Research Paper: Explaining the Renovation Model and Sustainability of Rural Housing, Based on the Vernacular Architecture Elements (Case Study: Sistan Region in the Southeast of Iran

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ABSTRACT

Purpose: This study has been carried out to investigate rural residents' perception of the built environments by vernacular patterns. It aimed to examine major factors in the renovation and rehabilitation of rural housing based on vernacular architectural characteristics based on the recommended conceptual model prepared from related research studies.

Methods: This study is conducted using a questionnaire distributed among 150 residents of three villages: Ghale-Now, Dehnow Piran, and Deh-Arbab. A quantitative approach and documentary and survey methods were used to collect data.

Results: The results show that people consider renovation and rehabilitation as a factor in improving the quality of life. Also, findings show that the top priorities are providing the residents' needed services, improving road conditions, total renovation, and preserving the village's identity. The investigations indicated that providing adequate housing requires a comprehensive and systematic approach to all the quantitative and qualitative dimensions of housing formation. Further, considering villages of the region as a single system and focusing on policy priorities in all three social, economic, and physical dimensions of housing are fundamental. Therefore, if the preservation of sustainable values of vernacular architecture is intended, it is necessary to preserve the basis of vernacular architecture and find solutions only for its problematic components.

Conclusion: presenting adequate housing patterns for the villages of the Sistan region requires inspecting the architecture of housing patterns, especially the typology of rural housing, preparing the principles and standards of good design with sustainable elements and identity formation present in them. Finally, the new achievements of the study on the use of indigenous components in the renovation of vernacular housing in the region include the adaptation of occupancy and living spaces based on improving the environmental quality. In addition, other achievements include changing behaviour and lifestyle habits, improving communication routes by considering the residents' priorities and lifestyle, and the physical manifestation arising from these habits in the recommended conceptual model.

Keywords:
Physical retrofitting, Renovation patterns, Village identity, Rural housing, Sistan region

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1. Introduction

Rural areas have always witnessed changes in housing over time and harmony with social and economic transformations. The changes include shape, pattern, materials, and construction methods. They have led to new rural housing, which is different from the vernacular and traditional patterns and more similar to urban housing patterns than rural ones. This factor contributed to changes in the appearance of housing and the function of space. Subsequently, some spaces have accommodated new positions, and some have lost their operations and have been abandoned. Accordingly, when the main elements of rustic texture (housing) become unstable, it will affect the rural texture (Saidi, 2010: 5).

In Iranian vernacular architecture, practical methods and approaches have always been proposed to provide adequate living conditions in buildings. Different geographical and climatic conditions in this area have persuaded architectures to provide climate and environmental condition adaptation strategies through their inventive principles. A high degree of desirability can be obtained in today's architecture with the combination of these principles and new technologies, as well as in the structure of contemporary architecture while preserving its own identity. From the dawn of history, architectural design has been scrutinized as a solution that protects from natural factors by building a shelter.

Iranian people, especially residents of hot and dry climates, have created mechanisms to cope with extreme weather conditions for several years (Mahmoudi, 2008: 97). utilizing renewable energy such as solar and wind energy has been common in Iran since olden times to moderate the thermal conditions of living spaces. Using these energies in buildings can reduce fuel consumption and, more importantly, improve the quality, comfort, and health of the residential environment (Mir Lotfi et al., 2012: 39). Re-reading of vernacular housing types in villages is often for using the results in development-oriented planning of rural settlements.

Thus, the results of this project should lead to the expansion of an eco-oriented perspective on the rehabilitation and renovation patterns of rural settlements in the country on a large scale and provide an area of a comprehensive attitude toward rural housing (Raheb, 2015: 16). Analysis on vernacular architecture shows that titles such as identity, tradition, and structure have been significant factors in discussion regarding vernacular architecture and its usage in contemporary architecture (Shahbazi & Torabi, 2014: 35). Rural architecture of Iran is functional in terms of nature and its accountability to human needs, public activities, elements of production, and environment forms a homogeneous collection composed with a specific physical identity which manifests communication, functions and the role of multi-functional spaces. This identity originates in villages from the nature of settlement and way of life.

