranian rural communities, enabling a culturally relevant understanding of residents' emotional and functional bonds with their landscape.

2.2.5. Landscape preference

Landscape preferences are usually conceived of as predominantly being based on precognitive, affective responses to the physical environment related to feelings of liking or disliking. They are often defined as the aesthetic or evaluative response elicited by visual encounters with real or simulated natural settings (Buijs et al., 2009).

Landscape preferences have been extensively studied in the past. On the basis of evolutionary theories, many studies have focused on interpersonal agreement on landscape preferences (such as preferences for trees and water) (Ulrich, 1993).

Lothian (1999) suggested that landscape perceptions are formed by the two factors of inherent environmental characteristics and people's interpretations of these characteristics (Taghvaei et al., 2017; Huai & Van, 2022). From the perspective of evolutionary psychology, there are some innate and common understandings of landscapes irrespective of their cultural background (Dutton, 2003; Fry et al., 2009; Özgüner, 2011; Tveit et al., 2006). Other studies have shown that preferences for wild or more managed landscapes may differ significantly between social groups (Kaplan and Kaplan, 1989; Buijs et al., 2009). People with different sociocultural backgrounds may have

different preferences for urban parks (Hägerhäll et al., 2018; Elsadek et al., 2019). Nevertheless, comparative research between different cultural backgrounds can reveal some generally applicable preferences and local variances (Madureira et al., 2015). Consequently, more evidence on the cultural understanding of landscape perceptions and landscape preferences is needed to expand insights into which landscape features influence landscape perceptions that are universally applicable or culturally driven (Swapan et al., 2017; Ruegaard Petersen, 2024).

3. Research Methodology

3.1 Geographical Scope of the Research

In terms of geographical position between 37 degrees north latitude and 55 degrees east longitude, North Khorasan Province is placed in an intermediate geographic position in Iran's geography (Jafari et al., 2012). In terms of geographical size, measuring 28,434 square kilometers, or 1.7% of the country's geographical size, North Khorasan is a middle-sized province in geographical terms. (See Figure 2)

Geographically, North Khorasan comprises mountain and plain areas, where mountain areas dominate the landscape of the province. Structural and alluvial processes control the fertility of the plains in the province, which results in fertile farming fields along with less fertile farming fields. The climate of the province is highly variable, with mountainous conditions being the most prevalent condition because of extensive mountain ranges. Desert and semidesert climates prevail in the southern regions at the peripheries of the central desert, and the higher parts have a cold mountain climate. Rainfall is the source of water, and surface water resources depend on local precipitation patterns. Groundwater, used as springs, aqueducts, and wells, is a substantial source of water, although it is marred by issues of both quantity and quality by virtue of being overexploited and insufficiently replenished.

The vegetation in North Khorasan thrives on the basis of its climate, soil, and altitudinal gradient diversity, which is a very lovely phenomenon in the province. Forests, which constitute 3.3% of the national forest cover, and pastures, which constitute 51% of the natural cover, directly account for diversifying biodiversity in the province.

Despite North Khorasan being heaven on earth for nature, desertification is fought because of unauthorized animal grazing, cutting down trees, practicing unsuitable farming methods, and wasteful irrigation. Desertification has encroached infinitely over the past decades, and up to 20% of the province has already become desert, on the basis of provincial data provided by the Department of Natural Resources. The North Khorasan Province was selected because of its strong environmental potential, rich cultural and historical background, and varied climatic conditions.



Figure 2. Map of Iran with two zoomed views—an overview of North Khorasan Province (research area) and a detailed view of the selected study villages within the province. ● Mountain villages ● Forest villages ● Plain villages. Source: Authors' own construction.

Its diverse geography, including water bodies, fertile plains, and high plateaus, is an appropriate location for studying environmental dynamics. Moreover, researchers' acquaintance with the area makes it easier to collect data from government agencies at a faster rate, allowing efficient research.

This research tends to specify the relative features of the village environment in North Khorasan in relation to different landscapes to obtain a complete understanding. The natural conditions of North Khorasan villages vary and can be broken down into three categories: plains, mountain or valley areas, and forests. The variation enables the general rural model of evaluation to cover a wide range of local climates. In incorporating villages of different natural conditions, the research is now applicable for generalization for villages that share the same climates, and its overall use and scope are thus increased.

3.2. Criteria for Village Selection in the Study

The selection of villages in this study followed a systematic, multi-stage process to ensure analytical representation of North Khorasan's environmental and social diversity. The procedure was designed according to clearly defined criteria and relied on official datasets and classifications provided by provincial authorities (see Table 1 and Figure 3).

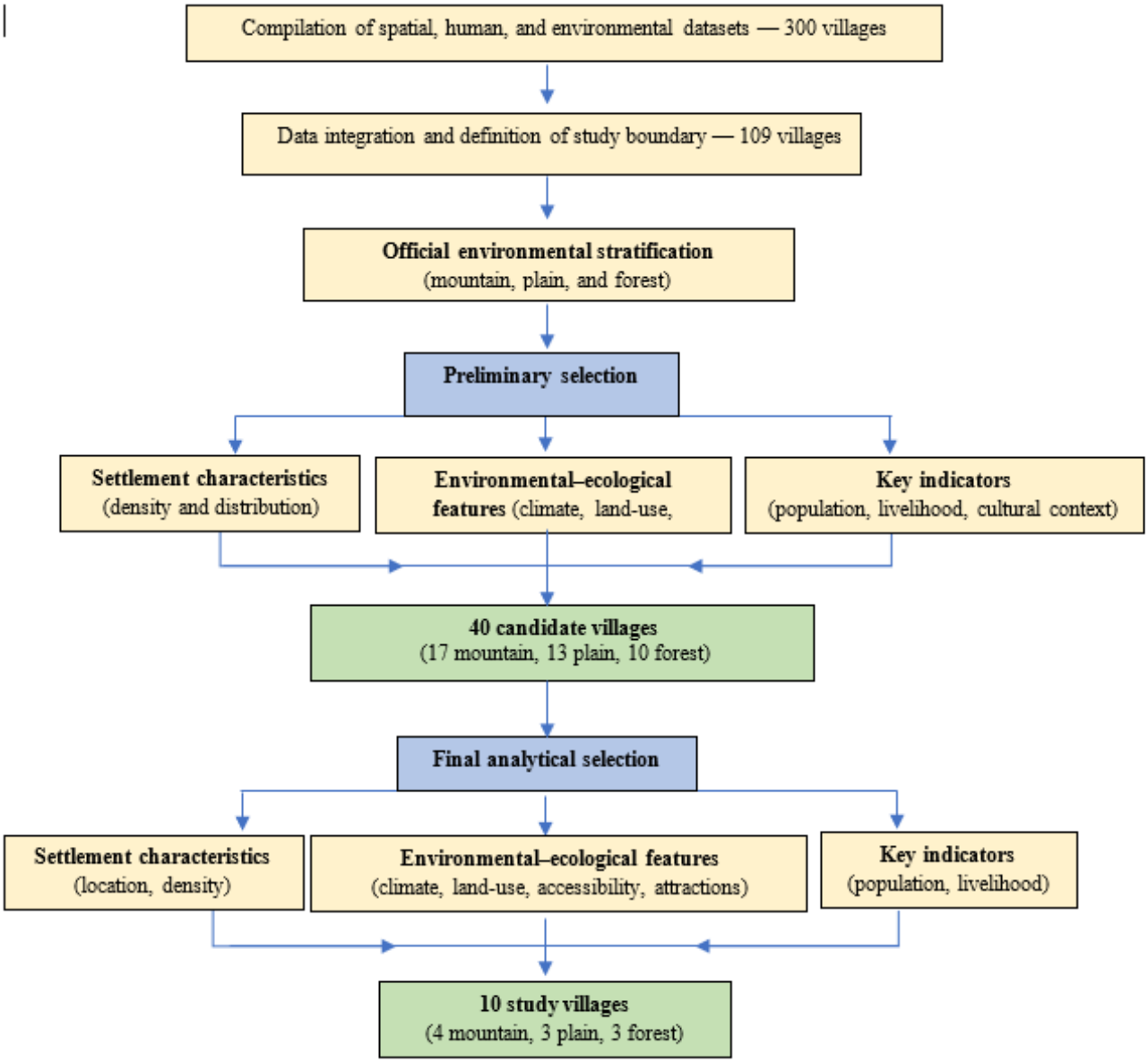


Figure 3. Process of village selection. Source: Authors' own construction.

Table 1. Multi-stage process of village selection and key evaluation

Stage	Purpose	Core criteria applied	Output
1. Data compilation	Identify villages with reliable and updated baseline data	Villages possessing valid *Haadi* plans (after 2009) and complete spatial, human, and environmental datasets from official agencies (Housing Foundation, Natural Resources Organization)	300 villages extracted from 720 inhabited settlements
2. Data integration and study boundary	Focus the research on areas with comprehensive and overlapping datasets	Spatial overlap between *Housing Foundation* and *Natural Resources* layers to ensure completeness and accuracy	109 villages identified within the defined study boundary (central and eastern zones of the province)
3. Official environmental stratification	Establish an environmental framework consistent with official classifications	National/Provincial Management and Planning Organization's typology based on natural siting: mountain, plain, and forest	81 mountain, 15 plain, and 13 forest villages identified
4. Preliminary selection	Capture environmental, spatial, and social diversity within each stratum	Settlement characteristics (density and distribution), ecological and landscape diversity (climate, land-use, accessibility), and key indicators (population, livelihood, cultural context)	40 candidate villages (17 mountain, 13 plain, 10 forest)
5. Final analytical selection	Choose the most representative villages in each environmental stratum through detailed multi-criteria evaluation	Based on the three main criteria and their sub-factors: • Settlement characteristics – geographical setting, density, and spatial distribution balance. • Environmental–ecological features – climate diversity, land-use extent, accessibility, and natural/historical attractions. • Key indicators–livelihood structure (agriculture, husbandry, mixed) and population scale (below/above 1,000).	10 final study villages: 4 mountain, 3 plain, and 3 forest
6. Validation and generalization	Ensure analytical representativeness at the provincial level	Coverage of all three official strata and internal heterogeneity in population, livelihood, and land-use	Enables analytic generalization across the North Khorasan Province

In the first stage, spatial, human, and environmental data were compiled from the Housing Foundation of Iran (rural guide plan after 2009) and the Natural Resources and Watershed Organization. These official sources provided reliable and up-to-date datasets covering 720 populated villages across the province. From this list, 300 villages with complete and verified baseline data were identified.

In the second stage, the two datasets were integrated through spatial overlay analysis to locate areas with comprehensive and overlapping information. The central and eastern corridors of North Khorasan, containing 109 villages, demonstrated the highest data completeness and were therefore defined as the study boundary (see Figure 4). This map shows the merged spatial coverage of human and environmental data layers and the boundary used for subsequent analysis.

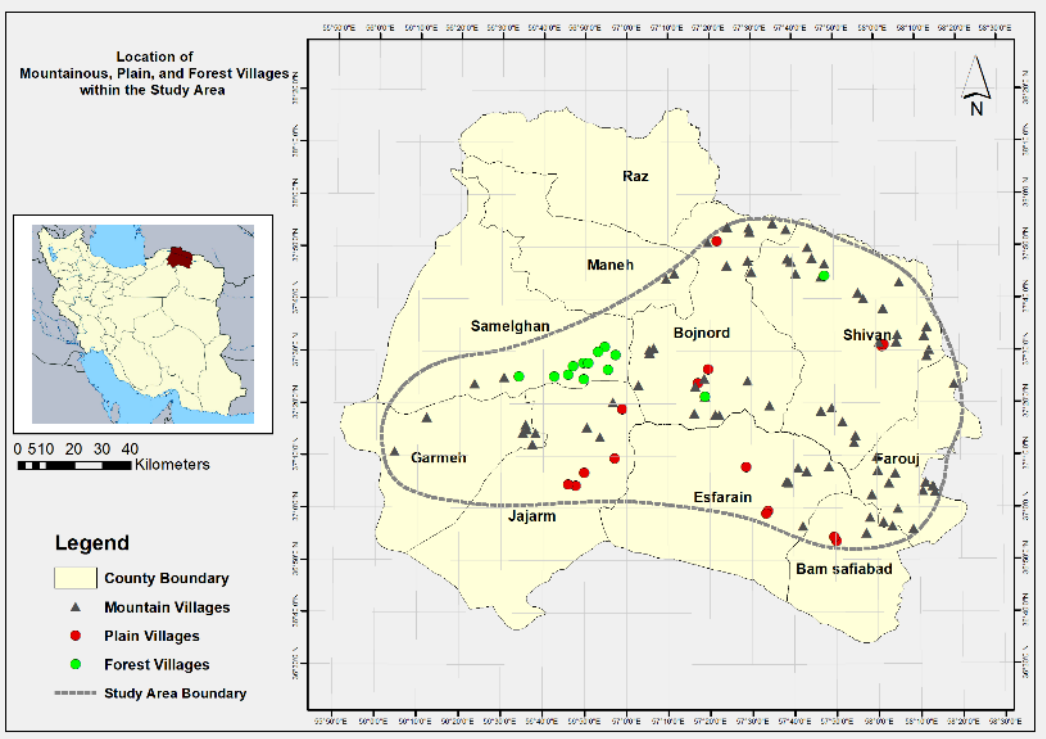


Figure 4. Study boundary and distribution of 109 villages with complete datasets in North Khorasan Province. Source: Authors' own construction.

The third stage involved official environmental stratification of these 109 villages, following the classification system used by the national and provincial Management and Planning Organization. Based on natural siting, villages were categorized into mountain, plain, and forest strata—81, 15, and 13 villages respectively. This typology, officially applied in regional planning, established a consistent environmental framework for comparison and ensured coverage of all major ecological settings in the province.

In the fourth stage, a preliminary selection was carried out within each stratum to capture environmental, spatial, and social diversity. Villages were evaluated according to three main criteria:

(1) Settlement characteristics – geographical location, density, and spatial distribution;

(2) Environmental–ecological features – climate, land-use pattern, accessibility, and the presence or absence of natural/historical attractions; and

(3) Key indicators– population class, livelihood type, and cultural context.

Applying these criteria resulted in 40 candidate villages (17 mountain, 13 plain, and 10 forest) representing a wide range of physical and social conditions within the study area.

During the fifth stage, a final analytical selection was performed using a refined multi-criteria evaluation based on the same three main criteria and their sub-factors. Under Settlement characteristics, attention was paid to geographical setting, density, and balance of spatial distribution. The Environmental–ecological features included climate diversity, extent of farmland and rangeland, accessibility, and natural/historical attractions. The Key indicators (sense of place) accounted for livelihood structure (agriculture, husbandry, or mixed) and population scale (below/above 1,000 inhabitants). This process identified ten representative villages—Khosravieh, Esfidan, Borzelan, and Rein (mountain); Jooshqan, Chukanlu, and Jorbat (plain); and Darkesh, Keshanak, and Roien (forest)—as the final study cases (see Figure 5), which illustrates their geographical distribution across the three environmental strata.

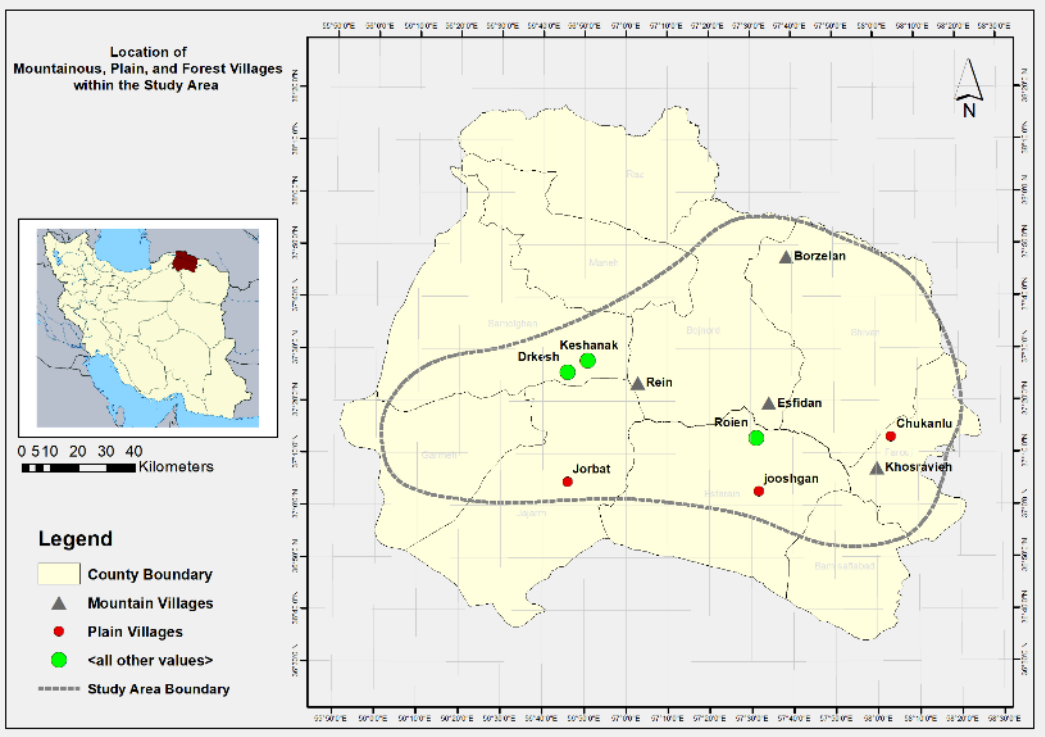


Figure 5. Location of the 10 final selected villages by environmental strata (mountain, plain, forest)

Finally, the sixth stage involved validation and generalization. The selected villages were cross-checked against official environmental and demographic typologies to confirm that all three strata were represented and that intra-stratum heterogeneity (in population, livelihood, and land-use) was maintained. This design supports analytical generalization at the provincial scale, allowing for meaningful comparison among the three environmental settings rather than statistical estimation of province-wide proportions.

Overall, this structured, criteria-based procedure clarifies how ten villages can effectively represent the environmental and social diversity of North Khorasan Province. The balanced stratification across mountain, plain, and forest settings, combined with systematic evaluation under the three main criteria—settlement characteristics, environmental–ecological features, and key indicators—ensures both representativeness and analytical rigor for subsequent landscape assessment.

3.3. Natural and human characteristics of villages

The mountain villages[1]**-** Esfidan is a mountain village in Bojnord County. Esfidan village has a semiarid and cold climate and approximately 1371 individuals according to the 2016 census. Esfidan is a stepped village and has beautiful natural landscapes such as green gardens, different waterfalls, and two very old cypress trees aged 500 years. Esfidan is a stepped village and possesses cultural heritage. Khosravieh village lies in Shah Jahan city in the Farouj region at 1800 m in elevation and has a semiarid and cold climate. The population in the 2015 census was approximately 662 inhabitants. Fish ponds have been constructed in rivers and many springs within this village.

1 All information related to the natural and human characteristics of North Khorasan province, including statistical information, maps, tables... from the study sources of the General office of Natural Resources and Watershed Management of North Khorasan Province, the Department of Natural Resources and Watershed Management of Shirvan City, Housing Foundation of Islamic Revolution, North Khorasan Province Management and Planning Organization, North Khorasan Agriculture Jehad, The Governorate of North Khorasan, Administration of Cultural Heritage, Handicrafts and Tourism Organization of North Khorasan has been taken.

Kalakan Glacier, the local location, is located 5 kilometers southeast of the village. Borzelan village is within the Qoshkhaneh rural district, 122 km northwest of Bojnord, between mountainous areas with elevations ranging from 1,300 to 1,890 meters. A semiarid climate prevails here, and springs and rivers are the sources of water for the village. The population included 498 people in 142 families according to the 2016 census. Despite being a mountainous village, Borzelan village has no specific natural or historical attractions. (For a better understanding of the mountainous character of the villages, see Image 1 and 2.)



Figure 5. Left; Aerial photo of Darkesh village, right; General view of Darkesh village



Figure 6. Left, Aerial photo of Khosravieh village, right; The general view of Khosravieh village.

The forest villages- Here, we analyze the conditions of the Roien, Darkesh, and Keshanak villages in North Khorasan Province by measuring their natural and sociocultural features. Roien village, located at an altitude of 1670 m above sea level, has a semiarid and cold climate. Roien, whose beautiful landscape is dotted with fruit trees and stone gorges, has a diverse ecosystem due to its numerous springs and the Roien River, which flows perennially. The population of the village is 2123. Beautiful architectural features such as houses along slopes have made Roien culturally attractive. Similarly, the location of Darkesh village explains yet another facet of life in the forest village. The elevation is 990 m above sea level. The climate of the area is mountainous and temperate. Darkesh is renowned for its dense oak woodlands, extensive gardens, and lush valleys. A total of 1027 people live in the village. Keshanak village is 27 kilometers southwest of Ashkhaneh, which is a half-arid forest area. The village elevation is between 870 and 1720 meters. The forest area is 880 hectares, the agricultural land area is 1020 hectares, and the garden area is 1020 hectares. It had 2807 people as of the 2016 census. The village is blessed with all sorts of natural attractions, such as mountains, valleys, waterfalls, hot springs, lakes, rivers, and forests. In addition, Golzar Imamzadeh, dating back 200 years, is located on the Keshanak heights of green hills. It is a resort spot for visitors. These three forest villages embody the complex relationship between natural scenery and cultural heritage and are therefore attractive sites for an integrated assessment of the rural landscape. (For a better understanding of the forest setting of the villages, refer to Image 3 and 4.)



Figure 7. Left; Aerial photo of Roien village, right; General view of the village

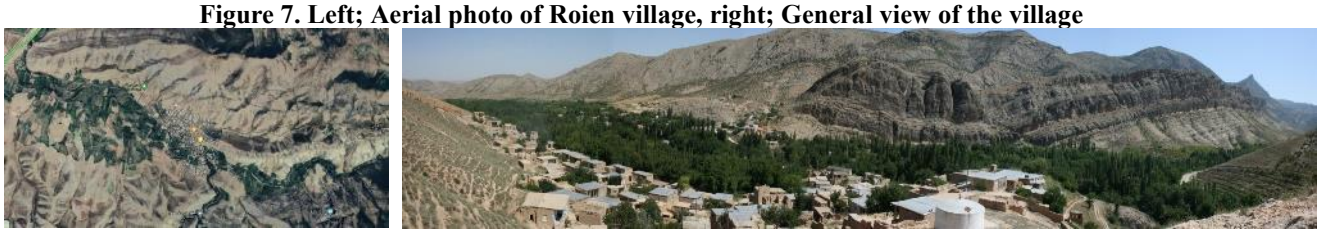


Figure 8. Left; Aerial photo of Darkesh village, right; General view of Darkesh village

The plain villages- Chukanlu village is situated in Farouj County and is 1,400 m in altitude. Chukanlu village is flatland, has a semiarid climate, is cold, and relies on deep wells to access irrigation water reservoirs. It has a population of 1,730 in the 2016 census and is flat and broad in dimension, so it is one of a kind in terms of identity. Jooshqan village is located 4 kilometers west of Esfarain. Jooshqan is situated at sea level (1,250 m) and is a plain village. Jooshqan village, similar to Chukanlu village, also relies on deep wells as agricultural water sources. Jooshqan village has residential lands of 747 hectares and orchard lands of 11 hectares and over 930 inhabitants according to the 2016 census. Jorbat village is situated 40 km east of Jajarm. It is a plain village by nature and is 940 m in elevation above sea level. The weather in the investigated area is cold and climatically arid. Qanats are village water sources used in agriculture. 120 hectares is irrigated cultivated land, and the number of pastures is 3699 hectares. The population of the village was 527 individuals according to the 2016 census. One notable monument of Jorbat village is the Jorbat petroglyph site, which is situated 8 kilometers east of Jorbat village and is registered among Iran's national monuments. (For a clearer view of the locations of the villages on the plains, see Image 5 and 6.)



Figure 9. Left; Aerial photo of Jooshqan village Right; General view of Jooshqan village

3.4. Research Design, Data Collection Methods, and Sampling Strategy

This research considers rural landscape assessments with three important indicators: "diversity," "perceived naturalness," and "sense of place." These have served as the building blocks upon which quantitative and qualitative studies have been conducted. A case study was undertaken with sample villages from North Khorasan Province via a qualitative study methodology to gain a better picture of more intricate landscapes of beauty.

Qualitative analysis was performed in phase one with the expertise of landscape architects, rural study experts, and environmental appraisers. Their preferences and rankings of the selected indicators were ascertained via an email questionnaire. The outcomes of phase one formed the basis for constructing a validated questionnaire that would be administered in phase two.

For the second stage, direct interviews and surveys were used to examine the perceptions and attitudes of the sample village residents toward beauty in the landscape and the sense of place-related factors. The data gathered were processed via data analysis software and yielded findings that provided a general vision of the countryside landscape, paving the way for final evaluation model development.

Participants- Expert Group: The expert group consisted of experts and elites in the fields of landscape architecture, rural studies, and environmental appraisal. Experts were selected using purposive sampling based on their academic background, professional experience, and direct expertise in rural landscape assessment, environmental appraisal, and landscape planning. These experts were responsible for validating and calibrating the questionnaire prior to its distribution among residents. In total, 25 questionnaires were emailed to the experts, of which 18 were completed. This expert consultation was designed to assess content validity and consistency of the questionnaire items rather than for inferential statistical analysis. According to methodological recommendations (Hinkin, 1998; Lynn, 1986), a panel of 15–20 experts is considered sufficient for content validation in interdisciplinary research. Therefore, the 18 completed expert questionnaires meet the recommended threshold and were sufficient to ensure the scientific validity of the research instrument and to enhance the reliability of the findings.

The non-response (7 experts) did not introduce systematic bias, as the non-respondents shared similar academic and professional backgrounds with the respondents. The participating experts represented a balanced mix of academic and professional perspectives, which strengthened the validity of the instrument.

Local Residents Group: The local residents group consisted of participants from ten selected villages in North Khorasan Province, chosen to reflect the province's geographical, cultural, and economic diversity. These ten villages, representing mountain, plain, and forest environments, have a total population of 12,698. To ensure comprehensive coverage of socio-environmental variation, a three-level cluster sampling strategy was employed. In the first stage, villages were identified according to the official environmental stratification framework. In the second stage, household clusters were established within each village, and in the third stage, individual respondents were randomly selected across different times of day and locations such as village centers, workplaces, and public spaces. This approach captured the full range of social and occupational diversity within the communities.

A total of 330 individuals (approximately 2.36% of the total population) were initially targeted, and 274 valid questionnaires were ultimately obtained due to field conditions. This sample size is considered statistically adequate for comparative rural studies and aligns with established sampling frameworks in rural sociological research (Dillman et al., 2014; Bernard, 2017). For a 50/50 proportion, $n = 274$ provides an estimated ±5.9% margin of error under simple random sampling, and an effective precision of ±7–8% when accounting for clustering effects. This level of accuracy is consistent with accepted thresholds for rank-based nonparametric analyses (Kruskal–Wallis and Spearman) used in this study.

Because the ten study villages were selected through the official environmental stratification (mountain, plain, and forest), covering all major ecological and social contexts of North Khorasan Province, the design allows for analytical generalization at the provincial level. Within these strata, the residents' sample provides sufficient statistical power to identify meaningful differences in perceived landscape preferences. All surveys were conducted face-to-face and through random

encounters, ensuring that a wide spectrum of perspectives on landscape beauty and sense of place was captured among respondents (see Table 2).

The validated data from expert and resident inputs established a reliable basis for developing an integrated framework for assessing rural landscape aesthetics in the region's diverse environmental and social contexts.

Table 2: Profiles of the respondents engaged in the survey questionnaire.

Geographical location of the village	village name	Number of respondents	Mean age	Female	Male
mountain type	Esfidan	25	39.7	10	15
	Khosravieh	14	41.7	5	9
	Rein	18	40	11	7
	Borzelan	14	42.1	4	10
forest type	Roien	50	40	28	22
	Darkesh	25	33.5	7	18
	Keshanak	56	42.3	29	27
plain type	Chukanlu	26	42.9	8	18
	Jooshqan	32	36.7	9	23
	Jorbat	14	42.6	6	8
Total	-	274	-	117	157

Explanation of Questionnaire Structure- The residents' survey used in this research was designed to test the residents' views about three rural scenery essentials: naturalness, diversity, and sense of place. The residents' questionnaire was designed not only to collect perception-based data but also to foster active participation by local people in the assessment process, reflecting the participatory spirit of citizen science in a community-based research context (see, for example, Fritz et al., 2019).

The sense of place section of the questionnaire was structured based on the two-dimensional framework of place identity and place dependence proposed by Williams and Vaske (2003). This framework has been previously applied and validated in Iranian studies, confirming its cultural appropriateness and psychometric reliability within both urban and rural contexts (Falahat, 2006; Mohammad-Moradi et al., 2022; Samadpourshahrak et al., 2020). For the present research, the questionnaire items were slightly adapted linguistically and contextually to reflect the local realities of North Khorasan villages, such as traditional architecture, community rituals, and agricultural livelihoods, ensuring that respondents could interpret and answer each item naturally within their cultural setting.

Two independent sets of residents' and experts' surveys were conducted, and 36 questions in total contained 5 diversity questions, 3 foundational and 8 secondary naturalness questions, 12 foundational and 7 secondary senses of place questions, and 5 demographic questions. Demographic variables such as age, education, and occupation were collected only for descriptive infographic purposes and were not analyzed as predictors of sense of place. The questionnaire was designed on the basis of past research, such as that conducted by 117. Zhuang et al. (2022) in China and Ólafsdóttir and Sæþórsdóttir (2020). The questionnaire also included Hemeroby index (Walz & Stein, 2014) to measure diversity and naturalness (Jorgensen & Stedman, 2001; Mohammad-Moradi et al., 2022). Field surveys were carried out to increase the accuracy of rural landscape variable measurements in Iran, especially in villages in North Khorasan. From these studies, some of the landscape features peculiar to the area, i.e., vineyards, fish ponds, and beehives, were part of the set of components that were evaluated, with detailed tables provided in the research findings chapter. Furthermore, the questionnaire was designed to also reflect temporal and cultural aspects influencing people's aesthetic perception. Items related to seasonal color changes and traditional or religious events were included so that both environmental seasonality and local cultural

practices were represented in the assessment of rural landscape aesthetics and sense of place.

In the initial phase, the expert survey was created on the Porsline site and conducted online with the participants. It consists of 15 7-point Likert scale questions (1 = very low, 7 = very high) and then 3 open-ended questions on the completion of every section to enable experts to provide more detailed explanations of their opinions. Following the scrutiny of the first set of expert answers, a few questions were made simpler or eliminated, and a resident-friendly questionnaire was developed.

In the second phase, the resident questionnaire was completed in a sample of 10 selected villages. Owing to the complexity of some of the specialized terms, e.g., diversity and naturalness, this term was put in less complex words, and its Likert scale was reduced from 7 points to 5 points (1 = very low to 5 = very high). The respondents were administered the questionnaire via a face–to–face interview and through direct contact with each respondent. The respondents were interviewed one by one by a survey administrator with clarifications provided, if necessary, while responses were carefully taken. To ensure consistent understanding between experts and residents, short and clear definitions of the three main concepts—*diversity*, *naturalness*, and *sense of place*—were presented at the beginning of the questionnaire. During the face-to-face interviews, these definitions were briefly explained by the interviewer to make sure that all respondents interpreted the questions based on a shared conceptual framework. The data derived are summarized in Table 3 of the article. The complete version of the residents' questionnaire, including all items related to diversity, perceived naturalness, and sense of place, is provided in Appendix A to ensure transparency and replicability of the data collection process.

Table 3. Summary of naturalness and diversity questionnaire framework

Indicator	The primary focus of the survey questions	Sub-indicator
Landscape Diversity	- Assessing the Impact of Diversity Factors on Village's Aesthetics	- Seasonal Colors - Topographical Diversity - Plain Landscape - the Integration of Stepped Architecture Next to the Orcahards - Pathways
Landscape Naturalness	- Influence of Natural and Cultivated Features on the Village's Aesthetics	- Forest - Orchards - Farmland - pastures - The mountains around the village - Water resources (Spring and river) - Salmon fountain pools - Colored beehives - Natural Sounds' Influence - Vernacular material of architecture
Sense of place Components of Sense of place	- Place identity - Place attachment - Place dependence - How much does each of the following things make you feel a sense of belonging to this village - Specify your level of satisfaction with each of the following items	- This village mirrors my essence. - I feel truly myself here. - This village reflects who I am. - This village is a part of me. - Feeling calm in this village. - Feeling happy in this village. - This village is my favorite place. - Missing this village when away. - This village meets my needs best. - Entertainment here suits my age. - Perfect place for my interests. - Nowhere else compares for my work. - Valuable historical monuments - Signs of traditional village architecture - Organizing cultural, religious, and ritual events - Well-being and comfort (economic welfare) - Infrastructure and services - Cleanliness and garbage collection

Data Analysis- Statistical analysis was conducted using IBM SPSS 29 to validate and compare three aesthetic indicators—diversity, perceived naturalness, and sense of place—across ten rural respondent groups in North Khorasan Province. Descriptive statistics were first calculated for each village and each sub-indicator. The normality of the indicators was then examined using the Kolmogorov–Smirnov test for the pooled sample and for the village-level groups. Because the p-values were below 0.05 in almost all cases, the assumption of normality was rejected and nonparametric procedures were adopted. The Kruskal–Wallis H test was used to identify significant differences among the ten villages, and Spearman correlation analysis was used to examine associations among diversity, perceived naturalness, components of sense of place, and overall sense of place. In this analytical framework, sense of place was treated as the main perceptual outcome, while diversity, perceived naturalness, and sense-of-place components were examined in relation to it. Before presenting the statistical results, the validity and reliability of the measurement instruments were evaluated to ensure the robustness of the analytical framework.

In the first stage, content validity was assessed through the expert questionnaire previously introduced in the Methodology section (Section 4.3.1). In this phase, 18 Iranian experts in landscape architecture and environmental design evaluated the indicators of diversity, naturalness, and sense of place regarding their alignment with the environmental, cultural, and aesthetic characteristics of Iran's rural landscapes. Their feedback was used to refine wording, simplify items, and improve conceptual clarity to ensure that the questionnaire was both theoretically coherent and locally adapted to the real conditions of rural Iran.

Moreover, the conceptual framework of this study has been further supported in a complementary comparative publication (Ghorbanzadeh et al., 2025), which demonstrates that while these three indicators possess general conceptual validity, their interpretation and relative importance vary across different cultural settings. This comparative insight reinforces the theoretical foundation of the present research but does not replace the content validation conducted by Iranian experts.

In the second stage, construct validity was examined through confirmatory factor analysis (CFA) performed in LISREL software, which is widely used for advanced statistical analyses such as structural equation modeling and factor analysis. All factor loadings were above 0.40, and the average variance extracted (AVE) for each construct exceeded 0.50 (AVE_diversity = 0.52; AVE_naturalness = 0.51; AVE_sense of place = 0.67), indicating satisfactory convergent validity. Model-fit indices ($\chi^2/df < 5$, RMSEA < 0.08, P > 0.05) also confirmed an acceptable model fit. As shown in Figure 6, the CFA model verified the significant correlations between the observed variables and their corresponding latent constructs, confirming the adequacy of the measurement model.

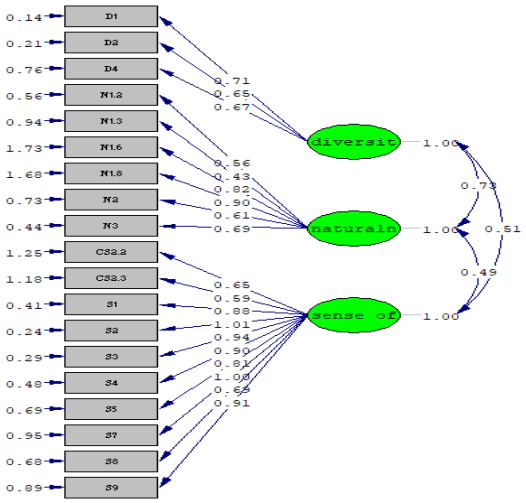


Figure 10. Measurement model (CFA) for the indicators of diversity, naturalness, and sense of place.

Discriminant validity was verified using the HTMT criterion (values < 0.9), and reliability was confirmed through Cronbach's alpha coefficients exceeding 0.70 for all constructs. Altogether, these results confirm that the three-dimensional framework—comprising diversity, naturalness, and sense of place—is conceptually rooted in the Iranian context, statistically validated, and theoretically consistent with broader international approaches to rural landscape assessment. The outcomes of these tests are presented in Table 4.

Table 4. Tests for rural landscape assessment for three indicators across ten respondent rural groups.

Indicators	Test Group	N	Analysis Method
- Experience of landscape diversity - Experience of naturalness - components of the sense of place - Sense of place	10 villages	274	Kolmogorov–Smirnov Test Kruskal–Wallis H Test Spearman-Brown correlation Test Correlation

4. Research Findings

This section presents the findings of the empirical analysis as a separate results section. The analysis is organized in three steps. First, the mean ranks of diversity, perceived naturalness, components of sense of place, and overall sense of place are compared across the ten selected villages. Second, the statistical relationships among the main indicators are interpreted through nonparametric correlation analysis. Third, the villages are compared within their environmental settings—mountain, forest, and plain—to identify how natural environmental values and social–cultural factors jointly shape rural landscape aesthetics.

4.1. Comparison of the Rankings of Landscape Aesthetic Indicators

Following onsite interviews and questionnaire administration among local residents, the survey results are presented in Table 5 as mean ranks for diversity, perceived naturalness, components of sense of place, and overall sense of place. The ranking procedure is important because the indicators were measured through ordinal Likert-scale responses and the distribution of scores was non-normal. The mean ranks therefore provide a comparable basis for identifying which villages are perceived as aesthetically stronger or weaker in relation to natural environmental values.

Because the purpose of the study is to evaluate the values of the natural environment in rural landscape aesthetics, natural and environmental factors such as village location, vegetation, water resources, landforms, and land-use patterns are emphasized as the primary components of interpretation. Social and cultural attributes are not treated as independent demographic predictors; instead, they are integrated under the components affecting sense of place, including valuable historical monuments, traditional architecture, cultural and religious events, welfare and comfort, collective memories, and satisfaction with local services.

Table 5. Mean Rank of Diversity, Naturalness, and Sense of place in villages

Geographical location of the village	village_name	N Participants	Mean Rank Diversity	Mean Rank Naturalness	Mean Rank components of sense of place	Mean Rank sense of place
mountain type	Esfidan	25	143.18	146.20	127.38	123.86
	Khosravieh	14	122.71	177.53	114.39	126.60
	Rein	18	59.55	141.41	165.88	235.47
	Borzelan	14	42.42	27.00	53.71	99.35
forest type	Roien	50	205.16	222.56	198.10	167.83
	Darkesh	25	203.86	164.28	114.62	122.29
	Keshanak	56	178.30	118.11	117.33	137.86
plain type	Chukanlu	26	115.90	86.59	109.55	116.09
	Jooshqan	32	110.46	131.07	187.67	122.28
	Jorbat	14	94.53	22.53	124.28	119.10

Significant correlation between aesthetic and perceptual variables in rural landscapes- In addition to ranking the indicators, correlation analysis was used to clarify how the aesthetic and perceptual variables interact. The Kruskal–Wallis test indicated statistically significant differences among the ten village groups in vegetation diversity, perceived naturalness, components of sense of place, and overall sense of place ($p < 0.001$). This confirms that residents' preferences are not homogeneous across North Khorasan; rather, they vary according to the environmental, ecological, and socio-cultural characteristics of each village.

According to the nonparametric Spearman correlation test, diversity was positively associated with perceived naturalness ($r = 0.539$, $p = 0.001$), indicating that landscapes with greater vegetation and land-cover diversity were more likely to be perceived as natural. Components of sense of place were also strongly associated with overall sense of place ($r = 0.595$, $p = 0.001$), showing that belonging, satisfaction, cultural memory, and local identity play an important role in strengthening residents' attachment to their village. Perceived naturalness was moderately associated with sense of place ($r = 0.477$, $p = 0.001$), suggesting that natural environments contribute to residents' emotional and cognitive connection with place. By contrast, the relationship between diversity and sense of place was weaker ($r = 0.322$, $p = 0.001$), indicating that landscape diversity alone has a secondary role in shaping place attachment. (see Table 6).

Table 6. Correlation Analysis Results Between Diversity, Naturalness, and Sense of Place

Variables	Correlation Coefficient (r)	Significance Level (p)	Relationship and Importance
Diversity ↔ Naturalness	0.539	0.001	Strong positive correlation; increased diversity is associated with higher naturalness.
Sense of Place Components ↔ Overall Sense of Place	0.595	0.001	Sense of place components have a significant impact on overall place perception.
Naturalness ↔ Sense of Place	0.477	0.001	Natural environments play a crucial role in strengthening the sense of place.
Diversity ↔ Sense of Place	0.322	0.001	Weaker correlation compared to naturalness; diversity plays a secondary role in shaping the sense of place.

Overall, the results indicate that diversity and perceived naturalness reinforce each other, but they do not automatically generate a strong sense of place unless they are supported by social, cultural, and livelihood-related conditions. Villages with abundant vegetation, water resources, and distinctive landforms generally received higher aesthetic evaluations; however, villages with weaker ecological conditions could still maintain place attachment when residents reported stronger cultural identity, collective memory, or satisfaction with everyday life. Therefore, rural landscape aesthetics in North Khorasan should be understood as a combined environmental and perceptual phenomenon rather than as a purely visual or ecological attribute.

Ranking of Indicators in Mountainous Villages- In the mountain villages, the mean-rank results show that environmental richness and social attachment do not always coincide (Figure 7). Esfidan obtained relatively high ranks for diversity (143.18) and naturalness (146.20), reflecting its orchards, stepped form, and surrounding landforms; however, its sense of place was moderate (123.86), suggesting that aesthetic quality alone is insufficient without stronger socio-economic and cultural support. Khosravieh also recorded a relatively high rank for naturalness (177.53), but its

sense of place remained moderate (126.60), indicating that natural features may support landscape appreciation but do not necessarily generate strong place attachment in the absence of sufficient social and livelihood-related factors. Rein showed the highest overall sense of place (235.47), despite moderate naturalness (141.41), which highlights the importance of social bonds, livelihood continuity, and daily dependence on the village environment. By contrast, Borzelan recorded low ranks across diversity (42.42), naturalness (27.00), and sense of place (99.35), demonstrating the cumulative effect of weak environmental resources and limited socio-economic vitality on residents' place attachment.

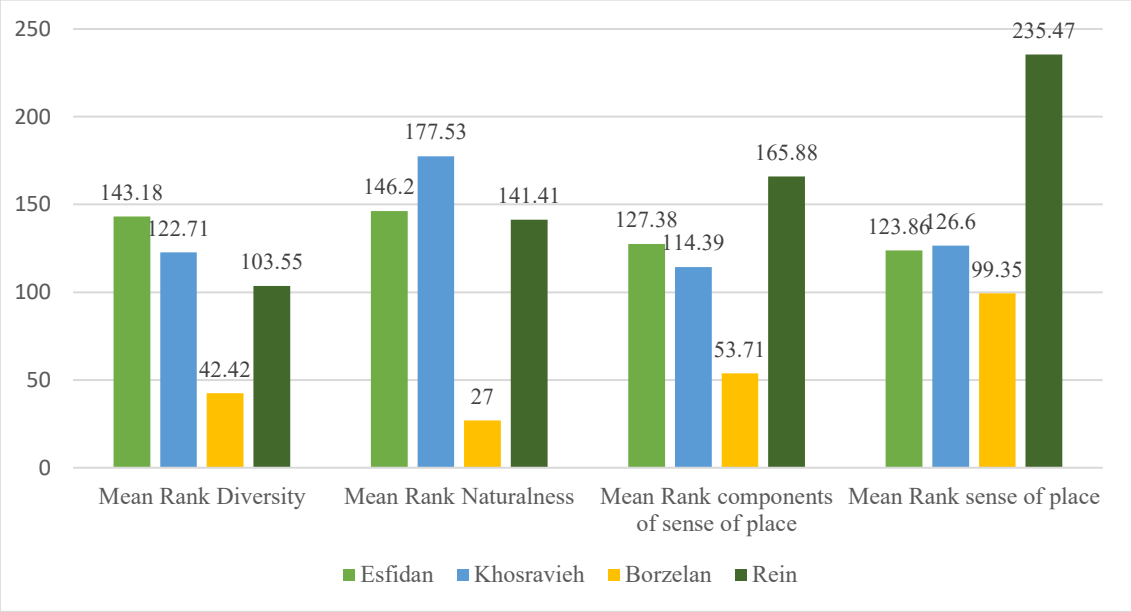


Figure 11. Comparison of Diversity, Naturalness, and Sense of Place Indicators for Mountain Villages

Ranking of Indicators in Forest Villages- In the forest villages, Roien ranked highest in naturalness (222.56), diversity (205.16), and sense of place (167.83), showing that ecological richness, water resources, orchards, and cultural identity can jointly create strong rural landscape aesthetics (Figure 8). Darkesh also recorded high diversity (203.86) and naturalness (164.28), but its lower sense of place (122.29) indicates that ecological value alone does not guarantee emotional attachment when social or economic conditions are less supportive. Keshanak, with moderate naturalness (118.11) and high diversity (178.30), maintained a relatively stronger sense of place than Darkesh (137.86), suggesting that cultural and social supports can partly compensate for uneven ecological advantages.

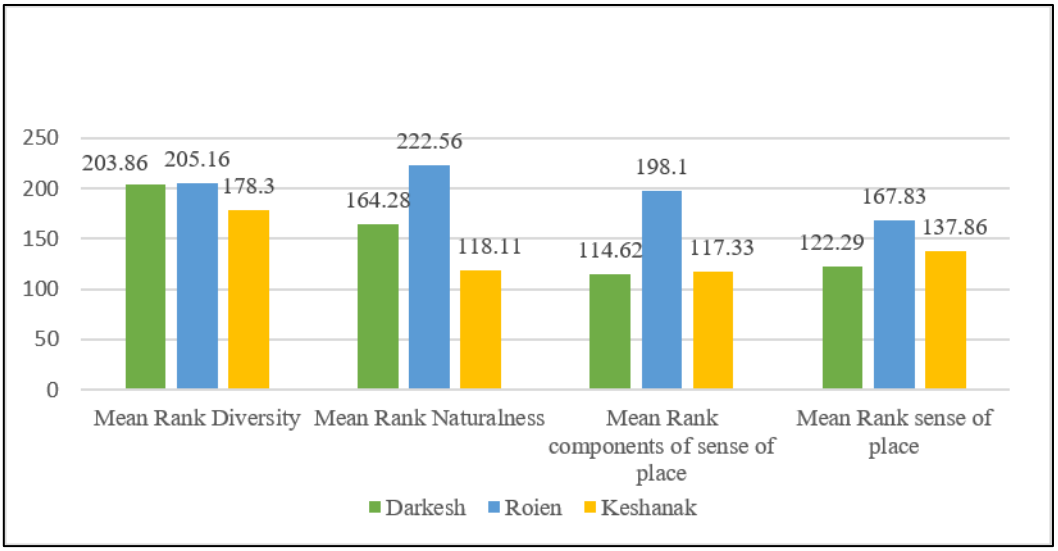


Figure 12. Comparison of Diversity, Naturalness, and Sense of Place Indicators for Forest Villages

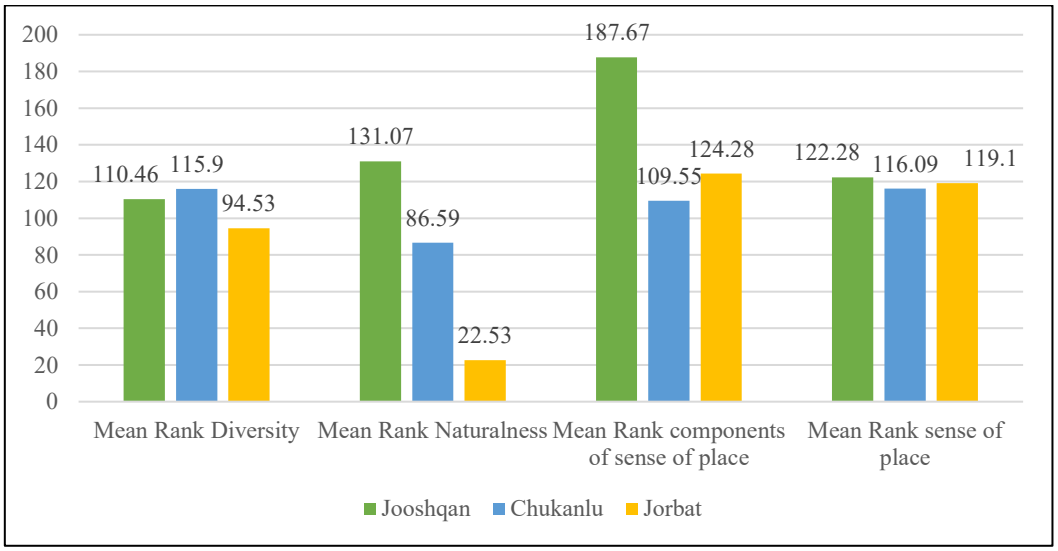


Figure 13. Comparison of Diversity, Naturalness, and Sense of Place Indicators for Plain Villages

Ranking of Indicators in Plain Villages- In the plain villages, the findings show that sense of place is shaped more strongly by cultural, livelihood, and satisfaction-related factors than by naturalness alone (Figure 9). Jooshqan recorded the highest rank for components of sense of place (187.67), together with moderate diversity (110.46) and naturalness (131.07), indicating the importance of social and cultural resources in sustaining residents' attachment to the village. Chukanlu showed moderate levels across the indicators, including diversity (115.90), naturalness (86.59), components of sense of place (109.55), and overall sense of place (116.09), suggesting a relatively balanced but improvable landscape condition. Jorbat, despite its cultural and historical value, recorded very low naturalness (22.53), mainly because of limited water resources and arid conditions, while maintaining a moderate level of sense of place (119.10). These results suggest that plain villages require targeted environmental restoration and landscape-management measures to strengthen their aesthetic and place-based values.

4.2. Analysis of Local Residents' Survey

Impact of Environmental and Economic Factors on Sense of Place Creation- The results confirm

that rural landscape aesthetics are shaped by a combination of environmental, perceptual, and livelihood-related variables. Residents' attachment to their village is influenced not only by visible natural features but also by the extent to which these features support daily life, agricultural productivity, cultural practices, and long-term community stability. Table 7 summarizes the variables identified through the local survey and shows how specific landscape and socio-economic factors strengthen or weaken sense of place.

Among the naturalness attributes, fruit orchards (N2), agricultural lands (N3), and water resources such as springs and rivers (N6) had the strongest influence on residents' sense of place. Water availability is particularly important because it directly affects agricultural productivity, orchard maintenance, landscape vitality, and household welfare. When water resources decline, cultivated land and garden landscapes lose their visual and functional quality, which in turn weakens livelihood security, environmental satisfaction, and emotional attachment to the village.

For example, Borzelan and Jorbat, where water resources were limited or under pressure, recorded low scores for water resources (N6) (1.92 and 1.78, respectively). These conditions were also reflected in economic welfare (CS2.1) (3.35 and 3.71, respectively) and in the sense-of-place item indicating that the village is incomparable to any other place (S12) (2.64 and 2.71, respectively). This suggests that environmental decline, particularly water scarcity, can indirectly weaken place attachment by reducing agricultural productivity, landscape vitality, and residents' satisfaction with local living conditions.

The findings also show that ecological richness must be accompanied by social and economic viability. Some villages with high naturalness and diversity, such as Darkesh, did not record equally high sense-of-place scores, which suggests that unequal access to resources, limited economic opportunities, or insufficient local services can weaken residents' attachment. Conversely, villages with moderate environmental conditions can maintain a stronger sense of place when cultural identity, social interaction, and welfare conditions are relatively stable.

The analysis reveals that ecological and economic conditions jointly shape residents' attachment to their environment. Water availability, agricultural productivity, and local infrastructure are decisive factors influencing both livelihood stability and the formation of sense of place. Among socio-economic variables, only economic welfare (CS2.1) was statistically analyzed as a contextual sub-indicator of sense of place, as it directly reflects residents' material well-being and local infrastructure conditions. Other demographic factors, including age, education, and occupation, were collected for descriptive purposes only and were not included in the analytical model, as the study primarily focused on perceptual and environmental dimensions of landscape preference. Villages suffering from water scarcity or declining agricultural outputs, such as Borzelan and Jorbat, display weaker place attachment and lower environmental satisfaction, while those with more stable ecological and social systems, such as Rein and Roien, maintain stronger emotional and functional ties to their surroundings.

These findings highlight that sense of place emerges not only from environmental qualities such as naturalness and diversity but also from the social and economic context in which people live. Economic welfare, fairness in resource access, and everyday social interactions reinforce people's identification with their landscape and sustain community well-being. Conversely, economic decline or environmental degradation undermines these bonds and reduces local participation in collective activities.

Hence, sense of place should be viewed as an integrative social–ecological construct that bridges environmental perception, cultural continuity, and community resilience. Strengthening this linkage—through supporting local livelihoods, preserving traditional knowledge, and promoting participatory landscape management—can enhance both environmental sustainability and rural quality of life. This perspective provides a conceptual bridge to the following section, where the influence of geographical and environmental contexts on sense of place is further explored.

Table 7. Factors Affecting the Strengthening or Weakening of Sense of Place from the Residents' Perspective.

Geographical location of the village	village_name	Naturalness			components of sense of place	sense of place			
		N2	N3	N6	CS2.1	S5	S6	S7	S12
mountain type	Esfidan	4.08	2.92	4.80	3.24	3.96	3.20	3.08	2.96
	Khosravieh	4.64	4.21	4.50	3.57	4.57	3.07	2.64	2.85
	Rein	4.33	4.27	4.88	4.72	4.77	4.72	4.55	4.83
	Borzelan	3.42	3.28	1.92	3.35	2.78	2.42	2.35	2.64
forest type	Roien	4.90	4.12	4.78	4.88	4.36	3.42	3.68	3.46
	Darkesh	3.60	3.40	4.68	2.64	3.68	3.00	2.84	2.72
	Keshanak	4.39	4.41	4.78	2.39	3.35	3.30	3.44	2.89
plain type	Chukanlu	4.34	4.11	3.73	3.30	4.00	2.92	3.11	2.88
	Jooshqan	3.62	3.87	3.53	3.71	3.71	3.21	3.31	2.87
	Jorbat	2.92	2.85	1.78	3.71	2.85	3.21	3.14	2.71
	Total	4.17	3.88	3.60	3.51	3.82	3.27	3.31	3.08

N2: Fruit orchards; N3: Agricultural lands; N6: Water resources (spring and river); CS2.1: Economic welfare and comfort; S5: Sense of tranquility in the village; S6: Sense of happiness in the village; S7: The village is the preferred place to live; S12: The village is incomparable to any other place.

Impact of Geographical Location on Sense of Place- Figure 14 compares diversity, perceived naturalness, components of sense of place, and overall sense of place across the three geographical settings. Forest villages recorded the highest average ranks for diversity and naturalness, confirming the importance of dense vegetation, water resources, and varied landforms in shaping aesthetic appreciation. However, the comparison also shows that the highest ecological value does not always lead to the highest sense of place, because residents' attachment is mediated by economic welfare, cultural continuity, and satisfaction with the living environment.

Mountain villages such as Rein and Esfidan demonstrate that sense of place can be strengthened when moderate or high naturalness is combined with social cohesion, traditional architecture, agricultural continuity, and cultural practices. These villages may not always match forest villages in ecological richness, but their distinctive topography, stepped settlement patterns, water sources, and collective memories provide important foundations for place attachment.

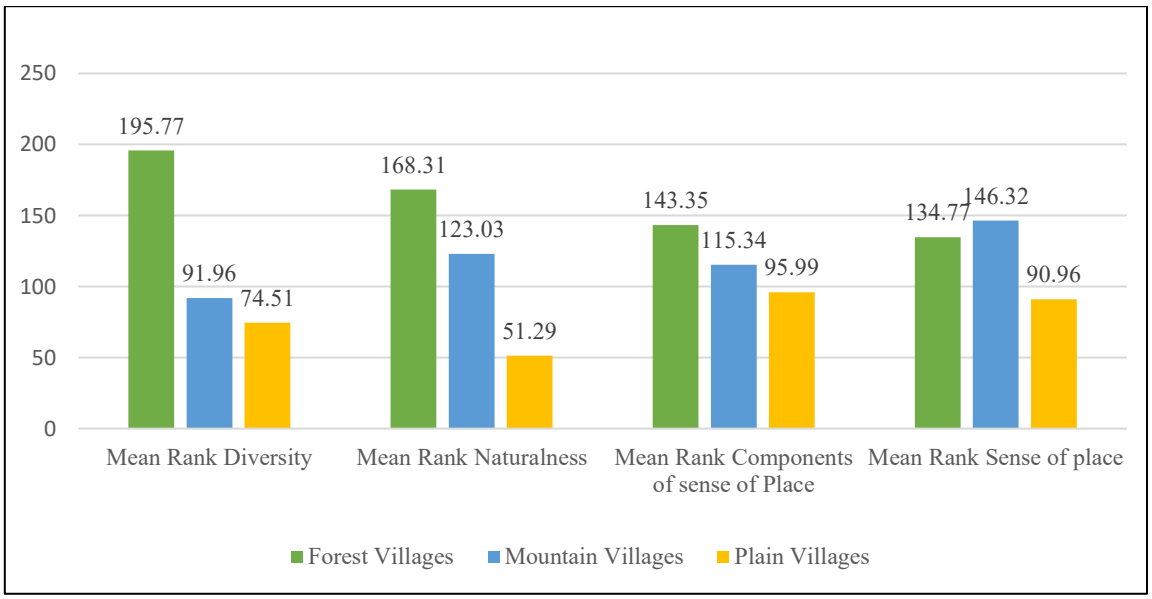


Figure 14. Comparison of mean ranks of diversity, naturalness, sense of place components, and sense of place among forest, mountain, and plain villages

Plain villages such as Jooshqan, Chukanlu, and Jorbat reveal a different pattern. Because naturalness and diversity are generally lower in the plain setting, components of sense of place—such as cultural heritage, social relations, satisfaction with services, and livelihood continuity—play a compensatory role. Nevertheless, the low naturalness scores in some plain villages indicate the need for targeted environmental restoration, water-resource management, and landscape-sensitive planning to prevent further weakening of place attachment.Figure 11 illustrates the mean ranks of the indicators for the ten villages.

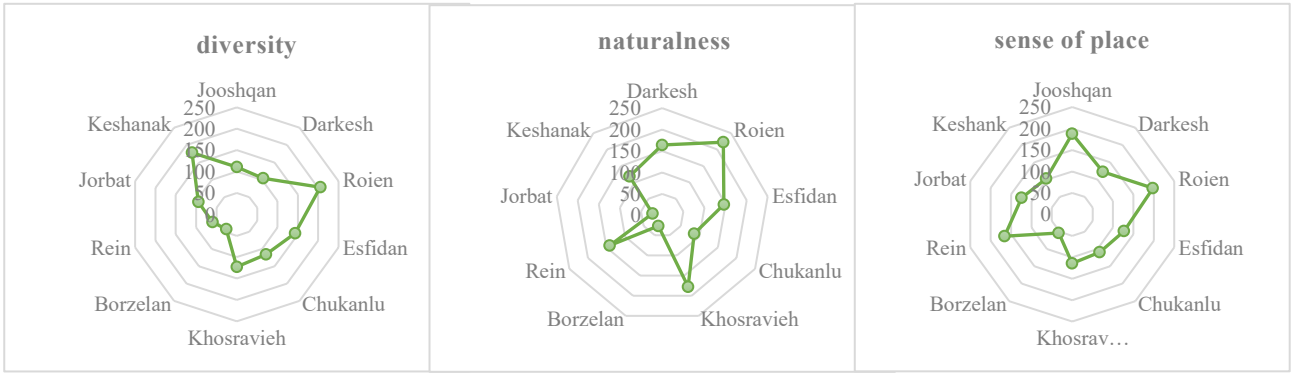


Figure 15. Comparison of mean ranks for diversity, naturalness, and sense of place across ten villages

5. Discussion and Conclusion

This study provides descriptive insights into the aesthetic quality of rural landscapes in North Khorasan Province and confirms the key role of perceived naturalness, structural diversity, and sense of place in shaping residents' perception and attachment to their living environment.

Nevertheless, certain methodological limitations should be acknowledged, including possible response bias, observer bias during fieldwork, and limited survey coverage due to the number of sampled villages. These constraints do not undermine the validity of the findings but can be minimized in future work through larger and multi-seasonal datasets.

The results highlight that sense of place constitutes the central ethical and functional bridge linking naturalness and landscape diversity in the pursuit of sustainable rural landscape management. Reinforcing this human–environment relationship enhances not only the ecological and aesthetic integrity of the countryside but also residents' emotional attachment, collective identity, and sense of belonging. Therefore, rural planning and policy should explicitly prioritize the cultivation of sense of place—through cultural continuity, social participation, and environmental stewardship—to achieve development that is both ecologically balanced and socially cohesive.