For this reason, housing in villages, in addition to the accountability of the need for housing, providing security, and family privacy includes a production system in villages that is mutually integrated. The existing types of rural housing are apparent examples of this characteristic (Mirriahi & Majidi, 2011).

On the contrary, in the contemporary era, many new technologies related to the construction industry and architecture are the major factors in environmental pollution and lead to human health damage. Thus, emphasizing only new technologies without using old patterns will not architectural structures in all fields. Therefore, it is necessary to correlate former patterns and unique architectural designs with today's needs. Considering this, an attempt is made in this article to investigate and analyze some of the valuable principles, models, and approaches governing the architecture of the southeast region of Iran and to extract the results to use in Iran's contemporary architecture. While emphasizing the valuable identity of vernacular architecture, this research has tried to use what can be extracted from vernacular architecture's structure and use it in contemporary architecture. In other words, the continuity of tradition in concept and design is the primary form of the theoretical foundations of this research. In other words, the variables forming the structure of vernacular architecture and their application in contemporary architecture of the Sistan region are observed for renovation and rehabilitation according to the required standards of this region. Therefore, the questions in the present study we are trying to answer are as follows:

- What are the influential and critical variables in Sistan's formation of rural houses?

- What are the strategies to preserve Sistan's traditional architectural patterns and face challenges head-on in renovating rural housing?

To answer the proposed questions, first, we will review the key concepts of vernacular architecture, rural housing, vernacular architecture of rural housing, and

the renovation concept in rural housing architecture. Then, respecting the role of the concepts, the correlation between rustic housing renovation and vernacular architecture in villages of Sistan will be presented. Thus, the Sistan region's vernacular architecture, especially its original and rural texture, has principles and standards that can be explained and used in future designs, targeted changes, and renovation.

2. Literature Review

Like any other concept, a village can be investigated at different levels. The concept of the village as a living space can be proposed as an external manifestation of human social life. The emergence of a village is in harmony with the formation of a settlement and, subsequently, the construction of living spaces (Raheb, 2007: 106). Different indigenous behavioural patterns can be seen in villages which the way of living, livelihood, climate, the form of settlement, religion, and other factors can influence their formation (Shamseddin et al., 2018: 293).

Housing is also multifaceted, including concepts such as comfort and security, identity expression, and residents' social status. The housing category has a broad and complex concept. Thus, a comprehensive definition cannot be provided. Housing as a physical location is considered a primary household shelter. In this shelter, some of the necessities of households or individuals are provided, namely, sleep, rest, and protection against environmental elements (Ahari, 1998: 7). The concept of housing includes the physical location in addition to the whole residential environment in a way that makes housing more than a shelter. This location provides all the public facilities and services for improving human living conditions; furthermore, it gives its users a long and reliable right of occupancy (Mukomo, 1996: 271). Housing can be considered a part of a cultural system of habitation in which a particular set of activities occur. The people's residential physical environment defines a condition of predictable and continuous behaviours. Rural housing affected by rural living conditions has characteristics that distinguish it from urban housing. Nowadays, rural houses to a large-scale need retrofitting against wear and tear factors and natural disasters, planning for reducing environmental pollution, coordination with climatic conditions, and considering the mental patterns of villagers regarding desirable housing and other effective factors (Aghazadeh, 2014). Compared to different types of architecture, residential architecture clearly clarifies the correlation between physical construction, lifestyle, and sociocultural characteristics. Daily behaviours based on human-environment mutual interactions and sociocultural norms are significant factors in the formation of residential architecture. Vernacular architecture is a collection of works and experiences of people over a long period. Works are scattered all over Iran in urban and rural textures. Vernacular architecture is a set of architectural units gathered on the ground and by its harmonies in shapes, applied plan volumetric, colouring and tones of empty and full surfaces and also in the field of materials and its visible constructions regulations (Falamaki, 2005: 17). vernacular architecture speaks of a distinct local culture; the culture formed by the people in the same place grows and is affected by complex events. But it will be adaptable to the same people with their native culture (Memarian, 2018: 182).