Although the present research is cross-sectional, based on the 2016 census and one-time surveys, it provides a valuable spatial understanding of rural landscape aesthetics and sense of place. Incorporating historical and longitudinal data—such as past land cover maps, satellite imagery, or repeated surveys—would help reveal how environmental and socio-economic changes have influenced aesthetic values and place attachment over time, clarifying whether the low sense of place observed in some villages (e.g., Borzelan) is a recent phenomenon or a long-term trend.

The analytical framework developed here offers a replicable model for analytical generalization across North Khorasan's three environmental settings (mountain, forest, and plain). Its adaptation to other provinces with distinct ecological and cultural contexts requires external validation to confirm the robustness and applicability of the indicators.

By extending these analytical and comparative perspectives, the outcomes of this research can meaningfully contribute to rural landscape

evaluation practices that remain adaptive and relevant to both current and future environmental and social conditions.

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Authors' contributions

The authors equally contributed to the preparation of this article. This research was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. The study involved interviews with adult residents from ten villages in North Khorasan Province, Iran. All participants provided informed consent to participate in the study prior to the interviews.

Conflict of interest

The authors declare no conflict of interest.

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Original Article

ارزیابی زیبایی‌شناسی منظر روستایی بر اساس ارزش‌های محیط طبیعی (مطالعه موردی: روستاهای منتخب استان خراسان شمالی)

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چکیده مبسوط

۱. مقدمه

مناظر روستایی به‌عنوان مخازنی از ارزش‌های بوم‌شناختی، فرهنگی و اجتماعی، نقشی حیاتی در هویت و پایداری جوامع محلی ایفا می‌کنند. بااین‌حال، تغییرات جهانی نظیر تغییر اقلیم، تخریب منابع طبیعی و تحولات ساختاری، این مناظر را با تهدیدات جدی مواجه ساخته است. از دست رفتن ارزش‌های زیبایی‌شناختی و پیوندهای عاطفی ساکنان با محیط، نه‌تنها به کاهش حس تعلق منجر می‌شود، بلکه زمینه‌ساز گسست فرهنگی و زیست‌محیطی در نواحی روستایی خواهد بود. در ایران، علیرغم وجود اسناد بالادستی، ارزیابی یکپارچه از مناظر روستایی مبتنی بر ادراک ساکنان و ارزش‌های محیط طبیعی کمتر مورد توجه قرار گرفته است. پژوهش حاضر با هدف پر کردن این شکاف، به ارزیابی زیبایی‌شناسی منظر روستایی بر اساس سه شاخص کلیدی «تنوع منظر»، «طبیعی‌بودن ادراک‌شده» و «حس مکان» در روستاهای منتخب استان خراسان شمالی می‌پردازد و در پی پاسخ به سه سؤال اصلی است: ۱) مؤلفه‌های ارزیابی زیبایی‌شناسی منظر روستایی بر اساس ارزش‌های محیط طبیعی کدام‌اند؟ ۲) ساکنان روستاهای منتخب، شاخص‌های مذکور را چگونه ارزیابی می‌کنند؟ ۳) کدام روستاها و بسترهای محیطی از ارزش‌های زیبایی‌شناختی قوی‌تر برخوردارند و این یافته‌ها چگونه به برنامه‌ریزی پایدار روستایی کمک می‌کند؟

۲. مبانی نظری تحقیق

چارچوب نظری پژوهش بر تلفیق رویکردهای عینی و ذهنی در ارزیابی منظر روستایی استوار است. بر اساس کنوانسیون اروپایی منظر و رویکرد خدمات بوم‌سازگان فرهنگی، زیبایی‌شناسی منظر نه‌تنها وابسته به ویژگی‌های فیزیکی (نظیر پوشش گیاهی، عوارض زمین و منابع آب) است، بلکه از طریق ادراک و تجربه انسانی معنا می‌یابد. سه شاخص «تنوع» (ناشی از تنوع پوشش‌های زمین و الگوهای فضایی)، «طبیعی‌بودن ادراک‌شده» (میزان دوری از دخالت انسانی بر اساس شاخص هِمِروبی) و «حس مکان» (شامل هویت مکان، وابستگی و دلبستگی عاطفی بر اساس مدل ویلیامز وواسک) به‌عنوان مهم‌ترین مؤلفه‌های ارزیابی زیبایی‌شناسی منظر روستایی شناسایی شدند. این شاخص‌ها در پژوهش‌های داخلی نیز بومی‌سازی شده‌اند. با وجود غنای پژوهش‌های داخلی در حوزه توسعه روستایی، کمتر مطالعه‌ای به مقایسه روستاها در بسترهای محیطی متفاوت (کوهستانی، جنگلی و دشتی) با تأکید بر ادراک ساکنان پرداخته است. از این رو، پژوهش حاضر با بهره‌گیری از روش‌های ترکیبی، تلاش دارد تا پیوند میان ارزش‌های طبیعی و ادراک زیبایی‌شناختی را در قالب یک مدل تحلیلی بومی ارائه دهد.

۳. روش تحقیق

پژوهش حاضر با رویکرد آمیخته (کمی-کیفی) در ده روستای منتخب از استان خراسان شمالی شامل چهار روستای کوهستانی (اسفیدن، خسرویه، رئین و برزلان) ، سه روستای جنگلی (روئین، درکش و کشنک) و سه روستای دشتی (چوکانلو، جوشقان و جربت) انجام شد. انتخاب روستاها طی فرآیندی چندمرحله‌ای و بر اساس سه معیار اصلی «ویژگی‌های سکونتگاهی»، «ویژگی‌های بوم‌شناختی-محیطی» و «شاخص‌های کلیدی اقتصادی-اجتماعی» صورت گرفت. ابزار اصلی گردآوری داده‌ها، پرسشنامه‌ای ساخت‌یافته بود که روایی محتوایی آن توسط ۱۸ نفر از متخصصان تأیید و پایایی آن با آلفای کرونباخ بالای ۰/۷۰ احراز شد. روایی سازه با تحلیل عاملی تأییدی در نرم‌افزار LISREL بررسی و برازش مدل تأیید گردید. حجم نمونه شامل ۲۷۴ نفر از ساکنان بود که با روش نمونه‌گیری خوشه‌ای تصادفی انتخاب شدند. داده‌ها با استفاده از آزمون‌های ناپارامتریک کروسکال-والیس و همبستگی اسپیرمن در نرم‌افزار SPSS تحلیل شدند. مشاهده میدانی و مصاحبه‌های نیمه‌ساختاریافته نیز برای غنی‌سازی یافته‌ها به‌کار گرفته شد.

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۴ .یافته‌های تحقیق

یافته‌های آزمون کروسکال-والیس نشان داد که تفاوت معناداری بین ده روستا از نظر هر سه شاخص وجود دارد (p>۰/۰۰۱). در روستاهای کوهستانی، رئین با میانگین رتبه ۲۳۵/۴۷ بالاترین حس مکان را داشت که علی‌رغم طبیعی‌بودن نسبتاً متوسط، به دلیل پیوندهای اجتماعی قوی و تداوم معیشت حاصل شده است. در مقابل، برزلان با میانگین رتبه ۲۷/۰۰ در طبیعی‌بودن و ۹۹/۳۵ در حس مکان، ضعیف‌ترین وضعیت را نشان داد که ناشی از کمبود منابع آب و فرسایش اقتصادی-اجتماعی است. در روستاهای جنگلی، روئین با کسب بالاترین رتبه در تنوع (۲۰۵/۱۶) و طبیعی‌بودن (۲۲۲/۵۶) و حس مکان قوی (۱۶۷/۸۳)، نمونهٔ موفق از تلفیق غنای بوم‌شناختی و هویت فرهنگی است. در مقابل، درکش با وجود طبیعی‌بودن قابل‌قبول، حس مکان پایین‌تری داشت که نشان می‌دهد ارزش‌های طبیعی به‌تنهایی کافی نیستند. در روستاهای دشتی، جوشقان با میانگین رتبه ۱۸۷/۶۷ در مؤلفه‌های حس مکان، بالاترین امتیاز را کسب کرد که حاکی از نقش جبرانی مؤلفه‌های فرهنگی و اجتماعی در شرایط طبیعیِ ضعیف‌تر است. نتایج همبستگی اسپیرمن نشان داد که طبیعی‌بودن با حس مکان (r=۰/۴۷۷) و مؤلفه‌های حس مکان با حس مکان کلی (r=۰/۵۹۵) همبستگی مثبت و معناداری دارند (p>۰/۰۰۱)، در حالی که ارتباط تنوع با حس مکان ضعیف‌تر بود (r =۰/۳۲۲). تحلیل پرسشنامه ساکنان نشان داد که باغ‌های میوه، زمین‌های کشاورزی و منابع آب بیشترین تأثیر را بر حس مکان دارند و در روستاهایی با کمبود آب، رضایت از رفاه اقتصادی و دلبستگی به مکان به‌شدت کاهش یافته است.

۵ .بحث و نتیجه‌گیری

نتایج نشان می‌دهد ارزیابی زیبایی‌شناسی منظر روستایی در خراسان شمالی یک پدیدهٔ ترکیبیِ زیست‌محیطی-ادراکی است و نمی‌توان آن را به ویژگی‌های طبیعی یا بصری تقلیل داد. حس مکان به‌عنوان پل اخلاقی و کارکردی میان طبیعی‌بودن، تنوع و پایداری اجتماعی عمل می‌کند و زمانی تقویت می‌شود که ارزش‌های طبیعی با رفاه اقتصادی، تداوم فرهنگی و مشارکت اجتماعی همراه گردند. روستاهای با غنای بوم‌شناختی بالا لزوماً بالاترین حس مکان را ندارند و عواملی نظیر عدالت در دسترسی به منابع، کیفیت خدمات و سرمایه اجتماعی، نقش تعدیل‌کننده‌ای در دلبستگی ساکنان ایفا می‌کنند. این امر ضرورت بازنگری در برنامه‌های توسعه روستایی را آشکار می‌سازد و تأکید می‌کند که مداخلات باید با توانمندسازی اقتصادی، حفظ دانش بومی و مشارکت جوامع محلی همراه شوند. تفاوت آشکار بین بسترهای محیطی نشان می‌دهد که راهبردهای حفاظت و برنامه‌ریزی منظر باید متناسب با شرایط هر بستر تدوین شوند؛ به‌طوری که در روستاهای دشتی، اقدامات احیای محیطی و مدیریت منابع آب در اولویت باشد و در روستاهای کوهستانی، بر تقویت سرمایه اجتماعی و تنوع‌بخشی معیشتی تأکید شود. این پژوهش، با ارائه یک مدل تحلیلی قابل‌تکرار، چارچوبی عملیاتی برای برنامه‌ریزی منظر روستایی مبتنی بر ارزش‌های محیط طبیعی و ادراک ساکنان فراهم می‌کند که می‌تواند الگویی برای سایر استان‌های ایران باشد. انجام پژوهش‌های طولی و چندفصلی برای پایش تغییرات حس مکان، به‌عنوان پیشنهاد برای تحقیقات آتی مطرح می‌شود.

کلیدواژه‌ها: ارزیابی منظر روستایی، تنوع منظر، طبیعی‌بودن ادراک‌شده، تعلق مکانی، استان خراسان شمالی.

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Original Article

Vulnerability and Resilience of Rural Livelihoods under Climate Change in Sistan and Baluchestan, Iran

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Abstract

Purpose: This study examines the effects of climate change on the sustainability of rural livelihoods in Sistan and Baluchestan Province, Iran, with particular attention to the vulnerability of agricultural production and food security under changing climatic conditions.

Design/Methodology/Approach: An integrated analytical approach was applied using climatic, agricultural, and socio-economic data. Trends in temperature, precipitation, crop yields, and natural resource availability were evaluated. In addition, survey data were collected from local farmers to assess perceived impacts of climate variability on livelihood conditions.

Findings: The results indicate that rising temperatures and declining precipitation have significantly reduced agricultural productivity in the region. Although the cultivated area of cereal crops increased by about twenty-five percent, yields declined due to insufficient rainfall and increased evapotranspiration. In contrast, cucurbit crops such as watermelon and melon showed relatively improved performance due to higher rainfall during the past seventeen years. Furthermore, depletion of water resources in the Helmand River basin, reduction of inflow to Lake Hamun, and intensification of wind erosion have increased environmental pressure on agricultural systems. Survey results reveal that a large proportion of farmers experienced moderate to severe impacts from drought, resulting in reduced agricultural income and increased migration from rural areas.

Research limitations/implications: The study focuses on a single province, which may limit the generalization of the findings to other regions. Future studies should include multi-regional analyses and long-term socio-economic assessments to support climate adaptation planning.

Practical implications: The findings highlight the need for improved water resource management, adoption of modern agricultural practices, and implementation of targeted climate adaptation programs to strengthen rural livelihood resilience.

Originality/value: This research provides an integrated assessment of climate change impacts on rural livelihoods in an arid and socio-economically vulnerable region by combining environmental and socio-economic perspectives.

Keywords: Adaptation strategies, Climate change, Drought, Resilience, Rural livelihoods, Sistan and Baluchestan Province, Iran.

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1. Introduction

Climate change has become one of the most critical environmental challenges affecting natural resources and human livelihoods worldwide. Increasing temperatures, altered precipitation patterns, and the growing frequency of extreme events such as droughts and floods are intensifying pressure on ecosystems and human systems alike (Ikhuoso et al., 2020; Nyiwul, 2021). These changes reduce water availability, disrupt ecological processes, and threaten biodiversity, while also creating competition over limited natural resources (Shaffril et al., 2018). Such impacts are particularly severe in arid and semi-arid regions where livelihoods are highly dependent on climate-sensitive resources.

Rural livelihoods, especially those based on agriculture, are among the most vulnerable to climate variability and long-term climatic changes. Sustainable rural livelihoods require the capacity to withstand and recover from environmental shocks while maintaining or improving the assets and capabilities necessary for long-term development (Carr, 2020). This adaptive capacity is closely linked to the concept of resilience, which reflects the ability of communities to cope with disturbances while sustaining essential livelihood functions. Previous studies have shown that increased awareness of climate change and its indicators can influence livelihood strategies and adaptation practices among rural populations (Shahraki et al., 2021).

In many developing countries, agriculture remains the primary source of income and food security for rural communities, making it particularly sensitive to climatic fluctuations (Smith & Skinner, 2002). Recurrent droughts, declining water resources, and land degradation have intensified the vulnerability of agricultural systems and rural livelihoods (Speranza et al., 2008; Ellis, 2014). These pressures can lead to declining agricultural productivity, income instability, and in some cases rural out-migration as households seek alternative livelihood opportunities (Mohammadi et al., 2023). Projections indicate that countries located in arid regions, including Iran, will experience increasing temperatures and decreasing precipitation during the twenty-first century, which may further exacerbate food insecurity and resource scarcity (Keshavarz et al., 2013; Waha et al., 2017).

Sistan and Baluchestan Province in southeastern Iran represents one of the country's most climate-sensitive regions. The province is characterized by low and highly variable rainfall, frequent droughts, strong seasonal winds, and severe water scarcity. These environmental pressures, combined with socio-economic constraints, have made rural livelihoods particularly those dependent on agriculture and livestock highly vulnerable to climatic changes. Despite the growing attention to climate adaptation in arid regions, empirical studies that simultaneously examine both vulnerability and resilience of rural livelihoods in this province remain limited.

These challenges are directly linked to several United Nations Sustainable Development Goals (SDGs), especially SDG 2 (Zero Hunger), SDG 6 (Clean Water and Sanitation), and SDG 13 (Climate Action). By examining how climate stress affects food production, water scarcity, and livelihood resilience, this study provides evidence that can support researchers, policymakers, regional planners, and development practitioners in designing locally appropriate adaptation and rural development strategies.

Therefore, the main objective of this study is to assess the vulnerability and resilience of rural livelihoods to climate change in Sistan and Baluchestan Province. The study investigates how changes in temperature, precipitation, water availability, and agricultural productivity affect rural livelihood systems and examines the adaptive responses of local communities. The central hypothesis of this research is that increasing climatic stress particularly rising temperatures and declining precipitation has intensified the vulnerability of rural livelihoods in the region, while the level of resilience depends on the adaptive capacity of local communities and the availability of environmental and socio-economic resources.

2. Research Theoretical Literature

A growing body of research has investigated the impacts of climate change on rural livelihoods, particularly in regions where agriculture and natural resources form the foundation of local economies. Global studies indicate that climate change is altering precipitation patterns, increasing temperatures, and intensifying the frequency and

severity of extreme events such as droughts and floods (IPCC, 2022; Huang et al., 2023). These changes are especially critical in arid and semi-arid environments, where limited water resources and fragile ecosystems amplify the vulnerability of rural communities. For example, Ayanlade et al. (2018) found that in the Guinea Savannah region of Nigeria, significant temporal and spatial variations in rainfall patterns have disrupted traditional agricultural calendars and increased uncertainty for farmers. More recently, Bobojonov et al. (2022) demonstrated across multiple arid regions that climate-induced water scarcity disproportionately affects smallholder farmers who lack access to supplemental irrigation and financial safety nets.

In Iran, several studies have examined the relationship between climate variability and rural livelihood vulnerability. Zareei et al. (2017) analyzed drought patterns in southeastern Iran and reported that many meteorological stations frequently experience conditions ranging from normal to severe drought, with a high likelihood of transitions from wet to dry periods. At a more localized scale, Ashtab and Sharifzadeh (2016) investigated the vulnerability of farmers in Hirmand County, a key agricultural area in Sistan and Baluchestan Province, finding that farmers in the Qorqori sector face higher levels of vulnerability across social, economic, and environmental dimensions compared to those in the central sector. Complementing these findings, Erfanian et al. (2021) examined the long-term consequences of water stress in southeastern Iran and highlighted how groundwater depletion and soil degradation compound the livelihood insecurity of rural populations over successive drought cycles. Similarly, Savari et al. (2019) emphasized the importance of livelihood diversification and complementary economic activities as effective strategies for stabilizing the livelihoods of small-scale farmers under drought conditions. Building on this, Nazari et al. (2022) further documented that rural households with diversified income sources in arid Iranian provinces demonstrated significantly lower vulnerability indices during prolonged dry spells, underscoring the protective role of non-farm employment and off-farm income.

Recent studies have also explored practical strategies for strengthening agricultural resilience in the region. Karimi et al. (2024) identified several barriers to the adoption of climate-smart agriculture in the Sistan Plain, including financial constraints, weak institutional support, limited technical capacity, and insufficient farmer training, and highlighted the importance of targeted training programs, pilot projects, improved infrastructure, and supportive policies to facilitate the adoption of climate-adaptation practices. Likewise, Alavizadeh et al. (2023), in a study of rural households in Rostaq Dehestan, found that modern irrigation systems represent one of the most effective measures for improving drought resilience, emphasizing the importance of locally tailored solutions. Rezaei-Moghaddam and Karami (2023) further argued that participatory extension approaches where farmers are actively engaged in designing adaptation interventions yield more durable and context-appropriate outcomes than top-down technology transfer models. Additionally, Meinzen et al. (2021) demonstrated at the global level that secure land tenure and collective resource management significantly amplify farmers' willingness and capacity to invest in climate-adaptive technologies, a finding with direct relevance to the communal resource systems prevalent in Sistan and Baluchestan.

Beyond empirical assessments, theoretical research has expanded the understanding of vulnerability and resilience within rural livelihood systems. Scholars argue that vulnerability should not be viewed solely as a physical outcome of environmental change but rather as a dynamic process shaped by socio-economic conditions, political structures, and unequal access to resources (Adger, 2006; Turner et al., 2003). From this perspective, adaptive capacity varies across communities and social groups depending on their access to assets, knowledge, and institutional support. Ferdous et al. (2022) refined this argument by demonstrating that within the same agro-ecological zone, intra-community differentiation in social capital and prior exposure to shocks can produce markedly divergent adaptive trajectories. Studies within the framework of political ecology further emphasize that social inequalities including differences in gender roles, economic status, and power relations can significantly influence vulnerability and the ability to respond to environmental stress (Sultana, 2014; Tschakert et al., 2021). In this regard, Rao et al.

(2020) provided systematic evidence that gender-responsive adaptation programs substantially improve household resilience outcomes in rain-fed agricultural systems, as women's access to resources and decision-making is closely linked to food security and livelihood stability (UN Women, 2021).

Despite these contributions, research focusing specifically on the vulnerability and resilience of rural livelihoods in Sistan and Baluchestan Province remains limited. Many previous studies have primarily examined drought patterns, agricultural productivity, or adaptation strategies in isolation, without integrating both vulnerability and resilience perspectives within a comprehensive analytical framework. Moreover, the region's distinctive combination of chronic water scarcity, ethnic marginalization, and weak institutional infrastructure calls for context-specific inquiry that goes beyond generalizations drawn from other arid zones. Therefore, further research is required to provide a more integrated analysis that simultaneously considers climatic, environmental, and socio-economic dimensions. Such an approach can contribute to a deeper understanding of how rural communities in this arid region respond to climate stress and which factors enhance or constrain their adaptive capacity, ultimately informing more effective and equitable policy interventions.

3. Research Methodology

3.1 Geographical Scope of the Research

Sistan and Baluchestan Province, located in southeastern Iran, has a distinctive geographical configuration. It is bounded to the south by the Oman Sea, with an extensive coastline of approximately 300 km. To the east, it shares international borders with Pakistan and Afghanistan over a distance of about 1,800 km, while its northern and western boundaries adjoin the Iranian provinces of South Khorasan, Kerman, and Hormozgan. The geographical extent of Sistan and Baluchestan Province is 25°03′–31°29′N and 58°49′–63°20′E; the map of the province and the elevation data sources are presented in Figure 1.

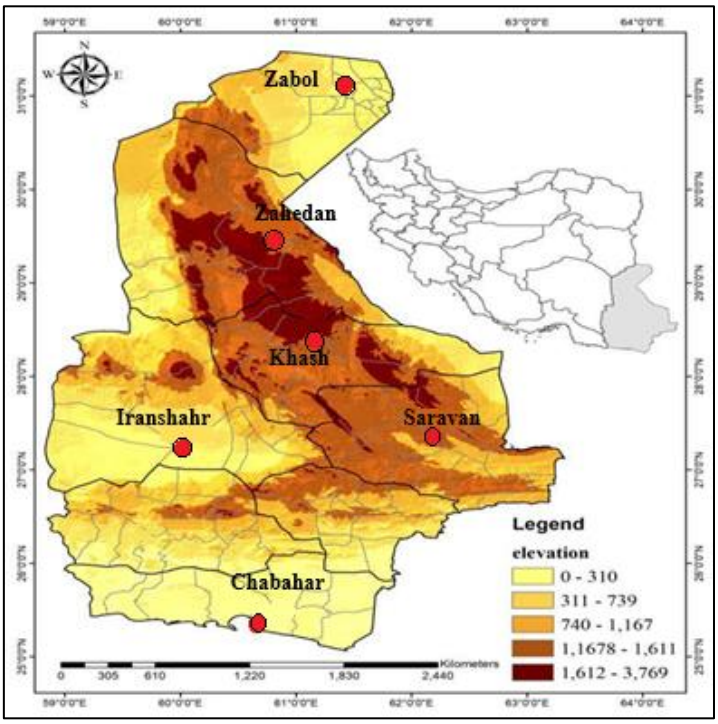


Figure 1. Geographical location of the study area with elevation characteristics

Climatically, the region is influenced by four dominant systems: Mediterranean, monsoonal, Oman Sea air masses, and Siberian high-pressure systems, with an overall predominance of arid desert conditions. Major climatic controls include the seasonal dominance of subtropical high-

pressure systems, the presence of extensive interior deserts, its position along the Alpine–Himalayan orogenic belt, and internal depressions such as the Jazmourian Basin. Together, these factors generate pronounced spatial and temporal climatic variability across the province.

As the second-largest province in Iran by area, Sistan and Baluchestan contains more than 10% of the country's inhabited villages, comprising 6,553 rural settlements. According to the 2016 National Population and Housing Census (Statistical Center of Iran, 2016), the province is administratively divided into 19 counties, 37 cities, 48 districts, 112 rural districts, and 9,839 settlements. In recent decades, the region has experienced notable climatic disturbances, including shifts in temperature and precipitation patterns, a marked reduction in the Helmand River's inflow, and prolonged severe droughts, resulting in a critical environmental situation.

3.2 Data Sources

Socio-economic data, including literacy and unemployment rates disaggregated by county, were extracted from the 2016 provincial statistical yearbooks. In addition, agricultural production data for six counties (Zabol, Zahedan, Khash, Saravan, Iranshahr, and Chabahar) over the period 2002–2019 were obtained from the Agricultural Jihad Organization. These data were grouped into three main categories: cucurbit crops, grains, and other field crops, as relevant.

A key limitation of this study is the reliance on a 17-year time series (2002–2019). This constraint reflects the lack of longer-term, integrated datasets for all required variables across the study counties. Nevertheless, this specific timeframe is particularly suitable for capturing recent accelerations in climate trends and extreme events (such as recurrent severe droughts) that may not be clearly visible in longer, smoothed historical records. Consequently, while the period restricts the analysis of centennial-scale trends, it provides a relatively high-resolution perspective on contemporary climate impacts that are most relevant to current rural livelihood strategies.

This study employs a multi-method analytical framework to investigate the complex, multi-scalar relationships between climate variability, agricultural production, and rural livelihood vulnerability in the Sistan and Baluchestan Province. The integrated approach combines trend analysis, econometric modeling, composite index construction, and structural equation modeling to provide a robust, triangulated assessment from climatic drivers to socio-economic outcomes (Figure 2).

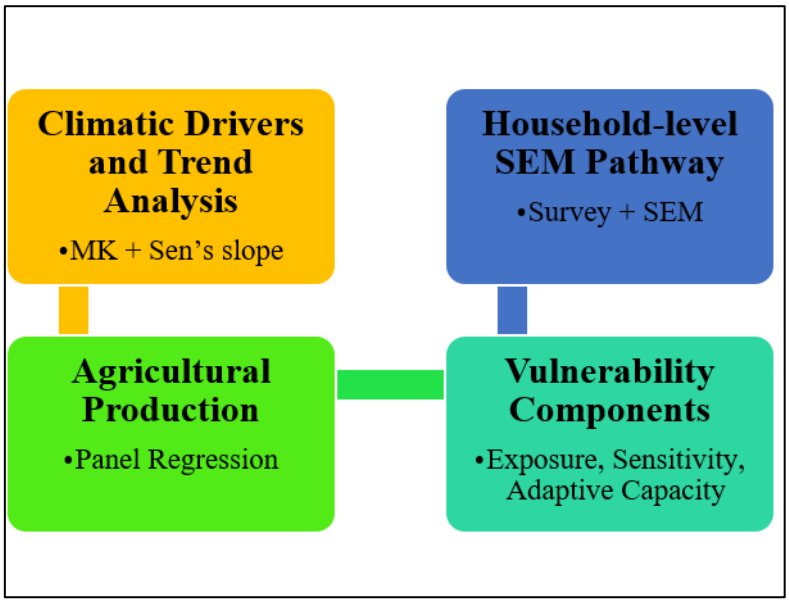


Figure 2. Conceptual model of the research

3.3 Trend Analysis

To detect and quantify long-term monotonic trends in key climatic variables (e.g., temperature,

precipitation, evaporation) and agricultural yields, the non-parametric Mann–Kendall (MK) test was employed (Mann, 1945; Kendall, 1975). This method is preferred in hydro-climatological studies due to its robustness against non-normally distributed data, missing values, and outliers, which are common in environmental time series (Hamed & Rao, 1998; Yue et al., 2002). The test statistic (Z)indicates the direction and significance of a trend: a positive Zsignifies an increasing trend, while a negative Zindicates a decreasing trend. To estimate the magnitude of identified trends, Sen's Slope Estimator (Sen, 1968) was applied, providing a non-parametric median rate of change. This combined approach is a standard for robust climatic trend detection, as validated in arid region studies (Tabari & Hosseinzadeh Talaee, 2011).

3.4 Panel Regression Analysis

To econometrically isolate the impact of climate variability on agricultural production, a panel regression model was estimated using data from the six selected counties over the study period. The dependent variable $(Y_{sn})$is the total volume of agricultural production (aggregating grains, legumes, vegetables, melons, and forage) in county $s$and year n. The core independent variables (X_{sn})comprise a suite of climatic factors: maximum wind speed, number of frost days, annual mean minimum and maximum temperatures, total annual precipitation, relative humidity, pan evaporation, and sunshine hours. To control for confounding factors, a vector of socio-economic variables (L_{sn})such as irrigated area, fertilizer use, and rural population was included (Lobell & Field, 2009).

The general form of the model is:

$$Y_{sn} = \alpha + \beta X_{sn} + \gamma L_{sn} + u_s + v_{sn}$$

where $u_s$represents county-specific fixed effects (capturing time-invariant heterogeneity like inherent soil quality or topography), and $v_{sn}$is the idiosyncratic error term. The choice between a fixed-effects and random-effects specification was determined using the Hausman test (Hausman, 1978), which tests for correlation between the unobserved effects $(u_s)$and the regressors.

3.5 Vulnerability Index Assessment

Regional agricultural vulnerability was assessed by constructing a composite vulnerability index (CVI) grounded in the Intergovernmental Panel on Climate Change (IPCC) conceptual framework, where vulnerability $(V)$is a function of Exposure (E), Sensitivity (S), and Adaptive Capacity (AC)(IPCC, 2022). The operationalization is expressed as:

$$V = f(E, S, AC)$$

- Exposure (E): Quantified using drought severity and frequency metrics derived from the Standardized Precipitation Index (SPI) (McKee et al., 1993) calculated from the climatic dataset.
- Sensitivity (S): Measured as the coefficient of variation in county-level crop yields, reflecting the system's inherent responsiveness to climatic shocks (Antwi-Agyei et al., 2012).

Indicators were normalized, and component weights were assigned using the Analytical Hierarchy Process (AHP) (Saaty, 1980), a multi-criteria decision-making tool. The weighting scheme was reviewed by an expert panel drawn from the Agricultural Jihad Organization, the Natural Resources Organization of Sistan and BaluchFestan Province, and the Khuzestan Water Organization (n =10); the pairwise-comparison consistency ratio (CR = 0.06) should be reported in the manuscript or supplementary material to improve reproducibility and transparency.

The final analytical stage employed primary data to examine the psychosocial and behavioral pathways linking climate stress to livelihood outcomes. The target population was farming households in the six counties. A stratified random sampling design ensured proportional representation across distinct agro-ecological zones. The sample size $(n)$was determined using Cochran's formula for large populations (Cochran, 1977):

$$n = \frac{Z^2 \cdot p \cdot (1-p)}{e^2}$$

where $Z$is the z-score, $p$is the estimated proportion, and $e$is the desired margin of error.

The survey data were analyzed using Structural Equation Modeling (SEM), a multivariate technique ideal for testing complex networks of direct and indirect relationships among latent constructs (Kline, 2015). The SEM assessed hypothesized pathways, for instance, how perceived climate risk influences adaptation intentions, which in turn affect livelihood diversification strategies and, ultimately, household well-being (Grothmann & Patt, 2005; Savari et al., 2019). Model fit was evaluated using standard indices: Comparative Fit Index (CFI > 0.90), Tucker-Lewis Index (TLI > 0.90), and Root Mean Square Error of Approximation (RMSEA < 0.08).

4. Research Findings

The survey population consisted of farmers residing in six selected counties of Sistan and Baluchestan Province. A stratified random sampling method was employed, and the sample size was calculated using the standard formula for determining sample size in infinite populations. Prior to conducting the survey, informed consent was obtained from all participants, who were assured that their information would remain confidential. This research was carried out with the approval of the Ethics Committee of the University of Yazd.

Summary statistics for climatic variables influencing agricultural production in Sistan and Baluchestan Province (2002–2019) are presented in Table 1. Due to regional data constraints, the analysis is restricted to this 17-year period. To enhance robustness given the relatively short time series, data were aggregated at the provincial scale. By combining observations across seven spatial units, a panel dataset comprising 119 observations was constructed. The "Groups" in Table 1 correspond to these seven spatial units.

Table 1. Descriptive Statistics of Selected Climatic Variables

Variable	Observations	Groups	Mean	Standard Deviation	CV (%)	Minimum	Maximum
Precipitation (mm)	119	7	90.5	82.2	90.83	0.0	513.1
Mean Annual Temperature (°C)	119	7	23.11	2.81	12.16	17.6	28.1
Mean Annual Evaporation (mm)	119	7	3549.9	985.15	27.75	821.5	5663.4
Mean Humidity (%)	119	7	50.42	15.22	30.19	32.0	90.08

Note: "Groups" refers to seven spatial units used in the climatic dataset. CV = coefficient of variation (SD/Mean × 100).

Cucurbits (watermelon, muskmelon, cucumber) rank among the province's most important agricultural products. Between 2002 and 2019, mean production reached 472,820 tons, accounting for approximately 24% of total agricultural output, with an average cultivated area of 22,619 hectares.

Figure 3 illustrates the spatial distribution of cucurbits Production Rankings in Sistan and Baluchestan Province, identifying Zabol (194,358 tons) and Chabahar (142,897 tons) as the leading producers, while Zahedan and Khash recorded markedly lower outputs (5,299 and 15,997 tons, respectively).

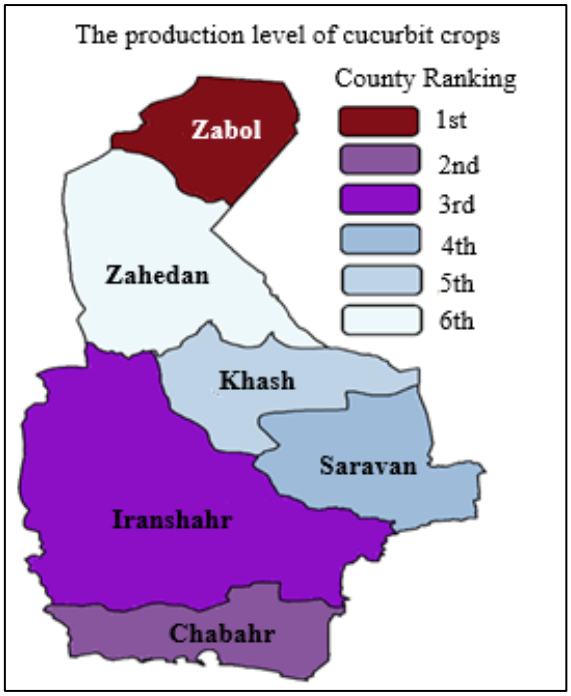


Figure 3. Spatial Distribution of Cucurbits Production Rankings in Sistan and Baluchestan Province

Mann-Kendall trend analysis (Figure 4) indicates a clear increasing trend in cucurbit and vegetable production at the provincial level. However, panel regression results (Table 2) demonstrate that this increase is strongly conditioned by climatic factors. Among the variables tested, only annual precipitation exhibited a positive and statistically significant effect ($\beta=0.88, p<0.05$), implying a yield increase of approximately 0.88 tons per hectare per unit increase in rainfall. Conversely, mean annual maximum temperature ($\beta=-14.34, p<0.05$) and annual evaporation ($\beta=-5.70, p<0.05$) had significant negative effects. These results suggest that despite overall production growth, yields remain highly sensitive to temperature extremes and evaporative water losses, increasing farmer vulnerability during low-rainfall years.

Table 2. Panel Regression Results for Cucurbit Crops in Sistan and Baluchestan Province

Variable	p value	Coefficient	t statistic
Annual Precipitation	0.001	0.8821	3.26
Annual Evaporation	0.001	−5.0741	−3.45
Annual Average Maximum Temperature	0.074	−14.3411	−1.80
Average Relative Humidity	0.001	−5.9413	−3.52

Note: The model is estimated using fixed effects; therefore, the intercept is absorbed by the unit-specific effects and is not reported separately. Multicollinearity diagnostics (VIF) should be reported in supplementary material.

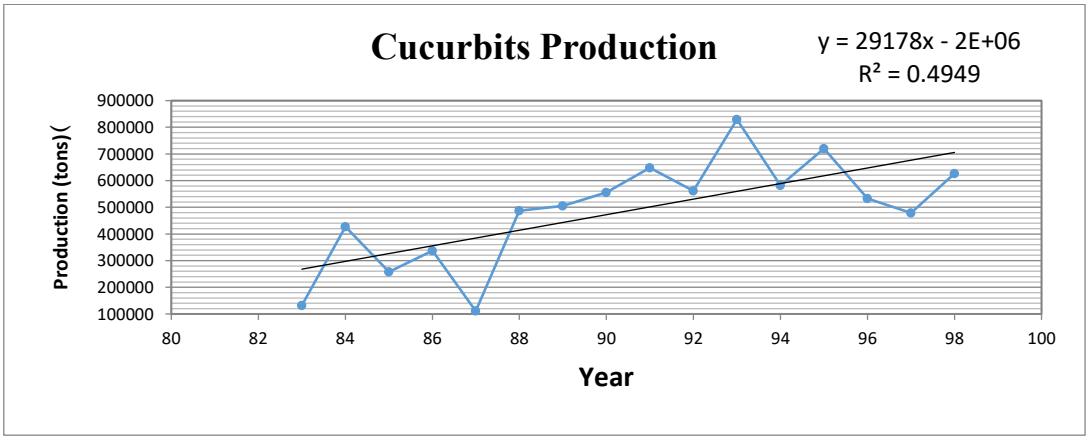


Figure 4. Trend of Cucurbits Production (in tons) in Sistan and Baluchestan Province

The vulnerability index (Figure 7) highlights pronounced spatial heterogeneity in climate risk across the province. A key vulnerability driver in the Sistan region is its dependence on the Hirmand River basin. Multiple interacting challenges including transboundary water disputes, desiccation of the Hamun wetlands, and erosion from the "120-day wind" create a compound hazard regime. These processes have precipitated an agricultural crisis, amplified migration, poverty, and unemployment, with broader implications for border security. Additionally, calcareous and marine sediments inhibit stable aquifer formation, rendering groundwater unreliable.

Mann-Kendall analysis (Figure 6) revealed a slight upward trend in provincial grain production over the 17-year period, though a notable decline occurred after 2014—the year of the largest recorded wheat cultivated area. Panel regression results (Table 3) indicate that mean annual minimum temperature ($\beta=7.15$, $p<0.05$), annual precipitation ($\beta=0.42$, $p<0.05$), and mean annual minimum relative humidity ($\beta=0.39$, $p<0.05$) positively and significantly affected cereal production. In contrast, the strongest statistically significant negative effects were associated with mean annual maximum temperature ($\beta=-23.09$, $p<0.05$), annual absolute minimum temperature ($\beta=-3.06, p<0.05$), and annual evaporation ($\beta=-2.42, p<0.05$).

Table 3. Panel Regression Results for Grains Crops in Sistan and Baluchestan Province

Variable	p value	Coefficient	t statistic
Annual Precipitation	0.004	0.4298	2.94
Annual Evaporation	0.012	−2.4300	−2.57
Annual Average Maximum Temperature	0.000	−23.0962	−4.11
Annual Average Minimum Temperature	0.044	7.1506	2.04
Average Minimum Relative Humidity	0.000	0.3989	4.00
Annual Absolute Minimum Temperature	0.033	−3.0695	−2.16

Note: The model is estimated using fixed effects; therefore, the intercept is absorbed by the unit-specific effects and is not reported separately. Multicollinearity diagnostics (VIF) should be reported in supplementary material.

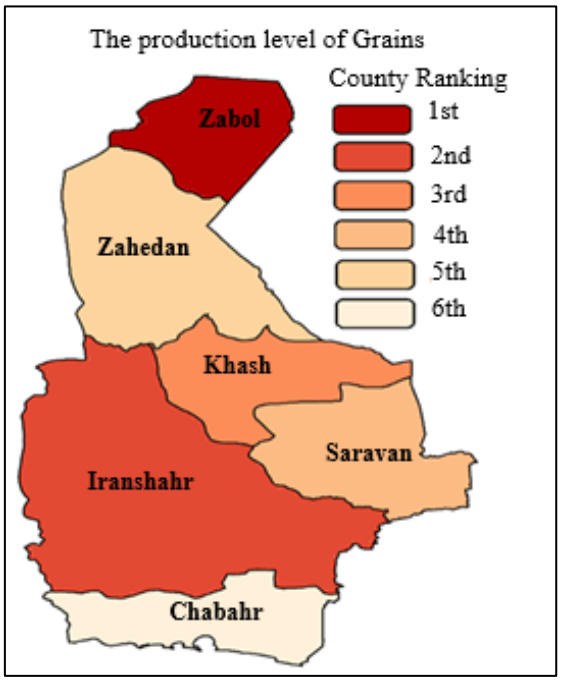


Figure 5. Spatial Distribution of Grains Production Rankings in Sistan and Baluchestan Province

The vulnerability index (Figure 7) highlights pronounced spatial heterogeneity in climate risk across the province. A key vulnerability driver in the Sistan region is its dependence on the Hirmand River basin. Multiple interacting challenges including transboundary water disputes, desiccation of the Hamun wetlands, and erosion from the "120-day wind" create a compound hazard regime. These processes have precipitated an agricultural crisis, amplified migration, poverty, and unemployment, with broader implications for border security. Additionally, calcareous and marine sediments inhibit stable aquifer formation, rendering groundwater unreliable.

Table 4. Descriptive Distribution of Farmers' Perceived Responses Regarding the Impacts of Climate Change on Livelihood Resilience Dimensions

Livelihood component	Decreased (%)	Increased (%)	Others (%)
Economic	11.25	36.25	52.50
Social	15.00	25.00	60.00
Environmental	17.50	15.00	67.50
Quality of life	20.00	20.00	60.00

Note: Table 4 presents descriptive frequencies and percentages only. It summarizes farmers' perceptions of climate change impacts and does not include inferential statistical testing; therefore, p-values, confidence intervals, and chi-square statistics are not reported.

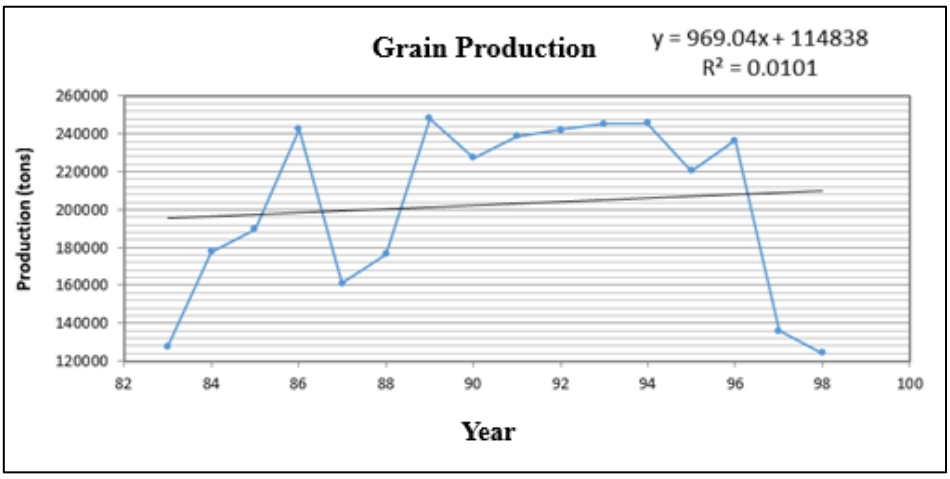


Figure 6. Trend of Grains production (in tons) in Sistan and Baluchestan Province

As Figure 7 indicates, Zabol (Index = 1.67) exhibits high vulnerability, consistent with the strong negative temperature effects identified earlier. Iranshahr and Khash also face serious vulnerability due to extensive, often unregulated groundwater exploitation. Limited surface water access has forced heavy reliance on groundwater, critically depleted in recent years. Overall, Chabahar (Index = 2.0), Khash (1.79), and Zabol (1.67) fall into the high-vulnerability category, while Zahedan (Index = 1.09) displays relatively lower vulnerability, though still considerable stress.

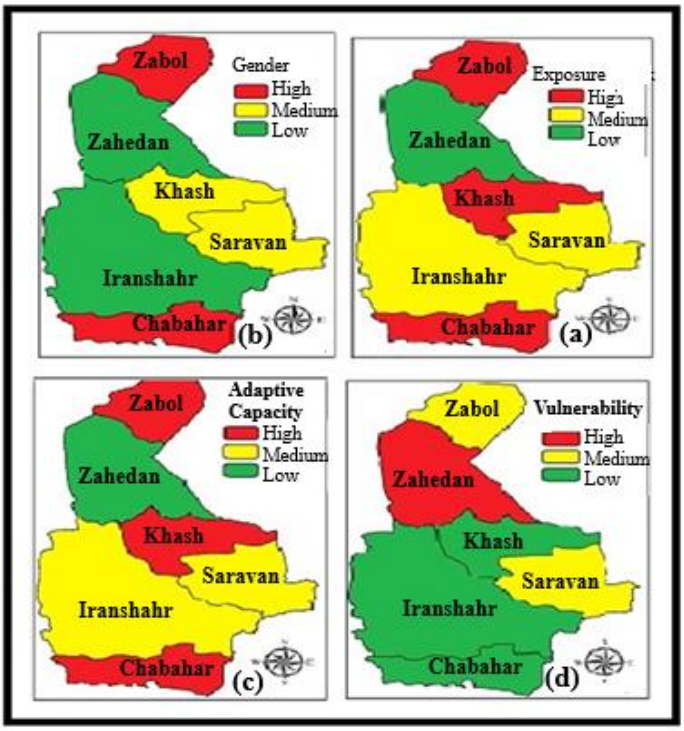


Figure 7. Results of Indices: (a) Exposure Index, (b) Gender Index, (c) Adaptive Capacity Index, (d) Vulnerability Index

Following the spatial vulnerability assessment, a household survey was conducted in the high-vulnerability districts of Chabahar and Khash, using a questionnaire validated by an expert panel.

The demographic profile revealed that 45% of respondents were over 60, 45% were illiterate, and 60% lived in households with >5 members, reflecting socio-economic challenges facing an aging farming population.

Table 5 summarizes the distribution of households across three livelihood resilience categories derived from the composite resilience index: Fully Suitable, Nearly Suitable, and Fully Unsuitable. The results show that 33.5% of households fell into the Fully Suitable category, 41.5% into the Nearly Suitable category, and 25.0% into the Fully Unsuitable category, indicating that most households were concentrated in the moderate-to-high resilience range.

Table 5. Distribution of Rural Households by Livelihood Resilience Category

Resilience category	Operational definition	Percentage of total sample (%)
Fully Suitable (High resilience)	Households with strong adaptive capacity, effective risk management, and diversified livelihood options, allowing them to cope effectively with drought.	33.50
Nearly Suitable (Moderate resilience)	Households with moderate adaptive capacity that can cope with some drought impacts but still face important resource and livelihood constraints.	41.50
Fully Unsuitable (Low resilience)	Households with limited adaptive capacity, high vulnerability, and substantial difficulty responding to drought conditions.	25.00

Note: Percentages represent the proportion of the total sample in each mutually exclusive category and therefore sum to 100%.

5. Discussion and Conclusion

This study assessed climate change vulnerability and resilience of rural livelihoods in Sistan and Baluchestan Province, examining how temperature, precipitation, water availability, and agricultural productivity affect livelihood systems. The central hypothesis that increasing climatic stress, particularly rising temperatures and declining precipitation, intensifies vulnerability, with resilience dependent on adaptive capacity and resource availability is largely supported, with important nuances across crops, space, and social groups. By integrating 17 years of climatic and agricultural data with spatial vulnerability indices and household surveys, this research provides a needed integrated empirical analysis for the province. Consistent with global and national projections (Keshavarz et al., 2013; Waha et al., 2017; IPCC, 2022), the province experiences rising maximum temperatures, high rainfall variability, and elevated evaporation. Panel regressions confirm these trends exert measurable pressure: grain yields (wheat, barley) declined despite expanded cultivated area, primarily due to thermal stress and water deficits, mirroring patterns in other stressed systems (Bobojonov et al., 2022). Cucurbit production increased, but this growth is precipitation-dependent, indicating contingent gains. These findings confirm earlier work on drought in southeastern Iran (Zareei et al., 2017; Erfanian et al., 2021) while extending it in three key ways. First, it integrates climate, production, and livelihoods within a single framework considering climatic exposure, agricultural outcomes, and livelihood impacts simultaneously. Second, the spatially explicit county-level vulnerability index reveals pronounced intra-provincial differences: Chabahar, Khash, and Zabol emerge as high-vulnerability hotspots due to combined climatic stress, transboundary Hirmand basin dependence, and critical groundwater depletion, aligning with localized evidence (Ashtab & Sharifzadeh, 2016) but providing systematic province-wide comparison. Third, household surveys link biophysical pressures to perceived impacts. High shares reporting moderate-severe drought impacts, income decline, and increased

migration align with studies highlighting income instability, diversification, and migration as climate responses in arid regions (Savari et al., 2019; Nazari et al., 2022; Mohammadi et al., 2023). The results align with vulnerability frameworks emphasizing dynamic, socially mediated processes (Turner et al., 2003; Adger, 2006), showing similar climatic hazards yield differentiated outcomes based on local socio-economics and institutions. Reliance on the transboundary Hirmand River and Hamun wetlands, combined with water disputes, weak institutional support, and limited infrastructure, creates "compound vulnerability" beyond climate alone. Wetland desiccation and intensifying "120-day wind" reduce water availability and soil quality while eroding ecosystem services and cultural landscapes integral to resilience, echoing political ecology perspectives on multi-level vulnerability drivers (Sultana, 2014; Tschakert et al., 2021). Household-level demographic characteristics high shares of older farmers, illiteracy, large households reveal constraints on adaptive capacity, consistent with studies highlighting assets, knowledge, and social capital in resilience (Carr, 2020; Ferdous et al., 2022). Limited education and aging populations hinder adoption of climate-smart practices and new opportunities, underscoring needs for targeted capacity-building (Rezaei-Moghaddam & Karami, 2023). Findings also resonate with research showing diversification into non-/off-farm activities reduces vulnerability (Savari et al., 2019; Nazari et al., 2022), suggesting broader livelihood portfolios enhance shock absorption.

This study provides robust, multi-method evidence that climate change is actively undermining the foundation of rural livelihoods in Sistan and Baluchestan Province. The integration of climatic, agricultural, spatial, and survey data confirms that rising temperatures and water scarcity are not future threats but present crises, exerting measurable negative pressures on grain yields and rendering apparent gains in other crops precariously dependent on rainfall. Crucially, vulnerability is not uniform; it is spatially concentrated in counties like Chabahar, Khash, and Zabol, where climatic stress intersects with transboundary water dependencies and groundwater depletion to create compound hazards. The research moves beyond merely diagnosing exposure to reveal the nuanced architecture of resilience. The counter-intuitive survey finding where higher reported resilience correlated with higher perceived drought impact challenges linear assumptions and underscores that resilience is a multidimensional construct, shaped by perception, expectation, and context as much as by material assets. This implies that effective policy must look beyond generic, top-down solutions. Ultimately, securing a viable future for the province requires a fundamental transformation from crisis response to proactive, systemic adaptation. This transformation must be anchored in the three pillars demonstrated as essential: climate-smart agricultural restructuring, equitable and cooperative water governance, and diversified economic foundations. Embedding these context-specific strategies within national development plans and international frameworks (e.g., SDGs 2, 6, 13) is imperative. The time for incremental adjustment has passed; the findings of this study constitute a clear call for decisive, evidence-based action to invest in the adaptive capacity of Sistan and Baluchestan's communities before existing vulnerabilities escalate into irreversible human and environmental insecurity.

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Authors' contributions

K. Joojizadeh: Data collection, analysis, and writing of the original draft; G. Mozaffari: Conceptualization, supervision, and methodology; F. Mohammadi Ravari: Writing, review, and editing; R. Kheirolomour: Writing, translation, and fieldwork, and All authors read and approved the final manuscript.

Conflict of interest

The authors declare no conflict of interest.

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Original Article

آسیب‌پذیری و تاب‌آوری معیشت‌های روستایی در برابر تغییرات اقلیمی در استان سیستان و بلوچستان، ایران

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چکیده

مبسوط

۱. مقدمه

پژوهش حاضر به بررسی یکی از بحرانی‌ترین چالش‌های زیست‌محیطی قرن حاضر، یعنی تغییر اقلیم، و پیامدهای مستقیم و غیرمستقیم آن بر پایداری معیشت روستایی در استان سیستان و بلوچستان می‌پردازد. تغییر اقلیم نه تنها به عنوان یک پدیده هواشناسی، بلکه به عنوان یک عامل تهدیدکننده امنیت غذایی و ساختار اجتماعی-اقتصادی در مناطق خشک و نیمه‌خشک عمل می‌کند. با توجه به پیش‌بینی‌های جهانی مبنی بر افزایش ۱/۵ تا ۴/۵ درجه‌ای دمای زمین تا سال ۲۱۰۰ و کاهش ۲۰ تا ۲۵ درصدی بارش‌ها در ایران، استان سیستان و بلوچستان به دلیل موقعیت جغرافیایی و وابستگی شدید به منابع آب برون‌مرزی (حوضه هیرمند)، در وضعیت آسیب‌پذیری مضاعف قرار دارد. این مطالعه با هدف واکاوی پیوند میان متغیرهای اقلیمی و پایداری معیشت، تلاش دارد تا ابعاد مختلف این بحران را در سطوح محلی و منطقه‌ای تبیین نماید.

۲. روش تحقیق

این تحقیق با اتخاذ یک رویکرد توصیفی-تحلیلی و با بهره‌گیری از داده‌های ثانویه و پیمایشی انجام شده است. پایگاه داده‌های اقلیمی شامل آمار ۱۷ ساله (۱۳۸۱-۱۳۹۸) از ۸ ایستگاه سینوپتیک استان (مانند زاهدان، زابل، خاش، ایرانشهر و چابهار) است که متغیرهایی نظیر میانگین دمای سالانه، بارش، رطوبت نسبی و تبخیر را پوشش می‌دهد. در بخش تحلیل آماری، از آزمون ناپارامتری «من-کندال» برای شناسایی روند تغییرات و از مدل رگرسیون پانل برای تخمین اثرات متغیرهای اقلیمی بر تولیدات کشاورزی استفاده شده است. همچنین، برای سنجش آسیب‌پذیری، مدل VSD به کار گرفته شده که از ترکیب سه مؤلفه اصلیِ «مواجهه»، «حساسیت» و «ظرفیت انطباق‌پذیری» به دست می‌آید. در بخش کیفی نیز از طریق پرسشنامه، ادراک ذهنی کشاورزان از پایداری معیشت مورد سنجش قرار گرفته است.

۳. یافته‌های تحقیق

یافته‌های حاصل از تحلیل داده‌ها نشان می‌دهد که میانگین بارش سالانه در دوره مورد مطالعه تنها ۹۰.۵ میلی‌متر بوده، در حالی که میانگین تبخیر سالانه رقم بسیار بالای ۳۵۴۹/۹ میلی‌متر را نشان می‌دهد که این ناترازی شدید هیدرولوژیک، پایداری منابع آب را از بین برده است. در بخش محصولات جالیزی (که ۲۴ درصد تولیدات استان را شامل می‌شود)، تحلیل رگرسیون نشان داد که افزایش هر واحد در بارش، منجر به افزایش ۰/۸۸ تنی در عملکرد می‌شود، اما تأثیر مخرب دمای حداکثر با ضریب ۱۴/۳۴- بسیار چشمگیرتر است. در مورد غلات که بیش از ۵۵ درصد اراضی زراعی (معادل ۱۰۰,۰۰۹ هکتار) را اشغال کرده‌اند، وضعیت بحرانی‌تر گزارش شده است؛ به طوری که علی‌رغم افزایش ۲۵ درصدی در سطح زیرکشت طی برخی دوره‌ها، تولید نهایی به دلیل تنش‌های حرارتی و خشکسالی با افت جدی مواجه شده و دمای حداکثر با ضریب ۲۳/۰۹- اثر کاهنده بر تولید داشته است. در مجموع، تغییرات اقلیمی باعث کاهش ۱۰ تا ۱۵ درصدی در کل بازده تولیدات کشاورزی استان شده است.

۴. بحث و نتیجه گیری

تحلیل شاخص آسیب‌پذیری در سطح شهرستان‌های استان حاکی از توزیع ناعادلانه ریسک‌های اقلیمی است. شهرستان چابهار با نمره ۲ و خاش با ۱/۷۹ در بالاترین رده‌های آسیب‌پذیری قرار دارند، در حالی که شهرستان زاهدان با نمره ۱/۰۹ آسیب‌پذیری کمتری را تجربه

می‌کند. این تفاوت‌ها عمدتاً ناشی از نرخ‌های متفاوت تبخیر و دسترسی به منابع آب پایدار است. در بخش پیمایشی، ۸۰ درصد از جامعه آماری روستایی، تأثیر تغییر اقلیم و خشکسالی بر معیشت خود را در سطح «زیاد و خیلی زیاد» ارزیابی کرده‌اند. کاهش ۳۰ درصدی ورودی آب حوضه هیرمند و خشک شدن تالاب هامون نه تنها کشاورزی، بلکه معیشت‌های جایگزین مانند صیادی و صنایع دستی وابسته به نیزار را نیز نابود کرده است. این وضعیت منجر به کاهش شدید درآمد ۶۵ درصد از خانوارها و افزایش نرخ مهاجرت‌های اجباری از روستا به حاشیه شهرها شده است. نتایج این پژوهش تأیید می‌کند که تغییر اقلیم در سیستان و بلوچستان از یک پدیده زیست‌محیطی به یک بحران معیشتی و امنیتی تبدیل شده است. ناپایداری تولید در دو بخش غلات و محصولات جالیزی، که ستون‌های اصلی اقتصاد روستایی منطقه هستند، ضرورت بازنگری در سیاست‌های مدیریت منابع آب و خاک را دوچندان می‌کند. برای مقابله با این روند، پیشنهاد می‌شود که دولت و نهادهای ذی‌ربط بر «دیپلماسی فعال آب» برای احقاق حقابه هیرمند، «تنوع‌بخشی به معیشت‌های غیرکشاورزی» (نظیر گردشگری و تجارت مرزی)، «ترویج الگوهای کشت مقاوم به خشکی» و «توسعه سیستم‌های گلخانه‌ای» تمرکز کنند. همچنین تقویت صندوق‌های بیمه محصولات کشاورزی و آموزش روش‌های نوین سازگاری به روستاییان، می‌تواند ظرفیت انطباق‌پذیری جامعه محلی را در برابر تکانه‌های اقلیمی آینده افزایش دهد.

کلیدواژه‌ها: استان سیستان و بلوچستان، استراتژی سازگاری، تغییر اقلیم، خشکسالی، شاخص آسیب‌پذیری.

تشکر و قدردانی

این مقاله با حمایت مالی صندوق حمایت از پژوهشگران و فناوران کشور (بنیاد ملی علم ایران) انجام‌پذیرفته است و مراتب سپاسگزاری از این بنیاد، به‌پاس حمایت مالی، ابراز می‌شود. همچنین از سازمان هواشناسی و جهاد کشاورزی استان سیستان و بلوچستان به‌خاطر ارائهٔ آمار و داده‌های مورد نیاز، و نیز از تمامی کشاورزان و ساکنان بومی منطقه که در بخش میدانی این پژوهش همکاری نمودند، صمیمانه قدردانی می‌شود.

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Original Article

Explaining the Right to Rural Theory in Iranian Rural Development Programs

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Abstract

Purpose- This study evaluates the factors affecting the promotion of adaptation strategies (AS) in rural development programs from the perspective of the right to the rural area, which has been neglected in the existing literature. In such a way, the AS theory and its related components were developed innovatively. To address this research gap, the present study aimed to investigate the factors affecting the emergence of adaptive behaviors in development programs among Iranian villagers.

Design/methodology/approach- Method: This study employed a multivariate analysis utilizing structural equation modeling (SEM). Data collection was conducted through a questionnaire, which was subsequently analyzed using SPSS and SmartPLS software. The target population comprised all specialists engaged in rural development in Iran. To determine an appropriate sample size, statistical power analysis was performed using G*Power software. The study's sample consisted of 144 specialists—including academic, executive, and managerial professionals—drawn from the nine spatial planning regions of Iran. Participants were selected via a multistage sampling approach, ensuring an empirically representative and balanced distribution across these regions.

Findings- The study's findings, following the classification of AS, initially revealed that the development plans examined were plagued by significant incompatibility. To robustly validate these results, SEM was employed to assess the explanatory power of the framework and rank the predictors. The results indicated that factors such as a healthy environment, spatial justice, sustainable livelihood, self-determination, and Maintaining Socio-Cultural Authenticity positively and significantly influence the selection of adaptive strategies.

Practical implications- The results of this study reveal the dynamics and complexities of adaptation strategies based on the application in development programs to improve the theory and practice of rural development. The results of structural equations showed that these influential factors accounted for 84.4% of the variance in AS adoption under the rural entitlement theory, which is a very high rate. These findings provide solutions to increase the effectiveness of development program strategies in community-based contexts and, consequently, improve the adaptive behavior of Iranian villagers and farmers.

Keywords- Right to Rural, Adaptation, Environmental sustainability, Structural Equation Modeling, Community-led.

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1. Introduction

Rural communities worldwide confront complex challenges stemming from climate change, economic fluctuations, and social dynamics. The rapid pace of these environmental changes and socio-economic transformations often poses a significant barrier to simultaneously pursuing development and conservation objectives (Ige et al., 2024). It is crucial to adopt an approach that can redirect socio-economic behavioral incentives toward community protection and control over local natural resources. Adaptation incentives are effectively created when decision-makers institutionalize them within programs. Although some development programs have successfully fostered desirable individual and social behaviors toward conservation measures (Manfredo et al., 2020; Ranjan et al., 2019), others have failed (Somerville et al., 2015). The underlying assumptions of these programs frequently underestimate the intricate nature of human behavior and the social and cultural contexts that often determine outcomes (Doss & Quisumbing, 2020; Fenton et al., 2022). This study focuses on measuring the factors that influence adaptive behaviors within rural communities.

In this context, the theory of the "right to the rural" is regarded as a pertinent solution. Initially applied by Henri Lefebvre in urban studies (Harvey, 2015), this concept was later adapted by various scholars, including Hill (1972), Rozelle and Li (1998), Kung (2000), Landy and Moreau (2015), and El Nour et al. (2015) in the field of rural studies. By critically reinterpreting traditional frameworks, the theory of the right to the rural redefines the relationship between communities and their environments (Fabricius et al., 2004). It posits that decisions regarding the maintenance and shaping of natural and human landscapes are an inherent right of residents (Claeys & Edelman, 2020). This theory challenges the traditional urban-centric focus of development programs, advocating for a balanced approach. Rather than viewing rural areas as colonialist and one-sided, it presents them as vibrant spaces that deserve fair rights and participatory governance (Shuling & Jin, 2022). Also, this approach aligns with valuing indigenous knowledge (Magni, 2017) and ensuring that interventions are culturally appropriate (Coast et al., 2016) and consistent, contrasting sharply with top-down development models (Altieri & Masera, 1993). Integrating the Right to rural theory into rural development decision-making to foster adaptive behaviors has become increasingly imperative in recent years (Van Assche & Hornidge, 2023). In rural settings, where communities are often most vulnerable to environmental shocks, decision-makers face the dual challenge of reducing poverty while enhancing local populations' capacity to withstand current and future climate-related stresses. To address these challenges, interventions must be designed to yield multiple co-benefits, such as improving livelihoods, strengthening adaptive capacity, and reducing greenhouse gas emissions, thereby creating incentives for positive outcomes (Savari & Moradi, 2022). Comparative studies have demonstrated that while some regions have successfully incorporated the principles of the right to the rural into their rural development programs, the path to sustainable adaptation is rarely linear (Lowery et al., 2020). Despite this, rural development programs often assume that adapting to changing human behavior is a prerequisite for achieving desired conservation outcomes. However, planners frequently overlook AS aimed at institutionalizing behavior during the design, implementation, and evaluation of programs (Raj et al., 2022; Anabestani et al., 2022; Hashemi et al., 2013).

While global challenges are pressing, sustainable rural development pathways are profoundly shaped by local environmental conditions, institutional frameworks, and applicable cultural practices (Natarajan et al., 2022). The increased frequency, intensity, and spatial reach of natural hazards, driven by global environmental change, have disproportionately impacted marginalized rural communities, which often lack sufficient power and resources (Smith et al., 2022). Moreover, the mismatch between top-down adaptation interventions and local cultural practices has further constrained the success of these initiatives (Conway et al., 2019). In response to these shortcomings, researchers and policymakers are now advocating for more nuanced and context-sensitive planning and evaluation approaches that better capture the complex interactions between environmental, social, and economic factors in rural areas.

A review of rural development programs in Iran

reveals that objectives such as boosting economic growth have consistently been emphasized (Mokhtari Karchegani et al., 2024), with financial investments and loans prioritized to equip and modernize the agricultural sector, thereby securing the livelihoods of rural households (Savari & Moradi, 2022). However, pathological analyses of these development programs indicate that interventions have been inadequately designed and implemented, resulting in the exacerbation of socio-spatial inequalities (Fami et al., 2019). For instance, the land renewal plan led to numerous small farmers selling their agricultural lands to land brokers, forcing them to leave their villages. Research has shown that cultural assimilation policies, which have dominated Iran's rural development programs (Karchegani et al., 2025), have resulted in the loss of territorial identity in rural areas adjacent to metropolises, the erosion of local traditions, and a decline in rural community trust and participation rates in these programs (Sobhaninia et al., 2023). This necessitates a shift in the assumptions and orientation of development programs toward greater adaptation to the unique local characteristics of vulnerable rural communities (Savari, Damaneh, et al., 2023). Given the significance of this topic, specifically the "right to the rural" as a dominant approach to promoting adaptive behaviors in rural communities, and the dearth of comprehensive research identifying effective factors, this study was undertaken to contribute to the existing literature in this knowledge area. Therefore, the primary objective of this study is to investigate the effective factors of the right to the rural on the emergence of adaptive behaviors in development programs among Iranian villagers.

2. Research Theoretical Literature

Numerous studies have investigated and identified the determinants of implementing various strategies related to the right to the rural in spatial planning programs. These factors can be categorized based on their characteristics into four key areas: Healthy Environment, Maintaining Socio-Cultural Authenticity, Self-determination, Spatial Justice, and Sustainable livelihoods.

2.1. Healthy Environment (HE)

The idea of the right to a "HE" emerged during the international environmental movement of the early 1970s (Scheidel et al., 2020). While it is difficult to attribute the concept to a single individual, its normative formulation is widely associated with the outcomes of the 1972 United Nations Conference on the Human Environment in Stockholm, which is considered the birth of modern environmental human rights. This conference stated that everyone has the right to live in an environment that is conducive to a life of dignity, health, and well-being (Rodríguez-Garavito, 2017).

In the rural development literature, the right to a HE is employed as both a normative and an analytical tool. Researchers and policymakers assert that rural development should be accompanied by environmental protection (Yuan et al., 2018). In practice, this entails evaluating rural policies—whether in agriculture, infrastructure, or tourism—not only for their economic or social benefits but also for their impact on natural resource protection (Carlisle et al., 2019). Consequently, rural development programs that incorporate the right to a HE are grounded in the belief that every individual has the right to live in an ecosystem that supports physical, social, and economic well-being. Conceptually, this right underscores access to clean air, water, and the sustainable use of land, acknowledging that environmental quality is a prerequisite for a dignified life.

The goal is to integrate environmental safeguards into rural development strategies, ensuring that growth is both equitable and environmentally sound (Ige et al., 2024). Key principles guiding this approach include sustainability, which necessitates the use of resources without jeopardizing future generations; participatory planning, which ensures that local voices shape environmental decisions; and environmental justice (Nicholas & Breakey, 2017), which seeks to address historical inequalities and equitably distribute benefits and risks (Carrión et al., 2022). Interdisciplinary collaboration among policymakers, communities, and technical experts is essential to align economic development with environmental stewardship. Global experiences demonstrate the practical implementation of these principles. For instance, grassroots and government initiatives have adopted agroecology as a tool to ensure the right to a HE (Anderson & Maughan, 2021). In the face of challenges such as deforestation and soil degradation, local programs have promoted sustainable agricultural practices

that restore ecological balance, enhance soil fertility, and reduce reliance on harmful chemicals (Savari, 2023). Additionally, participatory watershed management programs in India have been designed to address water scarcity, improve soil health, and restore ecosystems in rural areas (Narendra et al., 2021). These programs actively engage communities in the processes of restoring degraded agricultural lands and sustainably utilizing panchayat watersheds in Maharashtra.

H1: A healthy environment is an effective factor in promoting adaptation strategies in Iranian development programs.

2.2. Maintaining Socio-Cultural Authenticity (MCSA)

In the geographical literature, Greenwood (1982) posits in his article "Cultural Authenticity" that genuine cultural authenticity is not a fixed or staged performance designed for outsiders but rather an organic expression of a community's self-determined identity and values. This concept has been used to critique rural development practices, emphasizing that interventions should support and preserve the authentic socio-cultural fabric of rural communities (Belei, 2019). Rather than imposing standardized or commodified versions of culture, proponents argue that rural development practices should empower local residents to control the narrative of their cultural heritage. This approach ensures that economic growth, such as through tourism, does not erode local traditions, social practices, and indigenous knowledge systems (Kohsaka & Rogel, 2021).

Advocates of the right to the rural often present it as a universal claim. However, rural areas exhibit significant diversity in terms of resource endowments, cultural heritage, and social structure, which challenges the feasibility of a one-size-fits-all approach to rural rights (Yu et al., 2024). On the other hand, in a world characterized by rapid demographic shifts between regions, the influx of urban culture and values into rural areas can lead to the erosion of traditional customs and practices. As younger generations adopt urban lifestyles, older cultural norms may be discarded, leaving individuals feeling disconnected from their heritage (Huntsinger et al., 2019). This cultural shift can precipitate an identity crisis where individuals grapple with conflicting values and a diminished sense of belonging within their community. Despite these challenges, preserving the authenticity of the cultural fabric remains essential for meaningful development.

Cultural authenticity refers to the genuine representation and preservation of a community's traditions, values, and practices (Palmi & Lezzi, 2020). By incorporating this value into development initiatives, progress can be aligned with the community's identity and heritage. The key principles of this approach are grounded in reflecting local values and needs, documenting traditional knowledge and oral history, which collectively help preserve cultural heritage. For instance, the Guizhou Rural Tourism Development Center in China is dedicated to preserving, protecting, and developing the diverse culture and intangible heritage of ethnic minority groups in southwest China, particularly their exquisite handicrafts. The center collaborates with domestic and international organizations, modern designers, and young volunteers to explore and promote ethnic art, ensuring the preservation of cultural heritage while economically developing the region through tourism (Zhu & Phanlukthao, 2023). Another example is the heritage experience of the village of Arna Jharna in Rajasthan, India, which functions as a living museum where objects are integral to the daily lives of ordinary people, fostering experiential learning and preserving traditional knowledge (Lyngwa, 2022).

H2: Maintaining socio-cultural authenticity is an effective factor in promoting adaptation strategies in Iranian development programs.

2.3. Self-determination (SD)

SD is a socio-philosophical concept with roots in the American and French revolutions and the nationalist movement, notably highlighted by Woodrow Wilson in his 14-Point Declaration of 1918 (Fisch, 2015). Formally, it was recognized as an international legal right in the United Nations Charter (Thürer, 2008). However, the concept gained significant traction in rural development through the work of Chambers (1981), who argued in his influential article "Rapid Rural Assessment: Rationale and Case Study" that rural communities should be empowered to analyze their situations and set their own development goals. This perspective underscores the need for rural communities to take an active role in determining their development trajectories (Claeys & Edelman, 2020).

Based on the preceding discussion, the concept of SD embodies a grassroots approach that

emphasizes the active participation of local people in identifying their needs and implementing solutions. The United Nations defines community-led development as a process where community members come together to take collective action and create solutions to shared problems. David Harvey, with a Marxist perspective on space, posits that meaningful control over the built environment is not a privilege but a right and a fundamental element in the struggle against the neoliberal destruction of communities (Ahmad & Islam, 2024). Despite differences in approach and purpose, these perspectives share a common understanding of empowering lower levels to determine their own destiny (Conway et al., 2019). However, current practices of centralized, state-led policies often marginalize the voices of local communities, leading to tensions over who should control and manage rural resources. Meanwhile, community-led movements have emerged as pivotal forces in development programs, advocating for sustainable, local solutions to challenges such as poverty, environmental degradation, and social inequality (Fraser et al., 2024).

A review of successful experiences highlights the Green Belt Movement in Kenya, which mobilized local women to plant over 51 million trees, thereby preserving forests and supporting sustainable livelihoods (Kinoti, 2022). Another notable example is the Sarvadaya Shramadana Movement in Sri Lanka, which, through a self-management scheme, benefited 15,000 villages by meeting their basic social needs through collective action and centralized self-help. These studies demonstrate that community-led development is grounded in the recognition of rural SD by villagers (Kinoti, 2022). However, discussions also emphasize empowering local communities to take responsibility for development and move toward self-reliance. A review of the literature reveals that recognizing the community-led movement as a means to fulfill the right of villagers to SD has been raised as a fundamental principle (Kar & Chambers, 2008). This right is enshrined in international law, particularly in Article 1 of the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights, which states (Pinto, 2022): "All peoples have the right to SD and by this right freely determine their political status and freely pursue their economic, social and cultural development."

H3: Self-determination is an effective factor in promoting adaptation strategies in Iran's development programs.

2.4. Spatial Justice (SJ)

SJ is a concept that complements the right to rural space, emphasizing that every rural resident should have equitable access to the benefits and opportunities arising from rural growth (Nordberg, 2020). This perspective, rooted in the work of radical geographers such as Harvey (2010), highlights how urban and rural spaces are produced through unequal social processes, which reflect and reproduce social injustices. In alignment with Soja (2013) argument, it is clear that our physical environment plays a crucial role in shaping societal experiences, underscoring the need to address both social and spatial dimensions of justice in urban and rural contexts. Rural space is not merely a passive backdrop but an active agent in either creating or mitigating social inequalities. By recognizing the spatial aspect of justice, we can better understand how geographical factors influence access to resources, services, and opportunities, ultimately informing more equitable rural development strategies (Nordberg, 2020). The primary objective of SJ in rural development programs is to ensure that the design, planning, and implementation of rural policies and infrastructure are inclusive and fair. This involves actively working to reduce inequalities by empowering marginalized communities, enhancing connectivity, and improving access to vital services, thereby strengthening resilient and self-sustaining rural communities (Mahon et al., 2023). Generally, this approach aims to identify methods for fairly distributing resources—both tangible and intangible—and addressing access disparities between urban and rural areas. In essence, it acknowledges past injustices and structural inequalities that have shaped current spatial dynamics and seeks to rectify these through targeted policy actions (Shucksmith et al., 2021). Conceptualizing justice requires rethinking the spatial dimension to illustrate how our physical world produces and reproduces inequality. A fundamental principle is that development unfolds unevenly at global, regional, and local scales, meaning that the injustices central to broader social justice movements are deeply embedded in the

rural landscapes where we live (Mahon et al., 2023).

The growing emphasis on the "right to the rural" has fostered a convergence between the pursuit of SJ and the struggle for democratic rights in rural spaces. A notable example is the European Union's reform of its Common Agricultural Policy (Fund), which now incorporates principles of SJ (Shucksmith et al., 2021). These reforms aim to address regional inequalities by directing investments to disadvantaged rural areas, enhancing infrastructure, and increasing connectivity. By doing so, EU policies seek to rebalance economic opportunities and access to services across rural landscapes (Weck et al., 2022). This approach not only modernizes agricultural practices but also redefines spatial relations, ensuring that historically marginalized areas benefit from a fair distribution of resources and community-based planning. In Brazil, the Landless Workers Movement exemplifies SJ in rural development, advocating for land reform and community-based settlement plans that challenge long-standing spatial inequalities stemming from centralized land ownership (Wolford, 2004). Through participatory mapping, local governance, and direct action, the movement empowers rural communities to shape their environments and claim their right to equitable development. This experience illustrates how local mobilization and inclusive planning can transform rural spaces, ensuring that development benefits are more equitably distributed to all residents.

H4: Spatial justice is an influential factor in promoting adaptation strategies in Iranian development programs.

2.5. Sustainable livelihoods (SL)

SL is a profound insight in the rural development literature, whose emergence was systematically developed by international bodies such as the UK Department for International Development (DFID) in the mid-1990s (Yang, 2024). The original sustainable livelihoods framework marked a significant shift from single-sector interventions to a comprehensive analysis of how rural households combine five key asset types—human, social, natural, financial, and physical—to develop strategies (Natarajan et al., 2022). This approach is now being refined to understand the complexities of livelihood resilience in the face of various shocks, including environmental disruptions, economic fluctuations, and policy changes. By focusing on these diverse assets, the SL framework provides a holistic method for addressing development issues, emphasizing the interconnectedness of different resources and strategies that rural households employ to maintain or enhance their capabilities and assets over time.

SL in rural areas require strategies that enable individuals and communities to meet their basic needs—such as food, water, shelter, and clothing—in ways that are economically viable, environmentally sound, and socially equitable (Sampson et al., 2021). This approach emphasizes resilience, allowing rural communities to maintain and adapt to potential challenges. The primary goal is to enhance the quality of life for rural people and their future generations. From this perspective, the right to the rural introduces agriculture as a crucial resource that not only provides livelihoods but also serves as a source of income and employment for rural households (Sargani et al., 2023). For instance, agriculture is a vital sector in countries like Morocco, Yemen, Egypt, and Iran, where an estimated 20-40% of the population in these areas work in agriculture (Jobbins & Henley, 2015). In these countries, nearly 85% of agricultural land is owned by smallholder farmers, whose livelihoods are directly dependent on natural resources (Savari & Moradi, 2022). However, these farmers have limited adaptive capacity due to high poverty rates and restricted access to social safety nets and extension services. A literature review highlights organizations such as World Neighbors, which support rural communities by conducting comprehensive analyses of their production methods, income sources, and costs (Delgado & Siamwalla, 2018). These organizations assist communities in mobilizing assets, enhancing natural resources, and building knowledge and organizational capacity to improve well-being (Mokhtari Karchgani et al., 2024). Their strategies include supporting savings and credit groups, establishing seed and grain banks to mitigate food shortages, processing and marketing products, and generating income through small enterprises(Giller et al., 2021). In the Dutch context, smallholder farmers have transitioned to organic farming practices, utilizing natural composts and pesticides to reduce costs, enhance soil health, and increase biodiversity (Westerink et al., 2021). This shift has resulted in a gradual improvement in income and

the empowerment of women through the creation and sale of organic agricultural inputs. In Peru, organic farming provides primary income to indigenous communities, aiming to reduce poverty-related deforestation. By offering financial support, this initiative has achieved a reduction in deforestation, improved food security, and increased investment in education and forest restoration (Zimmerer et al., 2020). This approach enables individuals to adopt sustainable lifestyles while protecting rainforest ecosystems.

H5: Sustainable livelihoods are an effective factor in promoting adaptation strategies in Iranian development programs.

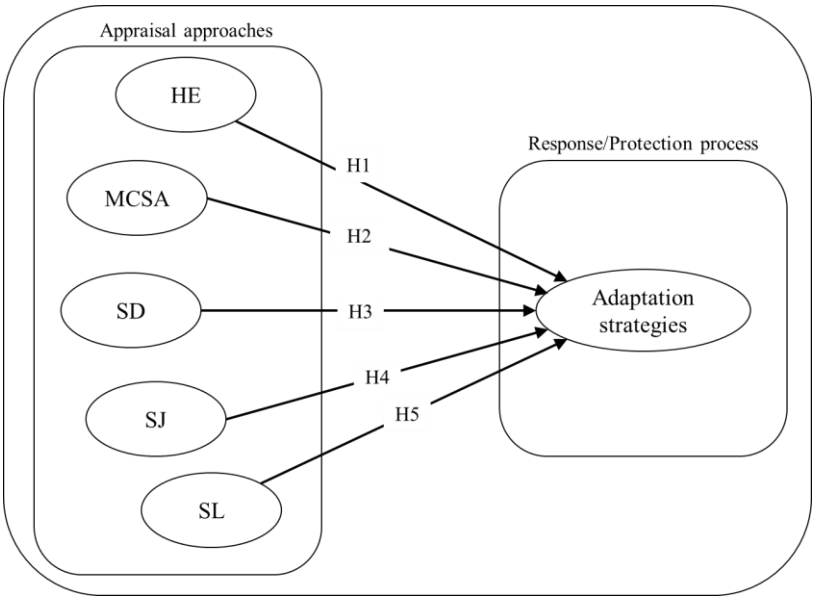


Fig. 1. Research Framework in this Research.

3. Research Methodology

3.1 Geographical Scope of the Research

This research is grounded in the "9-Division Zoning" framework outlined in the Sixth Development Plan (2010-2016). The selection of this zoning system from among the 17 existing zonings was primarily based on four key criteria: its currency, comprehensiveness, spatial coverage of all rural areas in Iran, and its mandatory enforcement by executive agencies. This zoning was proposed concurrently with the emphasis on spatial planning in Article 92 of the Permanent Provisions of the Sixth Development Plan Law, which was approved on November 10, 2016 (Akbari et al., 2019). To implement this, the Planning and Budget Organization is required to collaborate with relevant executive agencies within a year to conduct the country's zoning planning based on the desired spatial organization of the 2045 Horizon. Following approval by a specialized commission, the regional planning documents are submitted to the Supreme Council for final approval (Karchegani et al., 2020).

In this study, Strategic Provincial Plans (SPPs) function as strategic documents designed for the implementation of rural development programs. The selection of these plans was guided by Iran's spatial planning zoning, which facilitates an understanding of the differences and similarities in rural development policies across various regions. The criteria for selecting SPPs included the availability of information, appropriate geographical distribution, and a time frame spanning from 2006 to 2023. Consequently, SPPs were chosen from the provinces using these criteria through judgmental sampling and consultation with academic experts. As a result, one document was selected from each of the nine regions: Mazandaran, Ardabil, Hamadan, Khuzestan, Fars, Tehran, Markazi, Sistan and Baluchestan, and North Khorasan (Figure 1).

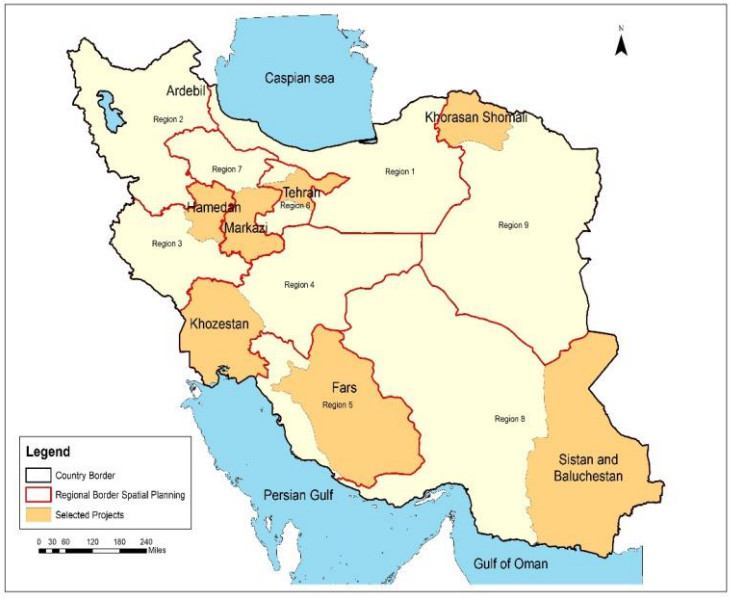


Figure 1. Geographical location of the 9 SPPs selected in the research

3.2. Statistical population and sample size

To determine the sample size, various methods were considered. Initially, the sample size was calculated using GPower software based on statistical power (Faul et al., 2007). For this purpose, the statistical test of multiple linear regression was employed: Fixed model, R2 deviation from zero. In the study, an effect size f2 of 0.15 (indicating a strong effect size) was assumed, with a first type error of 0.05 and a statistical power of 0.95. Given that there were five predictors, the calculated sample size was 138 individuals (see Figure 1). This was increased to 144 samples to ensure equal distribution between regions. The choice of a statistical power of 0.95 was informed by previous research (Faul et al., 2007).

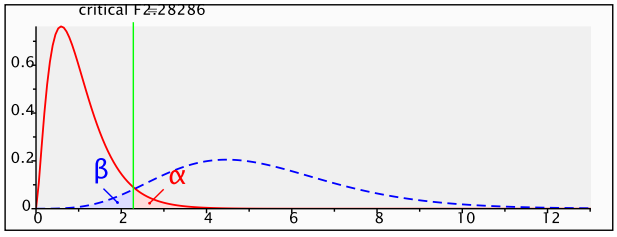


Figure 2. G-Power analysis for statistical power, effect and sample size

In the subsequent stage, the criteria for selecting samples were established, encompassing all implementers, officials, and academics responsible for provincial spatial planning in Iran. Given the nature of the samples, the purposive sampling method was employed in the form of a normal distribution across the nine planning regions of the country, with seven individuals selected from each region. Considering the use of the stratified non-probability sampling method in this study, the sample list was initially determined based on criteria such as "executive experience," "monitoring and evaluation history," "management (in the Ministry of Interior and governorates)," and "related academic field of expertise." These criteria were categorized into several homogeneous layers based on the nine regions. These strata were evenly distributed across the nine study regions, and the sample size was allocated proportionally based on the population size in each stratum.

3.3. Survey tool

The primary data collection instrument for this

study was a structured questionnaire, carefully designed following an extensive review of relevant literature to ensure the inclusion of established items, all of which were properly sourced and referenced. The questionnaire consisted of two main sections. The first section gathered demographic information from local communities. The second section was organized into five key components: (1) four items to evaluate a HE, (2) four items to assess SJ, (3) four items to evaluate SL, (4) Four items to measure SD, and (5) four items to assess the maintenance of socio-cultural authenticity.

Table 1. Status assessment of AS variables among respondents

Construct	Measurement items	Sources
Healthy environment (HE)	I think that ensuring access to clean air and water resources for rural residents is the most important factor in the effectiveness of spatial planning programs.	Scheidel et al., 20 Rodríguez-Garavito, 2017; Rodrígu Garavito, 2017; Carrión al., 2022
	I think that promoting the sustainable use of rural land (agricultural, forest, brownfield, etc.) can contribute to the effectiveness of spatial planning programs.	
	I think that the use of renewable energy is the most important factor in the effectiveness of spatial planning programs.	
	I think that promoting agroecology (as a tool to restore ecological balance and promote sustainable agricultural practices, soil productivity and quality, livestock and crop mix) leads to the effectiveness of spatial planning programs.	
Spatial justice (SP)	I think that focusing on eliminating urban-rural inequalities is the most important factor in improving the performance of spatial planning programs.	Nordberg, 2020; Mahor et al., 2023; Shucksmith al., 2021; Weck et al., 2022; Tavakoli & Mokhtari Karchegani, 2024b
	I think that the adoption and promotion of green technologies (rainwater collection and storage systems, renewable energies, organic farming, waste recycling, and public transportation systems based on clean energy) to meet the different needs of residents is a determining factor in the effective promotion of spatial planning programs.	
	I think that the equitable distribution of resources and services (promotional and infrastructure) can contribute to the effectiveness of spatial planning programs.	
	I think that equality of opportunities for diverse rural groups (ethnic, racial, age, gender, religious, and linguistic) is the most important task of spatial planning programs.	
Self-determination (SD)	I think that granting political authority to lower levels to determine their destiny contributes to the effectiveness of spatial planning programs.	Fisch, 2015; Thürer, 2008; Ahmad & Islam, 2024; Pinto, 2022; Tavakoli & Mokhtari Karchegani, 2024a
	I think that the active participation (preparation, decision-making, implementation, and monitoring) of stakeholders can lead to taking responsibility for development programs.	
	I think utilizing indigenous knowledge can contribute to the effectiveness of spatial planning programs.	
	I think creating a network of diverse actors to explore middle ground solutions will help make spatial planning programs more effective.	
Maintaining Socio-cultural authenticity (MCSA)	I think that emphasizing local cultural values and traditions, without imposing external norms, can contribute to the effectiveness of programs.	Belei, 2019; Kohsaka & Rogel, 2021; Kohsaka & Rogel, 2021; Yu et al., 2024; Mokhtari Karchg et al., 2024
	I think that promoting indigenous knowledge and oral history existing in rural communities can contribute to a more effective implementation of programs.	
	Maintaining territorial identity in rural areas, especially in the face of demographic change and the effects of urbanization, can contribute to the effectiveness of programs.	
	I think that recognizing and respecting ethnic, linguistic, racial, and religious differences contributes to the effectiveness of spatial planning programs.	
Sustainable livelihood (SL)	I think that emphasizing education and empowerment of rural communities can help the effectiveness of spatial planning programs.	Yang, 2024; Natarajan al., 2022; Sampson et a 2021; Sargani et al., 20 Savari & Moradi, 2022; Mokhtari et al., 2020
	I think that access to diverse job opportunities (such as employment in non-agricultural sectors) can help the effectiveness of spatial planning programs.	
	I think that strengthening foreign investments (government, public, and private) is the most important factor in strengthening the effectiveness of spatial planning programs.	
	I think that financial support (such as loans, tax exemptions, etc.) is the most important factor in strengthening the effectiveness of spatial planning programs.	

3.4. Reliability and validity

To ensure the validity of the measured indicators, a panel of experts reviewed the initial draft of the survey before its administration. Additionally, a pilot test was conducted with 15 expert respondents before full-scale data collection.

During this stage, Cronbach's alpha was calculated to assess internal consistency. Any ambiguous questions were modified or removed, and the wording of the items was simplified to enhance clarity. Along with face validity, the average variance extracted (AVE) and composite reliability (CR) were calculated. Since Cronbach's alpha exceeded the threshold of 0.70 for all items, the composite reliability was above 0.60, and the AVE values were greater than 0.50, the survey instrument was confirmed to have acceptable reliability and validity (Table 1). Cronbach's alpha is a method used to measure the reliability of a questionnaire by assessing the internal consistency of its items. This approach is widely employed for instruments such as questionnaires or tests that measure multiple characteristics. Generally, if Cronbach's alpha exceeds 0.7, the reliability of the instrument is considered acceptable (Hair et al., 2017). In contrast, composite reliability (CR) is a measure of the internal fit of a model, calculated based on the consistency of the items designed to measure each construct. A CR value greater than 0.6 indicates acceptable reliability (Tabachnick et al., 2007). The primary distinction between Cronbach's alpha and CR lies in their calculation methods: Cronbach's alpha depends on the variability of the data, with the standard deviation being a key determinant, while CR is based on the internal consistency of the items for each construct, making it a more precise metric.

All participants were informed about ethical issues, such as data protection, by the researcher and provided verbal consent at the beginning of each interview. Informed consent was obtained from all individual participants who participated in the study. All materials and methods were prepared following the guidelines and regulations. All procedures involving human participants were conducted by the ethical standards of the Institutional Research Committee and the 1964 Declaration of Helsinki and its subsequent amendments or similar ethical standards.

3.5. Data analysis

This step was conducted in two stages, utilizing both descriptive and inferential statistics with SPSS and Smart PLS software. SEM was employed to explore causal relationships between variables. SEM is a multivariate analytical technique within the family of regression analyses, enabling the simultaneous testing of multiple regression equations. One of the primary reasons SEM is widely used among researchers is its ability to facilitate theory testing by creating and analyzing equations that represent relationships between variables (Hair et al., 2017). Another significant advantage is its consideration of measurement error, allowing researchers to analyze their data while accounting for such errors. SEM-PLS, the third generation of SEM, employs a variance-based approach to analyzing collected data. Its notable features include robustness with small sample sizes, insensitivity to outliers, predictive capabilities, and support for very complex models.

A redesigned graphical user interface is a prominent feature of this version, offering users an efficient and optimized experience. The developed structural model comprises two main components (Savari, Sheheytavi, et al., 2023): the measurement model and the structural model. The measurement model assesses the validity and reliability of the observed variables designed to measure the latent constructs. The observed variables represent the items of the questionnaire, while the latent variables are the primary categories of the study constructs. Conversely, the structural model examines the direct and indirect relationships between the latent variables, serving as a basis for testing the research hypotheses. Consequently, this study utilized SEM to evaluate the proposed theoretical framework, enabling the assessment of the predicted relationships within it.

4. Research Findings

4.1. Descriptive statistics

The distribution of respondents by age reveals that a significant portion of participants (50.8%) fall within the 35-50 years category. The second largest group (30.2%) consists of individuals older than 55, while the youngest age group, those under 35, represents 19.0% of the sample. The majority of respondents are male, comprising 73.0% of the total sample, while females account for 27.0%. In terms of educational background, the respondents are predominantly at the Master's level (49.2%), followed by PhD holders at 38.1%. Only 12.7% of the participants hold a Bachelor's degree.

Most respondents (39.7%) have more than 10 years of experience in Strategic Provincial Planning (SPP), followed by those with 5-10 years of experience (34.9%). A smaller proportion (25.4%) has less than 5 years of experience in the field.

Over half of the participants (60.3%) have been involved in the preparation of SPP, while 39.7% have not. The majority of respondents report a medium level of awareness (52.4%), with 34.9% indicating high awareness. A smaller proportion (12.7%) reports low awareness of this topic. A substantial portion (69.8%) of respondents have participated in relevant training courses, while 30.2% have not (Table 2).

Table 2. Demographic characteristics of the participants

Variable	Category	Frequency	Percent	Mode
Age (year)	Lower than 35	27	19	+
	35-50	73	50.8	
	More than 55	43	30.2	
Gender	Male	105	73	+
	Female	39	27	
Education	Bachelor	18	12.7	+
	Master	71	49.2	
	PhD	55	38.1	
Study experience in SPP	Less than 5	37	25.4	+
	5–10	50	34.9	
	More than 10	57	39.7	
Participation in the preparation of SPP	Yes	87	60.3	+
	No	57	39.7	
Awareness of the characteristics of the right to the village	Low	18	12.7	+
	Medium	75	52.4	
	High	50	34.9	
Presence in relevant training courses	Yes	101	69.8	+
	No	43	30.2	

measurement model evaluates the unidimensionality, reliability, and validity, as well as the discriminant validity of the data (Hair et al., 2017). To confirm that the questio nnaire items were appropriately selected, the following steps were undertaken.

Unidimensionality: The initial step in assessing the measurement model involves examining the unidimensionality of the indicators and items. This is typically measured by the standardized factor

4.2. Evaluation of the research structural model

SEM analysis is conducted in two stages: structural and measurement (Tabachnick et al., 2007). The loading (λ). In this study, all standardized factor loadings exceeded the threshold of 0.50 and were statistically significant at the 1 % level ($P < 0.01$), indicating that the measurement items exhibit unidimensionality and possess adequate validity (Table 3).

Table 3. Results of confirmatory factor analysis for the measurement model

Latent variables	Indicator	λ	T value	CR	AVE	α
Healthy environment (HE)	HE1	0.888	103.583	0.905	0.777	0.904
	HE2	0.897	90.808			
	HE3	0.874	63.612			
	HE4	0.866	57.18			
Maintaining Socio-Cultural Authenticity (MCSA)	MCSA1	0.877	64.908	0.915	0.796	0.914
	MCSA2	0.913	104.23			
	MCSA3	0.889	77.645			
	MCSA4	0.89	67.566			
Self-determination (SD)	SD1	0.884	65.934	0.910	0.788	0.910
	SD2	0.884	76.248			
	SD3	0.89	79.265			

Latent variables	Indicator	λ	T value	CR	AVE	α
	SD4	0.892	76.064			
Spatial justice (SJ)	SJ1	0.866	60.285	0.889	0.751	0.889
	SJ2	0.873	60.091			
	SJ3	0.87	60.471			
	SJ4	0.856	55.297			
Sustainable livelihood (SL)	SL1	0.849	52.574	0.896	0.760	0.894
	SL2	0.889	86.927			
	SL3	0.871	67.207			
	SL4	0.877	56.776			

Reliability and Validity: To further assess the measurement items, Cronbach's alpha (α), Composite Reliability (CR), and Average Variance Extracted (AVE) were computed. The results confirmed the reliability and validity of all indicators, with composite reliability scores above 0.60, Cronbach's alpha values exceeding 0.70, and AVE values greater than 0.50, ensuring that the measurement items are both reliable and valid (Table 3).

4.3. Discriminant validity

In the final step of evaluating the measurement model, discriminant validity is assessed to ensure that each construct is distinct from others. This is achieved by verifying that the square root of the Average Variance Extracted (AVE) is greater than the correlations between constructs. As shown in Table 3, the square roots of the AVE values (ranging from 0.751 to 0.796) surpass the corresponding inter-construct correlations (ranging from 0.295 to 0.601), thereby confirming the discriminant validity of the measurement model.

Table 4. Correlations with square roots of the AVE

Constructs	1	2	3	4	5	6
Adaptation strategy	0.881[a]					
HE	0.882[**]	0.889[a]				
MCSA	0.882[**]	0.916[**]	0.923[a]			
SD	0.884[**]	0.911[**]	0.878[**]	0.897[a]		
SJ	0.879[**]	0.902[**]	0.913[**]	0.866[**]	0.907[a]	
SL	0.877[**]	0.89[**]	0.899[**]	0.901[**]	0.872[**]	0.892[a]

[a] The square roots of AVE estimate

[**] Correlation is significant at the < 0.01 level

4.4. Evaluation of the research structural model

Following the validation of the measurement model, the next step involves assessing the fit of the structural model. Several key indicators are examined to evaluate the model's overall fit, as outlined in Table 5. The results show that the structural model demonstrates robust validity and an adequate fit, with all indicator values meeting the established criteria and falling within acceptable ranges.

Table 5. The summary of the goodness-of-fit indices for the measurement model.

Fit index	SRMR	d_G1	d_G2	NFI	RMS-Theta
Suggested Value	<0.1	>0.05	>0.05	>0.90	≤0.12
Estimated model	0.037	0.383	0.393	0.99	0.06

Once the fit indices have been confirmed through the assessment and measurement stages, we can advance to testing the research hypotheses. The structural model is depicted in both standardized and significant formats in Fig. 3 and Fig. 4.

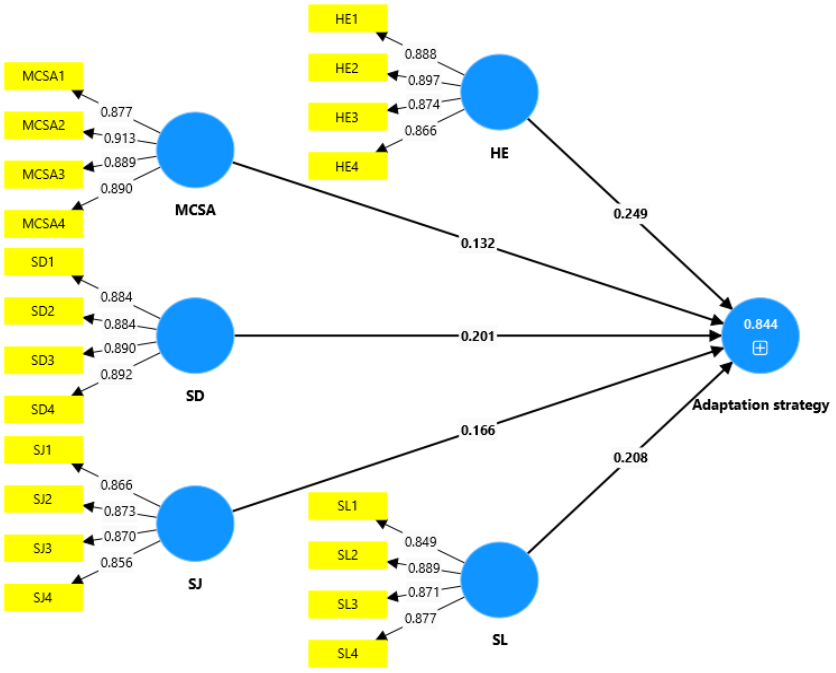


Fig. 2 Path model with standardized factor loadings

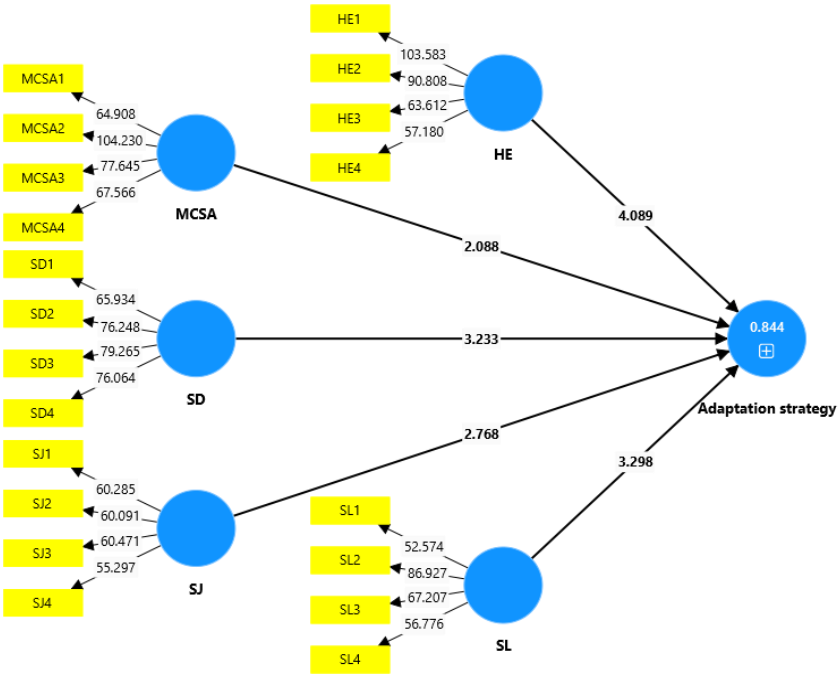


Fig. 3 Path model with t values

4.5. Hypothesis testing

Before testing the structural model, the Variance Inflation Factor (VIF) method was employed to examine any potential errors arising from high correlation among latent variables. The results indicated that all VIF values (external and internal) fell below the threshold, confirming the absence of multicollinearity issues. To evaluate the structural model, this study followed the steps proposed by Hair Jr et al. (2021), which included estimating path coefficients (β values) and their corresponding t-statistics. The partial least squares analysis utilized a bootstrap algorithm with 5000 samples to assess their significance (Table 6). The findings

revealed that the designed framework is effective, as all research hypotheses were significant, with the variables accounting for 84.4 % of the variance in the effectiveness of the Right to rural Framework in development programs.

Table 6. Direct effect on AS

Hypothesis			ƛ	t	Result	P Values	R^2
H1:HE	→	AS	0.249	2.709	Confirm	0.0000	0.844
H2: MCSA	→	AS	0.132	1.260	Confirm	0.0370	
H3: SD	→	AS	0.201	1.052	Confirm	0.0010	
H4: SJ	→	AS	0.166	1.325	Confirm	0.0060	
H5: SL	→	AS	0.208	0.829	Confirm	0.0010	

5. Discussion and Conclusion

This article addresses the gap left by previous studies that have focused on the role and status of the right to the rural in the Iranian context. The implications of this study can lead to strengthening adaptation strategies in provincial spatial planning programs that are derived from the theory of the right to the countryside. Drawing on the ideas presented by Rozelle and Li (1998), Kung (2000); Pinto (2022) Landy and Moreau (2015), El Nour et al. (2015), Claeys and Edelman (2020), and Pinto (2022) the issue of the right to the rural has been introduced in a fragmented manner under separate strategies, such as the right to SD, the right to maintain cultural-social authenticity, the right to SJ, SL, and the right to a HE. In this research, the concept of the right to the rural is examined within a broader and integrated theoretical framework, which can be considered a significant contribution to the literature on rural development.

SEM was employed to examine the influential factors (HE, MCSA, SD, SJ, and SL). The results indicate that a HE is the most influential factor in achieving the goals of the Right to the Country theory. As shown in Figure 2 and the factor loadings associated with the HE variables, the factors of sustainable use of agricultural land, provision of bioenergy with renewable fuels, transitioning towards agroecology, and access to a healthy climate had the greatest impact. This finding aligns with the results of Anderson and Maughan (2021), who identified environmental factors as variables affecting agricultural adaptation during crisis periods. This can be justified by the fact that agricultural activities are predominant in rural areas, emphasizing the need for continuous access to water and soil as the most critical production inputs. Livestock farming, alongside agricultural activities, forms the foundation of rural life. Consequently, if access to these resources is limited, farmers will be compelled to discontinue their agricultural activities.

SJ emerged as the second most influential factor on AS, primarily through elements such as the equitable distribution of resources and services (promotional and infrastructure), the adoption and promotion of green technology (including rainwater collection and storage systems, renewable energy, organic farming, waste recycling, and public transportation systems based on clean energy), the elimination of urban-rural disparities, and the equality of opportunities for diverse rural groups (ethnic, racial, age, gender, religious, and linguistic). The coefficient of equitable distribution of resources and services had the greatest impact. These findings align with the results reported by Mahon et al. (2023). It is noteworthy that development programs can significantly enhance local production sectors by strengthening infrastructure resources, thereby linking local markets to regional marketing networks (Richter, 2019). Consequently, improving spatial equity factors helps strengthen the production-to-market communication network and places marginalized areas within the territorial context. Furthermore, enhancing the use of green technology increases resilience during droughts (Calo et al., 2021).

Sustainable livelihood was identified as the third most influential factor. As shown in Figure 2 and the factor loadings associated with the sustainable livelihood variables, the factors of access to diverse job opportunities (such as employment in non-agricultural sectors), incentive financial support, foreign investment, and expansion of education and empowerment programs for local

communities had the greatest impact, respectively(Sargani et al., 2023). These findings align with other research, which has demonstrated that adequate income and access to diverse job opportunities in the non-agricultural sector are effective factors in the success of programs addressing vulnerable conditions. Given the high vulnerability of rural households to natural hazards, if suitable economic conditions are not provided, they may be compelled to migrate (Shah et al., 2019).

The right of rural people to SD emerges as the fourth effective factor in enhancing the effectiveness of development programs, primarily through its components such as community-led movements, granting political authority to local levels, active participation, and expanding the network of actors. These findings are consistent with the results reported by Fraser et al. (2024). Consequently, rural programs cannot be successfully implemented without the local community taking responsibility for development. The literature highlights the concept of SD as emphasizing the psychological aspects of development, which include the inherent human need for identity and spatial and social connectedness with one's environment. Social identity theory, as proposed by Tajfel et al. (1979), suggests that individuals derive a significant part of their self-concept from membership in social groups. Furthermore, SD theory, developed by Deci and Ryan (1985), posits that satisfying basic psychological needs, including the need for relatedness, leads to increased motivation and well-being. Consequently, SD is believed to reinforce other factors, such as economic, cultural, and infrastructural factors (Cunningham et al., 2022; Fraser et al., 2024). However, there is limited evidence regarding the role of SD in the effectiveness of development programs (Conway et al., 2019; Sargani et al., 2023).

Finally, maintaining sociocultural authenticity in program design has emerged as a pivotal factor in enhancing the effectiveness of interventions, particularly in contexts where rapid urbanization threatens traditional cultural identities. This variable highlights how promoting indigenous knowledge, oral history, and local cultural values and respecting ethnic, linguistic, racial, and religious differences can not only help maintain rural populations but also strengthen the functional aspects of implementation programs. Programs that integrate indigenous knowledge and oral traditions serve not merely as a means to preserve heritage; they are also crucial in creating frameworks that resonate with local populations. For instance, research in Latin America and Southeast Asia demonstrates that when development plans incorporate traditional ecological knowledge, they yield adaptive and context-specific solutions to environmental and social challenges. By grounding programs in local narratives and practices, policymakers can foster a sense of ownership and legitimacy, ensuring that interventions are perceived not as externally imposed but as integral to the historical and cultural context of the community.

The implications of this study can assist rural development managers and policymakers in making informed decisions to prevent the inefficiency of development programs and the consequent decline in the quality of life for residents. This enables farmers to continue their activities in the field of production and food security, which serves as the main pillar of society. Furthermore, policymakers require comprehensive information about the level of adaptation and available resources to enhance planning, and the results of this study provide such essential information.

The theory of the right to the rural has transformed our understanding of development programs. The top-down implementation of spatial policies has historically marginalized local communities from the development process, as the compatibility gap between upstream policies and local contexts is evident. Efforts to bridge this gap are ongoing, and although achieving these goals is often considered challenging, they underscore the need for a more comprehensive theoretical framework. Consequently, conducting research in this field is essential. This study aimed to identify the factors influencing the effectiveness of rural development programs through the lens of the theory of the right to the rural. The findings revealed that factors such as a HE, SJ, SL, SD, and MCSA have a positive and significant impact on the selection of compatible strategies. The results from the structural equations indicate that the effective factors account for 85.2% of the variance in the use of AS under the Right to the Country theory, which is a highly significant rate. The results demonstrate

that the Right to the Country theory employs five primary strategies to enhance the adaptation of rural development programs: (1) integrating development goals with environmental health; (2) distributing resources (services and infrastructure) to provide equal opportunities, thereby increasing the ability to benefit; (3) diversifying livelihood opportunities to mitigate shocks from climate change crises and economic fluctuations; (4) empowering local communities by granting decision-making powers to mobilize collective action towards sustainable practices; and (5) strengthening social and cultural authenticity through the promotion of indigenous knowledge and respect for local traditions, which facilitates the resilience of rural populations.

Limitations and Future Research

Although this study utilized epistemological variables to understand rural development stakeholders' perceptions of adopting sustainable program development and implementation practices based on the theory of the right to the rural, several limitations should be acknowledged. Firstly, the effectiveness of these approaches is contingent upon the specific contexts of each case study. This study provides a foundation for other rural development studies to gain a deeper understanding of where each approach is likely to be effective. However, more detailed program evaluations would provide stronger evidence, leading to more consistent development programs. Secondly, this study highlights the need to enhance the measurement model and its validity by incorporating more constructs related to actual behavior. Thirdly, the researchers in this study limited their use of the right to the rural to gain insight into stakeholders' adoption of more effective practices. Furthermore, its effectiveness could be enhanced by incorporating incentives to promote environmentally friendly behavior among individuals. This approach also offers an opportunity to expand the explanatory scope of theories such as planned behavior and social identity, moving beyond their traditional concepts to more internalized and sustainable practices.

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Conflict of interest

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Original Article

تبیین نظریه حق بر روستا در برنامه‌های توسعه روستایی ایران

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چکیده مبسوط

۱. مقدمه

جوامع روستایی در سراسر جهان با چالش‌های پیچیده‌ای ناشی از تغییرات اقلیمی، نوسانات اقتصادی و تحولات اجتماعی مواجه هستند. اگرچه برخی برنامه‌های توسعه موفق به ایجاد رفتارهای مطلوب در جهت اقدامات حفاظتی شده‌اند، بسیاری از آنها به دلیل پیش‌فرض‌های نادرست درباره ماهیت پیچیده رفتار انسانی و بافت‌های اجتماعی-فرهنگی، ناموفق بوده‌اند. در این راستا، نظریه «حق بر روستا» که ابتدا توسط هانری لوفور در مطالعات شهری مطرح شد و بعداً در حوزه روستایی بسط یافت، به‌عنوان راهکاری مؤثر مطرح شده است. این نظریه با بازتعریف نقادانه چارچوب‌های سنتی، رابطه جوامع با محیط خود را دگرگون می‌سازد و بر حق ساکنان در تصمیم‌گیری درباره حفظ و شکل‌دهی به چشم‌اندازهای طبیعی و انسانی تأکید دارد.

بررسی برنامه‌های توسعه روستایی در ایران نشان می‌دهد که تأکید بر رشد اقتصادی و سرمایه‌گذاری‌های مالی، اگرچه در اولویت بوده، اما تحلیل‌های آسیب‌شناختی حاکی از تشدید نابرابری‌های اجتماعی-فضایی، زوال هویت سرزمینی و کاهش اعتماد و مشارکت جوامع روستایی است. با توجه به اهمیت موضوع «حق بر روستا» و کمبود پژوهش‌های جامع در این حوزه، مطالعه حاضر با هدف بررسی عوامل مؤثر بر ظهور رفتارهای سازگارانه در برنامه‌های توسعه روستایی ایران از منظر این نظریه انجام گرفته است.

۲. مبانی نظری تحقیق

مطالعات پیشین، عوامل تعیین‌کننده در اجرای راهبردهای مرتبط با حق بر روستا را در پنج حوزه کلیدی شناسایی کرده‌اند:

محیط زیست سالم: این مفهوم در جریان جنبش زیست‌محیطی اوایل دهه ۱۹۷۰ شکل گرفت و بر این باور استوار است که هر فردی حق زندگی در اکوسیستمی را دارد که از سلامت جسمی، اجتماعی و اقتصادی پشتیبانی کند. در توسعه روستایی، این رویکرد به ارزیابی سیاست‌ها از منظر تأثیر بر حفاظت از منابع طبیعی می‌پردازد.

عدالت فضایی: ریشه در آرای هاروی و سوجا دارد و بر دسترسی عادلانه ساکنان روستایی به مزایا و فرصت‌های ناشی از رشد روستایی تأکید می‌کند. هدف اصلی، کاهش نابرابری‌ها از طریق توانمندسازی جوامع حاشیه‌نشین و بهبود دسترسی به خدمات حیاتی است.

معیشت پایدار: چارچوب توسعه‌یافته توسط DFID، نشان‌دهنده گذار از مداخلات بخشی به تحلیل جامع از چگونگی ترکیب دارایی‌های پنج‌گانه توسط خانوارهای روستایی و تأکید بر تاب‌آوری در مواجهه با شوک‌هاست.

خودتعیینی: این مفهوم با ریشه در انقلاب‌های آمریکا و فرانسه، در توسعه روستایی از طریق آثار چمبرز جایگاه یافت و بر مشارکت فعال مردم محلی در شناسایی نیازها و اجرای راه‌حل‌ها تأکید دارد.

حفظ اصالت اجتماعی-فرهنگی: بر حفظ و پشتیبانی از بافت اصیل اجتماعی-فرهنگی جوامع روستایی و مخالفت با تحمیل نسخه‌های استانداردشده فرهنگ تأکید دارد.

۳ .روش تحقیق

این پژوهش بر اساس چارچوب «تقسیم‌بندی ۹ منطقه‌ای» برنامه ششم توسعه انجام شد. حجم نمونه با استفاده از نرم‌افزار GPower و آزمون رگرسیون خطی چندگانه (اندازه اثر ۰/۱۵، خطای نوع اول ۰/۰۵ و توان آماری ۰/۹۵) معادل ۱۳۸ نفر محاسبه و به ۱۴۴ نفر افزایش یافت. نمونه‌ها از میان مجریان، مسئولان و دانشگاهیان فعال در حوزه آمایش سرزمین به روش نمونه‌گیری هدفمند انتخاب شدند. ابزار اصلی، پرسشنامه ساختاریافته مشتمل بر دو بخش اطلاعات جمعیت‌شناختی و پنج مؤلفه اصلی بود. روایی پرسشنامه توسط پنل خبرگان تأیید و پایایی آن با محاسبه آلفای کرونباخ (>۰/۷)، پایایی ترکیبی (>۰/۶) و متوسط واریانس استخراج شده (>۰/۵) مورد

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تأیید قرار گرفت. تحلیل داده‌ها با نرم‌افزارهای SPSS و SmartPLS و به روش مدل‌سازی معادلات ساختاری انجام شد.

۴ .یافته‌های تحقیق

یافته‌های جمعیت‌شناختی نشان داد اکثر پاسخ‌گویان (۵۰/۸٪) در گروه سنی ۳۵-۵۰ سال، مذکر (۷۳٪) و دارای مدرک کارشناسی ارشد (۴۹/۲٪) بودند. نتایج مدل اندازه‌گیری، بارهای عاملی استاندارد شده بالاتر از ۰/۵۰ و معنی‌دار در سطح ۱٪ را نشان داد. شاخص‌های برازش مدل ساختاری (SRMR=0.037، NFI=0.99) حاکی از برازش مناسب بود.

آزمون فرضیه‌ها نشان داد که هر پنج عامل تأثیر مثبت و معنی‌داری بر ارتقای راهبردهای سازگارانه دارند .محیط زیست سالم با ضریب ۰/۲۴۹ بیشترین تأثیر را داشت و مؤلفه‌های استفاده پایدار از اراضی کشاورزی، تأمین انرژی زیستی با سوخت‌های تجدیدپذیر و گذار به کشاورزی بوم‌شناختی بیشترین بار عاملی را به خود اختصاص دادند .عدالت فضایی با ضریب ۰/۱۶۶ در رتبه دوم قرار گرفت که توزیع عادلانه منابع و خدمات بیشترین تأثیر را داشت .معیشت پایدار با ضریب ۰/۲۰۸، خودتعیینی با ضریب ۰/۲۰۱ و حفظ اصالت اجتماعی-فرهنگی با ضریب ۰/۱۳۲ به ترتیب در رتبه‌های بعدی قرار گرفتند. این پنج عامل در مجموع ۸۴/۴ درصد از واریانس پذیرش راهبردهای سازگارانه را تبیین کردند.

۵ .بحث و نتیجه‌گیری

این پژوهش با ارائه چارچوبی جامع از نظریه حق بر روستا، شکاف موجود در ادبیات توسعه روستایی را پر کرده است. یافته‌ها نشان می‌دهد که برنامه‌های توسعه روستایی ایران با ناسازگاری قابل‌توجهی مواجه هستند. محیط زیست سالم به‌عنوان مؤثرترین عامل، بر اهمیت دسترسی به منابع آب و خاک تأکید دارد. عدالت فضایی از طریق توزیع عادلانه زیرساخت‌ها و ترویج فناوری سبز، به تقویت شبکه ارتباطی تولید تا بازار کمک می‌کند. معیشت پایدار از طریق تنوع‌بخشی به فرصت‌های شغلی و حمایت‌های مالی، از آسیب‌پذیری خانوارها می‌کاهد. خودتعیینی با توانمندسازی جوامع محلی، حس تعلق و مسئولیت را تقویت می‌کند. حفظ اصالت اجتماعی-فرهنگی با ترویج دانش بومی، زمینه‌ساز پذیرش برنامه‌ها می‌شود.

پیامدهای عملی این پژوهش می‌تواند به مدیران و سیاست‌گذاران در تصمیم‌گیری‌های آگاهانه کمک کند. نظریه حق بر روستا با به‌کارگیری پنج راهبرد کلیدی می‌تواند به ارتقای انطباق‌پذیری برنامه‌های توسعه روستایی کمک کند. باوجود محدودیت‌هایی نظیر وابستگی اثربخشی به بافت هر منطقه، این پژوهش پایه‌ای محکم برای مطالعات آتی فراهم می‌آورد.

کلیدواژه‌ها: حق بر روستا، سازگاری، پایداری محیطی، مدل‌سازی معادلات ساختاری، اجتماع‌محور.

تشکر و قدردانی

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Original Article

Presenting a Model for Women's Entrepreneurship in Rural Tourism Based on Grounded Theory

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Abstract

Purpose- The ultimate goal of this research is to present a model for women's entrepreneurship in rural tourism to address the growing needs in this field and facilitate rural women's economic participation, thereby contributing to sustainable rural development through tourism-based entrepreneurial activities.

Design/methodology/approach- In this study, the qualitative method of grounded theory was used to achieve this model, with semi-structured interviews conducted with knowledgeable individuals and specialists in the subject area as the primary method of data collection. The sampling method employed was theoretical sampling. After conducting interviews and collecting data, the obtained codes were analyzed in various sections, and the final model was derived through the three stages of open coding, axial coding, and selective coding.

Findings- The final model comprises six main components: causal conditions (tourism industry dynamics, customer dynamics, organizational strengthening, human resource dynamics, and problem identification), the central category (women's entrepreneurship in rural tourism), contextual conditions (organizational complexity, customer characteristics, and environmental conditions), intervening conditions (managerial barriers, structural barriers, and tourism industry characteristics), strategies (organizational flexibility, customer-oriented human resource development, enhancing customer interactions, and service development), and outcomes (policy evaluation, market development, customer satisfaction, economic-cultural growth, increased revenues, and emerging opportunities). The findings highlight that addressing infrastructure barriers and external factors affecting tourism supply can create a favorable environment for women's entrepreneurship.

Research limitations/implications- The qualitative nature and limited sample size (21 participants) may restrict generalizability. Future research could employ quantitative methods to test the proposed model across diverse geographical contexts. Additionally, longitudinal studies examining the long-term impacts of implemented strategies are recommended.

Originality/value- This research presents a comprehensive, empirically grounded model specifically designed for women's entrepreneurship in rural tourism, addressing a significant gap in the literature. The model provides practical guidance for policymakers, rural development planners, and tourism stakeholders seeking to empower rural women economically and promote sustainable rural development through tourism entrepreneurship.

Keywords- Women's Entrepreneurship, Rural Tourism, Grounded Theory.

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1. Introduction

Today, rural sustainable development is more dependent than ever on entrepreneurship, with researchers considering rural entrepreneurs the most significant lever for developing rural areas (Aggarwal, 2018). One of the major potentials that has gained significant attention in recent years in rural areas, and where rural women are extensively active, is rural tourism. Rural tourism is regarded as a tool for economic and social revitalization in villages. As the fastest-growing global industry, tourism, by engaging women and supporting their abilities, has enabled rural women's mobility and entrepreneurship (Mrema, 2015; Nemirschi & Craciun, 2010). The increasing demand from tourists and the need for diverse tourism products and services have paved the way for business development and entrepreneurship in rural tourism (Rezaei et al., 2020). Hence, entrepreneurship in rural tourism has become increasingly important today (Akbarpour & Azimi, 2018). Experts believe that rural tourism entrepreneurship can play a significant role as a new strategy in reducing poverty, unemployment, and migration in villages and achieving sustainable rural development (Abbasi et al., 2022).

Many developed and developing countries agree that focusing on women's entrepreneurship can improve production and productivity. In recent years, efforts in Iran have been aimed at promoting and developing women's entrepreneurship in rural areas. These efforts include empowering rural and nomadic women, equipping them with the skills necessary to launch successful businesses, creating new opportunities for rural women, increasing their income and capital, and fostering self-sufficiency and independence (Movahedi & Yaghoubi Farani, 2015). The role of rural women in achieving rural development goals is undeniable (Kalupokuna et al., 2020). In many member countries of the Organization for Economic Co-operation and Development (OECD), the number of women entrepreneurs is growing daily. For instance, in 2020, the OECD reported that 17 million women entrepreneurs in Europe created jobs for 22 million people, and 9.4 million women in the United States created jobs for 12.2 million people (Ball, 2005; Fallatah, 2012).

Additionally, in Denmark in 2019, the country's Investment and Production Organization designed and implemented an operational plan to increase women entrepreneurs (Nedelcheva, 2012). In India, organizations such as the Development of Small and Medium Enterprises, banks, and non-governmental organizations have implemented special initiatives for women's entrepreneurship, particularly in rural areas (Vimlesh, 2014). According to the Global Entrepreneurship Monitor, in the three years leading to 2022, women launched 163 million businesses worldwide (Niethammer, 2013).

In contrast, statistics show that less than 10% of entrepreneurs in Iran are women (Mohammadi & Sharifi, 2019). Considering the low economic participation of rural women, the necessity of their self-employment for rural development, the undeniable role of rural women in national production and economic development, and the attention of policymakers and officials to these issues, it is essential to provide appropriate conditions for rural women's entrepreneurial activities.

With the potential of rural areas, especially in tourism, facilitating women's engagement in this sector could unlock their capabilities, leading to significant economic transformations in the country. Rural women, who have the potential to be pioneers in transforming rural tourism and improving their families' livelihoods, often work in limited, low-income roles that fail to consistently attract tourists.

By leveraging rural women’s inherent abilities and the region’s tourism potential, women could establish entrepreneurial small businesses to improve the current unfavorable situation, generating positive economic and social impacts for themselves, their families, and the rural community. This would help steer regional rural tourism toward sustainability, fostering a resilient and livable environment in their villages.

To address these challenges, this research aims to develop a women’s entrepreneurship model in rural tourism, focusing on rural development. This model seeks to facilitate women's entrepreneurial processes in rural tourism, enabling rural development while creating valuable tourism services for both tourists and rural women. Given these challenges, formulating a model for women's entrepreneurship in rural tourism is crucial.

Therefore, this study seeks to answer the following core question: What are the characteristics of the women's entrepreneurship model in rural tourism?

2. Theoretical Foundations of the Study

2.1. Women's Entrepreneurship

Entrepreneurship plays a vital role in the economic development of a country and is regarded as the sole solution for asset growth, job creation, and the provision of new and improved goods and services (Kumar, 2019). Entrepreneurship in rural tourism holds a significant position (Ciochină et al., 2016). Among these, the full participation of women in entrepreneurship, based on the principle of gender equality, is a fundamental factor in economic growth, development, and poverty reduction (Singh, 2016). Women entrepreneurs' activities in agritourism contribute to achieving sustainable development in rural areas (Dhahri et al., 2021).

In the field of women's entrepreneurship, research remains limited, and definitions provided are also restricted. Women's entrepreneurship involves activities such as participatory self-employment, independent self-employment, being an employer, and operating businesses with sole ownership. Women entrepreneurs are individuals who establish businesses either alone or collaboratively, producing new products through creativity and innovation, while accepting financial, social, ethical, and psychological risks to outperform competitors in the market (Ahmadi et al., 2019).

Given the undeniable role of women in rural development, enhancing rural women's entrepreneurship is considered an effective strategy for achieving sustainable rural development (Heidari Sareban, 2012). Rural women's entrepreneurship does not require formal and professional education but relies on experiential knowledge passed down through generations. Thus, on the one hand, governmental support should be directed toward helping these women entrepreneurs in areas where they lack knowledge, such as sharing expertise (e.g., management and marketing). On the other hand, government support for fostering a culture of entrepreneurship among rural women can facilitate coordination among stakeholders, including key actors and other factors. This means entrepreneurial events for rural women, which require risk-taking and innovation with new approaches, can further advance rural communities.

Moreover, the success of women's entrepreneurial efforts depends on collaboration and networking among various actors (individuals, service providers, and organizations) living in rural communities (Pato, 2015; Shirmohammadi & Mavouni, 2021). A rural woman entrepreneur can be considered a person who brings about significant changes in the rural environment by innovating most social goods. Thus, rural women entrepreneurs are crucial agents of economic development in villages (Muthulakshmi & Gurudevi, 2019).

2.2. Rural Tourism

Rural tourism is one of the low-cost forms of tourism that is widely practiced worldwide (Paresishvili et al., 2017). It is a unique type of tourism, attracting urban dwellers to explore rural areas. This form of tourism offers the authentic experience of rural life, leisure, creativity, ethnicity, local culture, exhibitions and festivals, handicrafts, seasonal changes, and more, which appeal to tourists (Madani & Taghavi Zirvani, 2022). Compared to the global tourism market, rural tourism represents a relatively small segment, as much of tourism is still concentrated on beaches and in cities (Shcherbachenko et al., 2021).

In reality, rural tourism has specific attractions that distinguish it from other types of tourism, including natural landscapes, natural reserves, wildlife sanctuaries, protected areas, unique scenery, and biodiversity (Paresishvili et al., 2017). Navarro Jurado and Nel-lo Andreu (2011) emphasized that rural tourism contributes to the development and economic growth of destination areas or tourist regions, prioritizing the achievement of economic, social, cultural, and environmental sustainability goals (Navarro Jurado & Nel-lo Andreu, 2011).

Thus, this type of tourism should be promoted and developed as it encourages the rural population to stay in their regions. Rural tourism may be the most suitable model for sustainable development in the tourism sector (López-Sanz et al., 2021). Various exciting tourist routes exist in these areas, such as adventure tours, eco-tours, educational tours, sports and wellness tours, and more. Tourists have the opportunity to engage in certain unique attractions and arrangements of this type of tourism, including observing natural landmarks, fishing, horseback riding, surfing, etc. (Paresishvili et al., 2017).

Bramwell (1994) argued that in many developed countries, special attention is given to rural areas, emphasizing their unique value and the need for protection (Bramwell, 1994).

The importance of environmental protection in rural areas has led to the association of rural tourism with sustainable tourism development (Sharpley & Roberts, 2004). Additionally, tourism can have various impacts on communities, which are particularly significant in developing countries. The development of rural tourism aims to address some issues such as reversing migration from urban areas to rural regions, increasing the stability of the active population by improving living conditions, providing opportunities for new economic and commercial activities, and protecting the natural environment and local culture (Hajarian, 2022; Grgić et al., 2017; Samantaray, 2016).

Rural tourism offers a fresh connection with nature, explaining the widespread popularity of agritourism, ecotourism, and other alternative tourism forms over the past decade. These types of tourism have gained substantial support through balanced marketing efforts and significant financial backing from governments and regional organizations (Shcherbachenko et al., 2021).

Rural tourism can bring social and cultural benefits to rural areas, facilitating social and cultural exchanges between local residents and visitors. It increases awareness of the value of heritage and the need for preservation among both tourists and local communities. Additionally, it strengthens the sense of identity and unity within local communities (Shcherbachenko et al., 2021).

Local transportation and other services will be utilized more effectively, enhancing their viability. For these reasons, tourism, in its optimal form, can help rural communities find new opportunities for local economic development, improve their quality of life, and preserve social and cultural values (Krajcik et al., 2019).

2.3. Background of the Research

Madawala et al. (2023) in a study titled "Investigating the Role of Entrepreneurial Self-Efficacy among Women Entrepreneurs in the Tourism Sector" confirmed through survey data collected from women entrepreneurs in Sri Lanka that entrepreneurial self-efficacy is influenced by social media, entrepreneurial passion, and entrepreneurial role models, while education and work experience do not impact entrepreneurial self-efficacy. The study also confirmed the mediating role of entrepreneurial sustainability behavior. For entrepreneurship stakeholders, this research highlighted an important factor: entrepreneurial self-efficacy is influenced by social media in the digital world. Moreover, the research provided a valid model of entrepreneurial self-efficacy, which enhances its use during business challenges or growth stages, while offering valuable insights for policymakers in developing countries to increase the contribution of female entrepreneurs to the economy. Vukovic et al. (2023) in a study titled "Rural Tourism Development, Entrepreneurship, and Women's Empowerment – A Case Study in the Suburbs of Serbia" adopted a quantitative approach and surveyed a sample of 513 women from a less developed rural area in Serbia. The results showed that self-employment is the main goal of women's empowerment. The study concluded two practical implications: (1) the potential of rural tourism can be enhanced through support from local tourism stakeholders; (2) women without professional careers in rural areas, especially in areas traditionally dominated by men (husband/brother/father), have more opportunities for earning income and economic independence. This research could impact future studies by examining other aspects of empowerment based on regional differences and alternative opportunities for tourism and local development in less developed rural areas. Rao et al. (2022) in a study titled "Enhancing Women's Entrepreneurial Competence in Rural Tourism: An Experiential Learning Perspective" focused on a 10-year regional program aimed at improving female entrepreneurship in China. The study examined the behaviors of women entrepreneurs and the improvements in entrepreneurship due to interventions by development agencies. From the perspective of experiential learning, the study revealed the crucial role of intellectual support, which aligns with the knowledge nature in tourism, and proposed a theoretical framework describing a dynamic participatory learning process between development agency staff and entrepreneurs responding to it. In a changing market, collaborative action learning helps women entrepreneurs overcome obstacles, improve entrepreneurship, and achieve independence.

Ghouse et al. (2021) in a study titled "Rural Women Entrepreneurs in Oman: Challenges and Opportunities" found multiple challenges faced by rural women entrepreneurs that hinder their business investments, including personal, family, educational, social-cultural, legal, financial, economic, organizational, and geographical factors, with family, organizational, and geographical challenges being the most significant. The study shows that policymakers should adopt a holistic view of how rural women involved in informal businesses can be better supported and sustained by overcoming challenges to gain business opportunities and contribute to regional socio-economic development. Figueroa-Domecq et al. (2020) in a study titled "Gender, Tourism, and Entrepreneurship: A Critical Review" found that dominant accounts of tourism entrepreneurship present successful entrepreneurial performance as male. This article highlights the marginal yet crucial role of feminist post-colonial economics, political economy, and post-structural approaches, helping to challenge implicit economic and male bias in the literature.

Maden (2018) in a study examined women's entrepreneurship in Turkey. This qualitative study, using semi-structured interviews with successful women entrepreneurs in Turkey, revealed that most women entrepreneurs in Turkey rely on traditional methods (such as government, non-government, and banking support mechanisms) for financial assistance. Family members and economic partners were other supportive resources that might provide support to female entrepreneurs. Movahedi et al. (2012) found that effective factors on entrepreneurship development included initiative, activity, opportunity recognition, perseverance, effort, overcoming obstacles, and individual competencies of women, indicating that an entrepreneur acts without requiring the request or command of others. The study also found that entrepreneurship is an economic activity requiring continuous search for new ideas, innovation, and profitability potential. Barriers to rural women's entrepreneurship were social-cultural barriers, support-economic barriers, and management barriers. The study also indicated the role of women entrepreneurs in the health of the economy and socialization. Mohammadi and Sharifi (2019) in a study titled "Investigating the Barriers to Rural Women's Interest in Tourism Entrepreneurship (Case Study: Oraman District of Sarvabad County)" found that the main barriers to rural women's entrepreneurship in the tourism sector include weaknesses in planning, executive performance of government agencies, financial limitations, marketing deficiencies, rural social-cultural barriers, individual weaknesses, educational limitations, and technical and practical obstacles. Among these, weaknesses in planning, executive performance of government agencies, and financial limitations had the most significant impact on the willingness of rural women involved in tourism entrepreneurship.

3. Research Methodology

3.1 Geographical Scope of the Research

This study is fundamental in terms of its research results, as the researcher, using the grounded theory approach, aims to present a new model in the tourism industry. The study is exploratory in nature, and because the data was collected through semi-structured interviews, the study is qualitative in terms of the type of data used. Overall, the research method employed in this study adopts a core approach to the model. Grounded theory research typically uses theoretical sampling (non-random) in the sampling process, which continues until theoretical saturation is reached. Theoretical saturation is reached when repetitive answers are obtained in interviews, and the researcher realizes that no new information can be gained (Pandit, 1996; Glaser & Strauss, 1967). In this research, interviews were conducted with 21 women entrepreneurs and tourism experts. To address the shortcomings of previous research, this study uses a qualitative approach and grounded theory methodology to develop a comprehensive model that includes causal factors, intervening factors, contextual factors, examines the concept of women's entrepreneurship in rural tourism, strategies, and consequences.

3.2. Data Collection Tools

In this research, in-depth interviews were used as the primary data collection tool. In-depth interviews are a form of unstructured interviews that generate rich data and often provide surprising evidence. In the qualitative research culture, in-depth interviews are used as a well-known method for data collection. An in-depth interview is a two-way conversation between a trained interviewer and an interviewee, aiming to extract detailed and

significant information that can be used in analysis (Kvale & Brinkmann, 2009).

3.3. Data Analysis

Data analysis in this study followed the guidelines of Strauss and Corbin (2015). The analysis included three main stages: open coding, axial coding, and selective coding, which ultimately led to the formulation of the qualitative model.

- **Open Coding:** The first step in data analysis is open coding, a process through which identified concepts and their features and dimensions are discovered in the data. During the open coding phase, data from interviews were carefully examined to identify main and sub-categories, with the subsequent classification of sub-categories (or sub-concepts). The analysis process followed the analytical techniques suggested by Strauss and Corbin (2015). The primary unit of analysis for open coding was the concepts. Transcripts of interviews were regularly examined to identify main categories, concepts, and sub-categories, leading to 249 open codes, 52 concepts, and 25 categories related to rural tourism, which were identified.
- **Axial Coding:** Axial coding is the process of relating categories to their sub-categories and linking categories at the level of features and dimensions. This coding is called "axial" because it revolves around a central category. In this stage, the grounded theory theorist selects a category from the open coding stage and places it at the center of the process, relating other categories to it. These categories include: causal conditions, strategies, contextual conditions, intervening conditions, and consequences. This stage involves creating a diagram called the coding pattern.
- **Selective Coding:** In selective coding, conditions or classes from the axial coding phase are merged, and a comprehensive analysis is carried out, presenting theoretical propositions based on the paradigm model (Alvani et al., 2011). Selective coding (theory creation) includes one of the axial codes as the central concept for the researcher (Pourabadi, 2016). In this research, during open coding, the data were divided into separate sections and carefully examined for similarities and differences, producing numerous themes. Through a back-and-forth data analysis process, these raw qualitative data were reduced to fewer categories, from which preliminary categories related to the phenomenon under investigation were derived by asking questions, comparing cases, events, and other states of each phenomenon, and identifying similarities and differences. In the next phase (axial coding), other categories were theoretically linked to the main or core phenomenon. Based on qualitative data analysis, the axial coding phase was completed, establishing the relationships among research categories, including causal conditions, core category, contextual conditions, intervening conditions, strategies, and consequences. During the selective coding phase, theoretical propositions or statements were presented based on the components of the axial coding stage (figure 1).

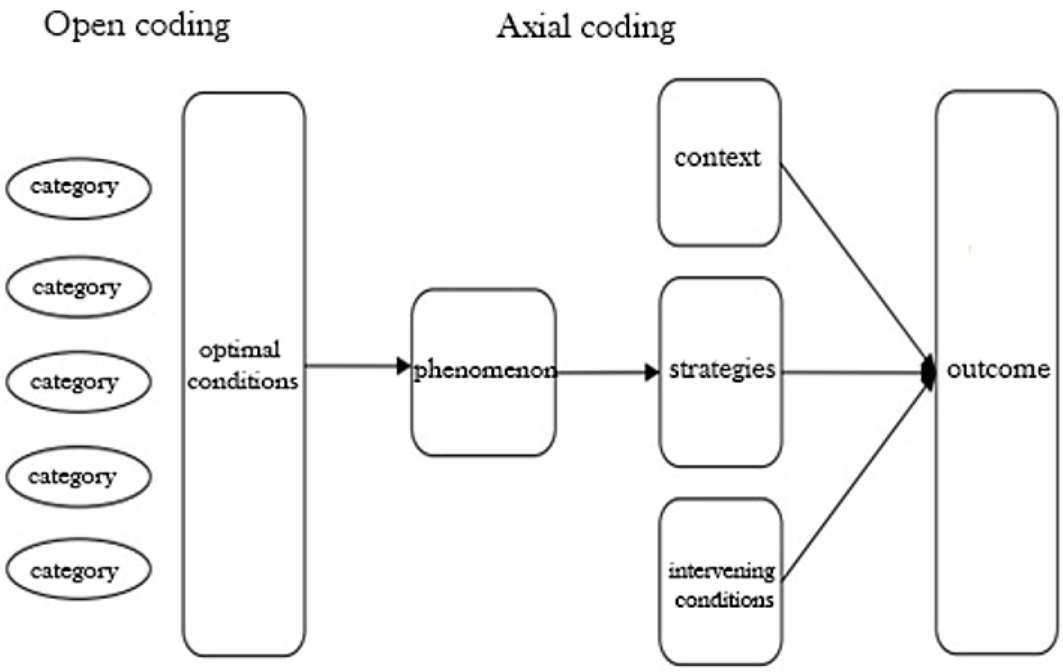


Figure 1. Paradigmatic Model of Coding

Thus, in this research, based on the dimensions of the coding paradigm, the analysis of interview data is clarified.

4. Research Findings

4.1. Causal Conditions

Causal factors include the categories directly influencing the phenomenon of women's entrepreneurship in rural tourism or creating and developing the phenomenon. Causal conditions are sometimes called preliminary or pioneering conditions, and often, based on the phenomenon itself and by systematically reviewing the data and reviewing events or incidents that are temporally prior to the phenomenon under investigation, causal conditions can be identified (table 1).

Table 1. Sample Codes in the Section on Causal Condition

General Category	Subcategory	Concept	Final Codes
Causal Conditions	Tourism Industry Dynamics	Competition Dynamics in the Tourism Industry	Liberalization of the competitive environment Formation of local markets Elimination of intermediaries
		Requirements for Competition Dynamics	Strengthening the position and positive image of tourism in villages Legal requirements of the tourism industry
	Customer Dynamics	Increased Customer Awareness	Knowledge and awareness of customers Importance of providing information to customers
		Increased Customer Demands	Increased options for customers Customer needs and expectations
	Strengthening Organizations and Infrastructure	Organizational Development	Development of tourism in villages Enhancing women's entrepreneurial competitiveness in villages
		Strategic Entrepreneurial Thinking	Strategic thinking in entrepreneurship policymaking in tourism

General Category	Subcategory	Concept	Final Codes
	Human Resource Dynamics	Market Development Motivation	Gaining competitive advantage and market share Women's motivation for market development
		Knowledge and Awareness of Women Entrepreneurs	Women's knowledge and awareness Importance of addressing customer needs
	Dynamic Process of Problem Identification	External Problem Identification	Recognizing issues based on existing laws Examining similar issues faced by competitors
		Internal Problem Identification	Recognizing issues using customer feedback Identifying problems through consultants' opinions
		Identifying Significant Issues	Financial and legal issues in the tourism industry Issues related to market survival and development Issues impacting the achievement of rural tourism objectives

4.2. Contextual or Governing Factors

Contextual characteristics include factors that are essential for achieving women's entrepreneurship in rural tourism. The governing context provides the specific conditions under which strategies are implemented to manage, control, and respond to phenomena. These conditions are made up of a collection of concepts, categories, and contextual variables (table 2).

Table 2. Sample Codes in the Section on Contextual Conditions

General Category	Subcategory	Concept	Final Codes
Contextual Conditions	Organizational Complexity	Structural Complexity	Organizational structure of women's entrepreneurship
		Stakeholders	Interests of stakeholders and shareholders Similarity of women's entrepreneurship services
	Customer Characteristics	Number and Diversity of Customers	High number and wide distribution of customers Diversity and heterogeneity of customers
		Customer Awareness and Knowledge	High awareness and knowledge of customers Competitors' special services and benefits to customers
		Customer Needs and Expectations	Customers' values, expectations, and demands Customers' bargaining power
	Environmental Conditions	Economic Conditions	Economic boom or recession Growth rate of the tourism industry
		Government Legal Requirements	Tourism industry regulations Government economic policies

4.3. Intervening Conditions

Intervening conditions modify the causal conditions and influence strategies and mutual

interactions. These conditions act to either facilitate or restrict strategies in the specific context under consideration (table 3).

Table 3. Sample Codes in the Section on Intervening Conditions

General Category	Subcategory	Concept	Final Codes
Intervening Conditions	Managerial Barriers	Traditional Thinking in Senior Management	Government-oriented mindset among tourism managers Lack of support and resource allocation by senior management Limited knowledge of senior management about entrepreneurship policymaking
		Weak Entrepreneurship in the Industry Core	Incomplete belief in entrepreneurship among employees Weak innovation and creativity among staff
	Structural Barriers	Structural Conflicts	Unclear position of entrepreneurship in organizational structures
		Bureaucracy	Restrictive regulations
		System Weaknesses	Weak organizational culture of entrepreneurship at various levels of the tourism industry
	Tourism Industry Characteristics	Knowledge and Experience Weakness in the Tourism Industry	Limited organization of relevant conferences and training programs Unprofessional policymaking for entrepreneurship in rural areas
		Capabilities and Quality	Quality and diversity of rural tourism services Educated and knowledgeable human resources

4.4. Main Category

Considering that the aim of this study is to present a model for branding women's entrepreneurship in rural tourism, the main phenomenon under study is defined as women's entrepreneurship in rural tourism (table 4).

Table 4. Sample Codes in the Section on the Main Category

General Category	Subcategory	Concept	Final Codes
Main Category	Tourism Strategies	Environmental and Cognitive Limitations	Cognitive limitations faced by policymakers Environmental limitations faced by policymakers
		Time and Information Constraints	Time limitations for policymakers Information limitations for policymakers
	Market Analysis	Monitoring customers and competitors	Monitoring competitor behavior
		Analyzing target customers	Market segmentation Analyzing customer behavior
	Creating Value for Customers	Value creation	Creating value for customers
		Enriching Services	Customizing rural tourism services based on customer feedback Prioritizing services according to customer opinions
	Introducing and Offering Services to	Introducing services to customers	Introducing services using logical messaging Providing information to customers

General Category	Subcategory	Concept	Final Codes
	Customers	Offering services to customers	Introducing and recommending tourism services to customers
	Expanding the Market for Tourism Services	Market development through advertising	Attracting valuable and potential customers
		Changing customer perceptions	Changing customer attitudes toward tourism services
	Nature-Based Job Creation	Increasing job opportunities	Formation of small home-based businesses Revitalization and promotion of handicrafts production Increasing rural women's employment

4.5. Strategies

Strategies reflect the interactions and actions taken by actors in response to certain conditions. These actions occur as a response to specific events and situations related to the phenomenon. The purpose of strategies is to manage, execute, and better realize the targeted phenomenon within the prevailing context. Strategies are chosen purposefully and implemented for a specific reason. By using tactics and strategies, the central phenomenon can be effectively achieved (table 5).

Table 5. Sample Codes in the Section on Strategies

General Category	Subcategory	Concept	Final Codes
Strategies	Organizational Flexibility	Flexibility in Policy-Making Processes	Flexibility in organizational structures and processes Utilizing experienced tourism experts and elites for policy-making
	Customer-Oriented Human Resource Development	Adjusting Employee Attitudes and Behavior	Improving the behavior of women entrepreneurs with customers Promoting a culture of customer orientation
		Training in Necessary Skills and Expertise	Providing training and enhancing communication skills for women entrepreneurs Continuous training for women entrepreneurs in planning, decision-making, entrepreneurship, and tourism
		Developing Human Resource Systems	Designing customer-oriented compensation systems Training women entrepreneurs in customer focus and program orientation
	Enhancing Interactions with Customers	Purposeful communication with customers	Regular and systematic assessment of customer behavior and attitudes
		Loyalty Programs	Establishing customer clubs to promote rural tourism Expanding customer loyalty programs
	Service Development and Improvement	Improving Service Quality	Enhancing diversity and quality of tourism services in villages Increasing efficiency and speed in responding to customers
		Developing Innovative Services	Creating and offering new tourism services in villages

4.6. Outcomes and Results

The purpose of this section is to identify concepts and categories related to the outcomes resulting from the implementation of women's entrepreneurship strategies in rural tourism. In fact, strategies are implemented either to confront or to manage and control a phenomenon, leading to certain outcomes (table 6).

Table 6. Sample Codes in the Section on Outcomes

General Category	Subcategory	Concept	Final Codes
Outcomes of Women's Entrepreneurship in Rural Tourism	Evaluation of Implemented Policies	Assessment of Economic Outcomes	Evaluating the outcomes of implemented policies by comparing them to the objectives Evaluating policy outcomes concerning allocated resources
		Assessment of Cultural and Social Outcomes	Evaluating outcomes based on customer satisfaction Assessing policy results with regard to enhancing the community's economic security
	Market Development and Strengthening Women's Entrepreneurship	Market Expansion, Retention, and Customer Acquisition	Increasing customer awareness Creating behavioral tendencies among customers Enhancing customer loyalty and commitment
		Improvement of Market Position	Attracting new customers Development and sustainability of women's entrepreneurshi
	Increased Customer Welfare and Satisfaction	Enhancing customer satisfaction	Improving the quality of rural tourism services Increasing customer satisfaction
		Improving Customer Welfare	Increasing customer welfare
	Economic and Cultural Growth of Society	Economic Growth of Society	Enhancing economic security Promoting economic growth in the community
		Cultural Development and Social Welfare	Improving overall community welfare levels
	Increased Revenues and Cost Reduction	Increased Revenues	Increased sales of services Higher revenues and profitability
		Cost Reduction	Lower customer attrition rates Reduced marketing costs
	Opportunities from the Tourism Entrepreneurship Market	Increasing opportunities derived from the tourism entrepreneurship market	Expanding environmental capacities aligned with tourism entrepreneurship Improving living standards

4.7. Validation of the Grounded Theory

While some qualitative researchers traditionally associate discussions about the validity and reliability of data and findings with quantitative research (Johansen & Christensen, 2008), the reality is that in qualitative research, the accuracy and credibility of data and findings are also critical components of the research process (Creswell, 2012). Various methods exist for validating grounded theory. In this study, two methods were used:

1. **Participant Review:** Feedback was gathered from participants.
2. **Expert Review:** Consultation and review by five university faculty members and three senior tourism managers were conducted. Based on the feedback and revisions, along

with guidance from supervisors and advisors, the final model was developed.

4.8. Propositions of the Research

Based on the components of the axial coding stage, the following propositions were derived:

1. **Proposition 1:** The dynamism of the tourism industry, customer dynamism, strengthening organizations and infrastructure, human resource dynamism, and the dynamic process of problem identification are causal conditions.
2. **Proposition 2:** Tourism strategies, market analysis, value creation for customers, introducing and providing services to customers, market development of tourism services, and nature-based employment are considered the main category (central phenomenon).

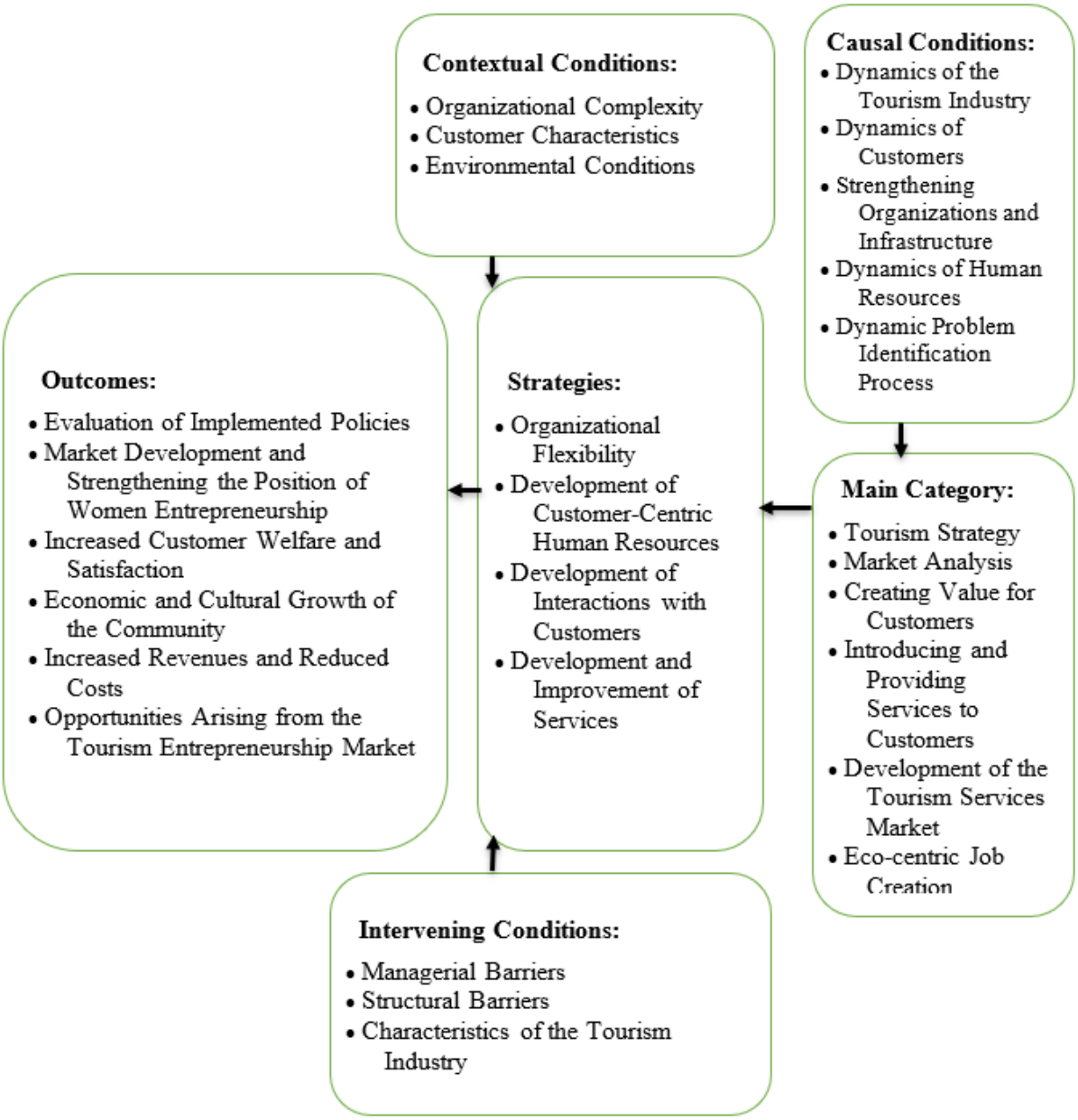


Figure 2. Diagram of Women's Entrepreneurship Model in Rural Tourism

3. **Proposition 3:** Organizational complexity, customer characteristics, and contextual conditions are considered the background for women's entrepreneurship in rural tourism.

4. **Proposition 4:** Managerial barriers, structural barriers, and characteristics of the tourism industry are considered intervening conditions for women's entrepreneurship in rural tourism.
5. **Proposition 5:** Organizational flexibility, customer-oriented human resource development, enhancing customer interactions, and service development and improvement are strategies for women's entrepreneurship in rural tourism.
6. **Proposition 6:** Contextual conditions, intervening conditions, and strategies result in the following:
   - Outcomes of implemented policies
   - Market development and strengthening the position of women's entrepreneurship
   - Increased customer welfare and satisfaction
   - Economic and cultural growth of society
   - Increased revenues and reduced costs
   - Opportunities emerging from the tourism entrepreneurship market (figure 2).

5. Discussion and Conclusion

This research was conducted with the aim of designing a model for women's entrepreneurship in rural tourism based on grounded theory. Using a mixed-method approach, expert interviews were conducted with a selected network of entrepreneurship and tourism experts, based on the research background and existing theoretical foundations. The final model was derived from the data collected during the research process and the analysis performed using coding methods.

In this study, efforts were made to select individuals for the interviews who had more than 10 years of work experience and possessed knowledge related to women's entrepreneurship in rural tourism. Every research is conducted with the goal of using its results to improve processes or change conditions. The findings of this research can be useful for women entrepreneurs working in rural and tourism settings today, who are seeking to enhance their position.

Economic development cycles are always driven by the development of entrepreneurship, and entrepreneurship is the engine of growth and development. Given that women have significant entrepreneurial potential, especially in institutionalizing the culture of entrepreneurship, their entrepreneurial skills lead to self-employment and job creation. Evidence shows that traditionally, women have been marginalized. This has resulted in women being at a lower level in terms of social, technical, cognitive, and business skills.

Moreover, entrepreneurship is a powerful tool for creating opportunities that can help solve problems such as unemployment, lack of creativity and dynamism, low productivity, poor product and service quality, and economic stagnation. On the other hand, tourism, with its characteristics such as variable demand, the need for innovation, wealth generation capacity in communities, and its role in economic and social development, provides a suitable platform for entrepreneurial activities. Thus, tourism is sufficiently new, chaotic, and unregulated to attract entrepreneurs.

If we aim to encourage entrepreneurship in the rural tourism sector through the involvement of women, the primary and infrastructure barriers must first be addressed, followed by external factors that influence the performance of the tourism supply side. This will lead to mutual and direct improvements in both supply and demand sides of tourism, ultimately expanding tourism in rural areas. This development will have significant economic impacts on rural communities, driven by women's participation, providing an exceptional stimulus for creating a favorable environment for attracting and supporting rural women's entrepreneurship in tourism.

The findings of this study align with the results of other researchers (Madawala et al., 2023; Vukovic et al., 2023; Rao et al., 2022; Figueroa-Domecq et al., 2022; Movahedi et al., 2012). Given the inter-institutional nature of both tourism and entrepreneurship, it is essential to establish a unified body or

committee composed of all institutions and active stakeholders in rural development, with activities directed towards the development of entrepreneurship and tourism, with particular emphasis on women active in the region's tourism sector. Furthermore, securing financial capital for launching women's startups through low-interest, long-term loans with facilitated terms for receiving and repaying them, establishing production cooperatives in the rural tourism sector by pooling savings from households and women active in rural tourism, creating a safe environment for private investors to support rural women's ideas, facilitating the competitive conditions for women's businesses against men, and recognizing women's economic role in legal arenas by offering supportive incentives, can play a crucial role in fostering women's entrepreneurship in rural tourism.

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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

ارائه مدلی برای کارآفرینی زنان در گردشگری روستایی مبتنی بر نظریه داده بنیاد

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چکیده مبسوط

۱. مقدمه

توسعه پایدار روستایی امروزه بیش از هر زمان دیگری به کارآفرینی وابسته است و کارآفرینان روستایی مهم‌ترین اهرم توسعه مناطق روستایی محسوب می‌شوند. در این میان، گردشگری روستایی به عنوان یکی از ظرفیت‌های مهم که در سال‌های اخیر توجه قابل‌توجهی به آن شده و زنان روستایی نیز فعالیت گسترده‌ای در این حوزه دارند، می‌تواند نقش مؤثری در تحرک و کارآفرینی زنان روستایی ایفا کند. با وجود پتانسیل بالای مناطق روستایی در جذب گردشگر، زنان روستایی اغلب در مشاغل محدود و کم‌درآمد فعالیت می‌کنند که قادر به جذب پایدار گردشگر نیستند. با بهره‌گیری از توانمندی‌های ذاتی زنان و پتانسیل‌های گردشگری منطقه، زنان می‌توانند کسب‌وکارهای کوچک کارآفرینانه ایجاد کنند و تأثیرات مثبت اقتصادی و اجتماعی برای خود، خانواده و جامعه روستایی به همراه آورند. با توجه به آمار پایین مشارکت اقتصادی زنان در ایران (کمتر از ۱۰ درصد کارآفرینان)، ضرورت خوداشتغالی زنان روستایی برای توسعه روستایی و نقش انکارناپذیر آنان در تولید ملی، ارائه مدلی برای کارآفرینی زنان در گردشگری روستایی ضروری به نظر می‌رسد. این پژوهش در پی پاسخ به این سؤال اصلی است که مدل کارآفرینی زنان در گردشگری روستایی دارای چه ویژگی‌هایی است؟

۲. مبانی نظری تحقیق

کارآفرینی نقش حیاتی در توسعه اقتصادی کشور دارد و کارآفرینی در گردشگری روستایی از جایگاه ویژه‌ای برخوردار است. مشارکت کامل زنان در کارآفرینی، مبتنی بر برابری جنسیتی، عامل اساسی در رشد اقتصادی، توسعه و کاهش فقر محسوب می‌شود. کارآفرینی زنان شامل خوداشتغالی مشارکتی، خوداشتغالی مستقل، کارفرمایی و اداره کسب‌وکار با مالکیت انحصاری است. زنان کارآفرین با تولید محصولات جدید از طریق خلاقیت و نوآوری، ریسک‌های مالی، اجتماعی و روانی را می‌پذیرند. گردشگری روستایی با جذابیت‌هایی مانند مناظر طبیعی، تنوع زیستی و فرهنگ بومی، به توسعه اقتصادی مناطق کمک می‌کند و اهداف پایداری اقتصادی، اجتماعی و زیست‌محیطی را دنبال می‌نماید. پیشینه تحقیق نشان می‌دهد عواملی مانند خودکارآمدی کارآفرینانه، توانمندسازی زنان و موانع متعدد فراروی کارآفرینان زن روستایی از موضوعات کلیدی این حوزه بوده است.

۳. روش تحقیق

این پژوهش از نظر نتایج تحقیق، بنیادی و به لحاظ ماهیت، اکتشافی است. با توجه به اینکه داده‌ها از طریق مصاحبه‌های نیمه‌ساختاریافته جمع‌آوری شده، پژوهش از نظر نوع داده‌ها کیفی محسوب می‌شود. روش تحقیق بر اساس رویکرد نظریه داده‌بنیاد (گراندد تئوری) انجام شده است. نمونه‌گیری در این پژوهش به صورت نظری (غیرتصادفی) انجام شد و تا رسیدن به اشباع نظری ادامه یافت. اشباع نظری زمانی حاصل می‌شود که پاسخ‌های تکراری در مصاحبه‌ها به دست آید و محقق به این نتیجه برسد که اطلاعات جدیدی قابل کسب نیست. در این تحقیق، با ۲۱ نفر از کارآفرینان زن و خبرگان حوزه گردشگری مصاحبه انجام شد. ابزار اصلی گردآوری داده‌ها، مصاحبه‌های عمیق بود که نوعی مصاحبه نیمه‌ساختاریافته محسوب می‌شود و داده‌های غنی و شواهد قابل‌توجهی را تولید می‌کند.

تجزیه و تحلیل داده‌ها در سه مرحله اصلی شامل کدگذاری باز، کدگذاری محوری و کدگذاری انتخابی انجام شد که در نهایت به تدوین مدل کیفی منجر گردید. در مرحله کدگذاری باز، داده‌های حاصل از مصاحبه‌ها به دقت بررسی و مفاهیم و زیرمقوله‌های اصلی شناسایی شدند و منجر به شناسایی ۲۴۹ کد باز، ۵۲ مفهوم و ۲۵ مقوله مرتبط با گردشگری روستایی گردید. در مرحله کدگذاری محوری، مقوله‌ها در سطح ویژگی‌ها و ابعاد به یکدیگر مرتبط شدند و

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مقوله مرکزی در مرکز فرآیند قرار گرفت. در مرحله کدگذاری انتخابی، شرایط یا طبقات حاصل از مرحله کدگذاری محوری تلفیق و تحلیل جامعی ارائه گردید.

۴. یافته‌های تحقیق

یافته‌های پژوهش در قالب الگوی پارادایمی شامل شش بخش اصلی ارائه شد:

شرایط علّی :شامل عواملی است که به طور مستقیم بر پدیده کارآفرینی زنان در گردشگری روستایی تأثیر می‌گذارند و شامل پویایی صنعت گردشگری، پویایی مشتریان، تقویت سازمان‌ها و زیرساخت‌ها، پویایی منابع انسانی و فرآیند پویای مسئله‌یابی می‌باشد.

مقوله محوری (پدیده اصلی) :کارآفرینی زنان در گردشگری روستایی شامل راهبردهای گردشگری، تحلیل بازار، ایجاد ارزش برای مشتریان، معرفی و ارائه خدمات به مشتریان، توسعه بازار خدمات گردشگری و اشتغال‌زایی طبیعت‌محور است.

شرایط زمینه‌ای :عواملی که برای دستیابی به کارآفرینی زنان در گردشگری روستایی ضروری هستند و شامل پیچیدگی سازمانی، ویژگی‌های مشتریان و شرایط محیطی می‌باشند.

شرایط مداخله‌گر :عواملی که شرایط علّی را تعدیل کرده و بر راهبردها و تعاملات متقابل تأثیر می‌گذارند و شامل موانع مدیریتی، موانع ساختاری و ویژگی‌های صنعت گردشگری می‌باشند.

راهبردها :اقدامات و کنش‌هایی که در پاسخ به شرایط خاص توسط کنشگران انجام می‌شود و شامل انعطاف‌پذیری سازمانی، توسعه منابع انسانی مشتری‌محور، توسعه تعاملات با مشتریان و توسعه و بهبود خدمات می‌باشد.

پیامدها و نتایج :شامل ارزیابی سیاست‌های اجرا شده، توسعه بازار و تقویت جایگاه کارآفرینی زنان، افزایش رفاه و رضایت مشتریان، رشد اقتصادی و فرهنگی جامعه، افزایش درآمدها و کاهش هزینه‌ها و فرصت‌های ناشی از بازار کارآفرینی گردشگری است.

۵. بحث و نتیجه‌گیری

این پژوهش با هدف طراحی مدل کارآفرینی زنان در گردشگری روستایی مبتنی بر نظریه داده‌بنیاد انجام شد و با استفاده از رویکرد آمیخته، مصاحبه‌هایی با خبرگان حوزه کارآفرینی و گردشگری انجام گرفت. چرخه‌های توسعه اقتصادی همواره با توسعه کارآفرینی به حرکت درمی‌آیند و کارآفرینی موتور رشد و توسعه محسوب می‌شود. با توجه به پتانسیل بالای زنان در کارآفرینی، توانمندسازی آنان می‌تواند منجر به خوداشتغالی و ایجاد شغل شود. گردشگری نیز با ویژگی‌هایی مانند تقاضای متغیر، نیاز به نوآوری، ظرفیت ثروت‌آفرینی در جوامع و نقش در توسعه اقتصادی و اجتماعی، بستر مناسبی برای فعالیت‌های کارآفرینانه فراهم می‌کند.

یافته‌های این پژوهش با نتایج محققان دیگر از جمله مداوالا و همکاران (۲۰۲۳)، ووکوویچ و همکاران (۲۰۲۳)، رائو و همکاران (۲۰۲۲)، فیگورو و همکاران (۲۰۲۲) و خورشیدی‌پور و همکاران (۲۰۲۰) همسو است. با توجه به ماهیت بین‌نهادی گردشگری و کارآفرینی، ضروری است که نهاد یا کمیته واحد متشکل از کلیه نهادها و ذی‌نفعان فعال در توسعه روستایی تشکیل شود. همچنین تأمین سرمایه مالی برای راه‌اندازی کسب‌وکارهای زنان، تشکیل تعاونی‌های تولیدی، ایجاد محیط امن برای سرمایه‌گذاران خصوصی، تسهیل شرایط رقابتی برای کسب‌وکارهای زنان و به‌رسمیت‌شناختن نقش اقتصادی زنان در عرصه‌های قانونی، می‌تواند نقش اساسی در توسعه کارآفرینی زنان در گردشگری روستایی ایفا کند.

کلیدواژه‌ها: کارآفرینی زنان، گردشگری روستایی، نظریه داده‌بنیاد.

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دکتر سید امیرمحمد علویزاده (دانشیار جغرافیا و برنامه‌ریزی روستایی دانشگاه پیام نور)

دکتر علی‌اکبر عنابستانی (استاد جغرافیای انسانی و آمایش دانشگاه شهید بهشتی)

دکتر جمشید عینالی (دانشیار جغرافیا وبرنامه‌ریزی روستایی دانشگاه زنجان)

دکتر سیروس قنبری (دانشیار جغرافیا و برنامه‌ریزی روستایی دانشگاه سیستان و بلوچستان)

دکتر صدیقه کیانی سلمی (دانشیار جغرافیا و برنامه‌ریزی روستایی دانشگاه کاشان)

دکتر علی گلی (دانشیار جغرافیا و برنامه‌ریزی روستایی دانشگاه شیراز)

دکتر ولی‌الله نظری (استادیار جغرافیا و برنامه‌ریزی روستایی دانشگاه فرهنگیان)

دکتر زهرا یکتامهر (استادیار جغرافیا و برنامه‌ریزی شهری دانشگاه آزاد اسلامی مشهد)

۹. ۳. انواع نقل قول‌ها (مستقیم و غیر مستقیم)، نقل به مضمون و مطالب به دست آمده از منابع و مآخذ، با حروف نازک و استفاده از نشانه‌گذاری‌های مرسوم، مشخص شود و نام صاحبان آثار، تاریخ و شماره صفحات منابع و مآخذ، بلافاصله در میان پرانتز نوشته شود.

۱۰. مقالات برگرفته از رساله و پایان‌نامه دانشجویان با نام استاد راهنما، مشاوران و دانشجو به صورت توأمان و با مسؤولیت استاد راهنما منتشر می‌شود.

۱۱ . چنانچه مخارج تحقیق یا تهیه مقاله توسط مؤسسه‌ای تأمین مالی شده باشد، باید در بخش تشکر و قدردانی مشخص گردد.

۱۲ . شیوه ارزیابی مقالات: مقالات ارسالی که شرایط پذیرش را احراز کنند، برای داوران خبره در آن موضوع ارسال می‌شوند. داوران محترم، جدای از ارزشیابی کیفی مقالات، راهبردهای سازنده‌ای پیشنهاد می‌کنند. پیشنهادهای داوران محترم به طور کامل، اما بدون نام و نشان داور، برای نویسنده مقاله ارسال خواهد شد.

۱۳ . مجله حق رد یا قبول و نیز ویراستاری مقالات را برای خود محفوظ می‌دارد و مقالات مسترد نمی‌گردد. اصل مقالات رد یا انصراف داده شده پس از سه ماه از مجموعه آرشیو مجله خارج خواهد شد و مجله پژوهش و برنامه‌ریزی روستایی هیچ مسئولیتی در این ارتباط نخواهد داشت.

۱۴ . مسؤولیت ارائه صحیح مطالب مقاله بر عهده‌ی نویسندگان مقاله است. از این‌رو، نسخه‌ای از مقاله آماده چاپ برای انجام آخرین تصحیحات احتمالی به نشانی الکترونیکی نویسنده ارسال خواهد شد. چنانچه ظرف مدت یک هفته پاسخی از سوی نویسندگان واصل نگردید به معنای موافقت آنها با اصلاحات انجام شده تلقی و نسبت به چاپ آن اقدام می‌شود.

۱۵. دریافت مقاله صرفاً از طریق سامانه مجله (http://jrrp.um.ac.ir) خواهد بود و مجله از پذیرش مقالات دستی یا پستی معذور خواهد بود.

۱۶. نویسندگان گرامی، مقالاتی که مطابق فرمت مجله تهیه نشده باشند به نویسنده بازگردانده شده و در فرآیند ارزیابی قرار نخواهد گرفت.

۱۷. فایل های ضروری برای ارسال از طریق سامانه عبارتند از:

الف) فایل مشخصات نویسندگان: در محیط word شامل اسامی و مشخصات نویسندگان به فارسی و انگلیسی.

ب) فایل اصلی مقاله بدون مشخصات: در محیط word شامل متن اصلی مقاله بدون اسامی و مشخصات نویسندگان.

ج) فایل چکیده مبسوط (مکمل) مقاله: شامل چکیده مبسوط فارسی در قالب یک فایل در محیط Word.

۱۸. شرایط جزئی تر و دقیق تر نیز در فایل راهنمای نگارش و ارسال مقاله توسط نویسندگان ارائه شده است.

۱۹. مقاله پس از ارزیابی علمی به زبان انگلیسی برگردانده شده و نویسنده(گان) موظف به ترجمه آن در مراکز ویراستاری معتبر خواهند بود و تا قبل از انجام ترجمه، امکان ارسال گواهی پذیرش مقدور نمی‌باشد. لذا پیشنهاد می‌شود فارسی زبانان مقاله خود را به زبان فارسی تهیه و ارسال نموده و پس از طی فرایند ارزیابی علمی و پذیرش نسبت به ترجمه آن اقدام شود.

آدرس پستی: مشهد- میدان آزادی- پردیس دانشگاه فردوسی مشهد- دانشکده ادبیات و علوم انسانی- دفتر مجلهٔ پژوهش و برنامه‌ریزی روستایی.

کد پستی: ۹۱۷۷۹۴۸۸۸۳ تلفن و نمابر: ۰۵۱-۳۸۷۹۶۸۴۰ پست الکترونیکی Rplanning@um.ac.ir

وب سایت: http://jrrp.um.ac.ir/

فرم اشتراک (یک ساله/ دوشماره) **مجلهٔ پژوهش و برنامه‌ریزی روستایی**

این جانب ..... شغل ..... با ارسال فیش بانکی به مبلغ ..... ریال به حساب جاری شماره **۴۲۵۲۹۹۶۳۸** بانک تجارت شعبه دانشگاه مشهد کد **۴۲۵۰** به نام عواید اختصاصی دانشکده ادبیات و علوم انسانی، متقاضی اشتراک فصلنامه از شماره .....هستم. چنانچه صاحبان مقالات منتشر شده متقاضی دریافت مجلّه و تیراژه‌ی آن از طریق پست پیشتاز باشند، باید هزینه‌ی آن را به شماره حساب مذکور واریز و اصل فیش پرداختی را به نشانی دفتر مجلّه ارسال کنند.

نشانی: ..... کدپستی: .....

شرایط پذیرش مقاله

برای سرعت بخشیدن به امر داوری و چاپ مقالات، از همهٔ پژوهشگرانی که مایل به چاپ مقالات علمی خود در این نشریه هستند، درخواست می‌شود به نکات زیر توجه کافی داشته باشند:

۱ . مقالهٔ ارسال شده نباید قبلاً در هیچ نشریهٔ داخلی یا خارجی چاپ شده باشد. هیئت تحریریه انتظار دارد نویسندگان محترم تا هنگامی که جواب پذیرش از نشریه نرسیده است، مقالهٔ خود را به مجلهٔ دیگری برای چاپ ارسال نفرمایند.

۲ . مقالات انگلیسی با قلم نازک Times New Roman11 با نرم افزار Word تهیه شود. مقالات، روی کاغذ A4 (با حاشیه از بالا ۳ و پایین ۲ و راست ۲ و چپ ۲ سانتی‌متر) تایپ شود. متن به صورت دو ستونی با رعایت فاصله ۱ سانتی‌متر بین دو ستون و فواصل بین خطوط به صورت single باشد. ۳ . حجم مقاله نباید ازحدود ۹۵۰۰ کلمه و یا حداکثر ۱۵ صفحهٔ چاپی به قطع نشریه بیشتر باشد (با در نظر گرفتن محل جداول، اشکال، خلاصه فارسی و فهرست منابع).

۴ . عنوان مقاله با در نظرگرفتن فواصل بین کلمات نباید از ۶۰ حرف تجاوز کند و با قلم Times New Roman14 سیاه تایپ شود.

۵ . نام نویسندهٔ مقاله با قلم سیاه Times New Roman10 عنوان علمی یا شغلی او با قلم Times New Roman10 در زیر عنوان مقاله ذکر شود. ضمناً آدرس الکترونیکی و شماره تلفن نویسندهٔ مسؤول در پاورقی آورده شود.

۶ . چکیدهٔ مقاله ساختاریافته با قلم نازک Times New Roman 11 به صورت تک ستونی باشد.

۷ . شکل‌ها و نمودارهای مقاله حتماً اصل و دارای کیفیت مطلوب باشد. فایل اصلی اشکال (تحت Excel،Word ،PDF) و با دقت ۳۰۰ dpi ارائه شود. اندازهٔ قلم‌ها خصوصاً در مورد منحنی‌ها (legend) به گونه‌ای انتخاب شوند که پس از کوچک‌شدن مقیاس شکل برای چاپ نیز خوانا باشند.

۸ . ساختار مقاله شامل عناصر زیر است:

۸. ۱ صفحهٔ عنوان: در صفحهٔ شناسنامه باید عنوان مقاله، نام و نام خانوادگی نویسنده (نویسندگان)، درجهٔ علمی، نشانی دقیق (کد پستی، تلفن، دورنگار و پست الکترونیکی)، محل انجام پژوهش، مسؤول مقاله و تاریخ ارسال) درج شود. عهده‌دار مکاتبات باید با علامت ستاره مشخص شود.

۸. ۲ چکیده: شامل چکیده‌های فارسی ساختار یافته (شامل هدف؛ روش؛ یافته‌ها؛ محدودیت‌ها؛ راهکارهای عملی؛ اصالت و ارزش و واژگان کلیدی (۳ تا ۶ کلمه)) است. تا حد امکان چکیدهٔ مقاله از ۳۰۰ کلمه تجاوز نکند . علاوه بر چکیده ساختار یافته، لازم است چکیدهٔ مبسوط فارسی بین ۷۵۰ تا ۱۰۰۰ کلمه نیز حاوی مقدمه، مبانی نظری، روش، نتایج و بحث، نتیجه‌گیری و کلیدواژه‌های مقاله تهیه شود، به طوری که حاوی اطلاعاتی از کل مقاله باشد و بتوان جداگانه آن را چاپ کرد. با توجه به این که مقاله بعدا به صورت کامل به انگلیسی برگردانده خواهد شد، نیازی به ترجمه چکیده مبسوط به انگلیسی نیست.

۸. ۳ مقدمه: شامل ۱- طرح مسئله؛ ۲- اهمیت و ضرورت؛ ۳- اهداف و سوالات اصلی تحقیق.

۸. ۴ ادبیات نظری تحقیق: شامل ۱- تعاریف و مفاهیم؛ ۲- دیدگاه‌ها و مبانی نظری؛ ۳- پیشینه نظری تحقیق و ... .

۸. ۵ روش‌شناسی تحقیق: در برگیرندهٔ ۱- محدوده و قلمرو پژوهش؛ ۲- روش تحقیق و مراحل آن (روش تحقیق، جامعهٔ آماری، روش نمونه‌گیری، حجم نمونه و روش تعیین آن، ابزار گردآوری داده‌ها و اعتبارسنجی آن‌ها)؛ ۳- سؤال‌ها و فرضیه‌ها؛ ۴- معرفی متغیرها و شاخص‌ها؛ ۵- کاربرد روش‌ها و فنون.

۸. ۶ یافته‌های تحقیق: ارائهٔ نتایج دقیق یافته‌های مهم با رعایت اصول علمی و با استفاده از جداول و نمودارهای لازم.

۸. ۷ بحث و نتیجه‌گیری: شامل آثار و اهمیت یافته‌های پژوهش و یافته‌های پژوهش‌های مشابه دیگر با تأکید بر مغایرت‌ها و علل آن، توضیح قابلیت تعمیم‌پذیری و کاربرد علمی یافته‌ها و ارائهٔ رهنمودهای لازم برای ادامهٔ پژوهش در ارتباط با موضوع، نتیجه‌گیری و توصیه‌ها و پیشنهادهای احتمالی.

۸. ۸ تشکر و قدردانی: قبل از منابع مورد استفاده ارائه شود و از ذکر عناوین دکتر و مهندس خودداری شود.

۹. نحوهٔ ارجاعات: منابع و مآخذ باید به صورت درون‌متنی و همچنین در پایان مقاله ذکر شود.

۹. ۱ ارجاعات در متن مقاله باید به شیوهٔ داخل پرانتز (APA) نسخه ۶ باشد؛ به گونه‌ای که ابتدا نام مؤلف یا مؤلفان، سال انتشار و صفحه ذکر شود. شایان ذکر است که ارجاع به کارهای چاپ شده فقط به زبان فارسی بوده و در اسامی لاتین معادل آن در زیر نویس همان صفحه ارائه شود. به عنوان نمونه: (شکوئی، ۱۳۸۷، ص. ۵۰) یا (وودز، ۲۰۰۵، ص. ۲۷).

۹. ۲ در پایان مقاله، منابع مورد استفاده در متن مقاله، به ترتیب الفبایِ نام خانوادگی نویسنده بر اساس الگوی فهرست نویسی APA تنظیم گردد.

نمونه فارسی:

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بسم الله الرحمن الرحيم

دانشکده ادبیات و علوم انسانی

مجلّهٔ پژوهش و برنامه‌ریزی روستایی

سال پانزدهم، شمارهٔ ۱، زمستان ۱۴۰۴، شمارهٔ پیاپی ۵۲

صاحب امتیاز: دانشگاه فردوسی مشهد

مدیر مسئول: دکتر حمید شایان

سردبیر: دکتر علی‌اکبر عنابستانی

هیئت تحریریه (به ترتیب حروف الفبا) :

کریستوفر برایانت	استاد برنامه‌ریزی روستایی و توسعه (دانشگاه مونترال کانادا)
خدیجه بوزرجمهری	دانشیار جغرافیا و برنامه‌ریزی روستایی (دانشگاه فردوسی مشهد)
سعید پیراسته	دانشیار جغرافیا و مدیریت محیطی (دانشگاه واترلو کانادا)
جعفر جوان	استاد جغرافیای روستایی (دانشگاه فردوسی مشهد)
محمدرضا رضوانی	استاد جغرافیا و برنامه‌ریزی روستایی (دانشگاه تهران)
عبدالرضا رکن‌الدین افتخاری	استاد جغرافیا و برنامه‌ریزی روستایی (دانشگاه تربیت مدرس)
عباس سعیدی	استاد جغرافیای روستایی (دانشگاه شهید بهشتی)
حمید شایان	استاد جغرافیای روستایی (دانشگاه فردوسی مشهد)
خدیجه شکرالله	دانشیار جغرافیا (کالج مسیحی فورمن/پاکستان)
سید اسکندر صیدایی	دانشیار جغرافیا و برنامه‌ریزی روستایی (دانشگاه اصفهان)
علی عسگری	استاد مدیریت بحران (دانشگاه یورک کانادا)
علی‌اکبر عنابستانی	استاد جغرافیای انسانی و آمایش (دانشگاه شهید بهشتی)
آنا فرمینو	استاد جغرافیا و برنامه‌ریزی منطقه‌ای (دانشگاه لیسبون جدید پرتغال)
ماریجا ماسکین	استاد موسسه معماری و شهرسازی و برنامه‌ریزی فضایی صربستان
مجتبی قدیری معصوم	استاد جغرافیای روستایی (دانشگاه تهران)
دو-چول کیم	استاد مدیریت محیط زیست روستایی (دانشگاه اوکایاما ژاپن)
سیدحسن مطیعی لنگرودی	استاد جغرافیای روستایی (دانشگاه تهران)

مقالات نمودار آرای نویسندگان است و به ترتیب وصول و تصویب درج می‌شود.

دستیار سردبیر: مهدی جوانشیری

ویراستار انگلیسی: مرکز ویراستاری ادبیات

مدیر اجرایی: زهرا بنی‌اسد

حروف‌نگاری و صفحه‌آرایی : معصومه ایرانپاک

شمارگان: ۵۰ نسخه

نشانی: مشهد، دانشگاه فردوسی مشهد، دانشکدهٔ ادبیّات و علوم انسانی دکتر علی شریعتی، کد پستی ۹۱۷۷۹۴۸۸۸۳ ، نمابر: ۳۸۷۹۶۸۴۰ (۰۵۱)

بها: داخل کشور: ۲۰۰۰۰۰ ریال (تک‌شماره) خارج کشور: ۲۵ دلار (آمریکا- سالانه)، ۲۰ دلار (سایر کشورها- سالانه)

درگاه الکترونیکی: http://jrrp.um.ac.ir/ E-mail:Rplanning@um.ac.ir

*** این مجله در جلسهٔ کمیسیون بررسی نشریات علمی کشور مورخ ۱۳۹۲/۲/۲۵ رتبهٔ علمی- پژوهشی دریافت و طی نامهٔ شمارهٔ ۳/۱۸/۳۵۷۲۸ در تاریخ ۱۳۹۲/۳/۱۳ ابلاغ گردیده است.**

این مجلّه در پایگاه های زیر نمایه می‌شود:

- **پایگاه استنادی علوم جهان اسلام (ISC)**
- **پایگاه اطلاعات علمی جهاد دانشگاهی (SID)**
- **پایگاه بانک اطلاعات نشریات کشور (Magiran)**
- **فهرست دسترسی آزاد مجلات (Doaj)**
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