The lack of adequate housing with the relatively required standards is an influential factor in reducing living standards in rural areas and eventually in the migration of villagers to urban areas. Renovation is done when the existing space has a practical function, but the relatively physical wear causes a decrease in its efficiency and productivity (Habibi & Maghsoudi, 2020). Economic and social empowerment, physical renovation, and capacity-building for employment have been the basis of these renovations.

The rural housing rehabilitation plan was first established in 1995 by the Housing Foundation of Islamic Revolution to improve housing quality, safety, health, welfare, and comfort in rural housing. This plan could create a sense of place, maintain household density, improve the visual landscape of the village, retrofit the housing, and altogether rehabilitate rural living. However, it was faced with many ups and downs, as well as administrative and executive barriers. In order to accelerate the implementation process of rural housing rehabilitation and achieve the goals of this plan and gain valuable experience as well as detect the weaknesses and deficiencies of the past years, in 2005, the guardian council approved the rural housing rehabilitation plan. This plan attempts to retrofit the dwellings with non-durable materials in villages all over the country and afterwards build 200,000 rural homes annually (Housing Foundation of Islamic Revolution, 2016: 2).

Based on the points mentioned above, villages look like a family of houses, all of which show common habits despite having no similar appearance. Housing is one of the essential needs of rural households. Adequate housing brings security and social welfare to rural households. In today's world, rural areas face more deprivation in terms of housing compared with urban

areas. Moreover, this issue reduces the social stability of these areas and is considered a significant factor in rural-urban migration. Rostami et al. (2021), in a study titled "Analysis of the role of livelihoods in the form of rural settlements in coastal areas of Bandar Abbas city", found that rural housing is the manifestation of lifestyle, livelihoods, and ultimately the forces and factors influencing the environment and socio-economic trends. The present study assumes the necessity of intervention in the rural housing plan. It seeks to evaluate factors influencing rustic housing plans and the reflection of such factors in this type of architecture under the title of rural housing aspects. Additionally, it presents new elements of rural housing by summarizing and completing previous studies. Similar studies in this field have also been conducted, which are discussed below:

Mousavi and Salehi (2005), in a study titled "Examining the social dimension of a traditional and new model in rural houses", compared the vernacular pattern of rural housing with its new design, and it was found that cultural values and economic characteristics are important factors in the formation of rural houses which influences the people's way of living.

Fazelniya et al. (2011), in a study titled "Investigation of the rural vernacular pattern of physical development of Tambaka village of Zabol on the contrary windy sands", suggests that the places of the village's new texture, designed with local standards were more harmonic with the sand flow.

Seydayi et al. (2015), in an article titled "Investigating physical changes and new housing spaces in village-towns (Case study: Deh Cheshmeh village; Farsan county)", point out that the morphology of rural settlements results from a historical process of the influences given and received on several factors besides spatial-local elements such as natural-ecological, socio-economic, cultural, etc.

Fazelniya et al. (2016), in another study titled "The investigation of the effect of housing pattern's changes in village-towns (Case study: village-town of Mohammad Abad of Zabol city)" found that weather conditions lead to different patterns of housing construction. Therefore, using other patterns in housing construction cause an increase in energy consumption and a decrease in residents' comfort.

Franklyn (2006), in a book titled "Housing Transformation", claims that housing changes in villages and cities are related to the culture, economic, and political conditions in addition to consumers' interests.

Ozgur Gocer et al. (2021), in an article titled "Rural gentrification of the ancient city of Asos (Bahramkaleh) in Turkey)" concluded that encouraging investment in vernacular housing renovation by preserving the original characteristics of abandoned traditional buildings can maintain the local community and lead to sustainable development in this region.

Jin Tao and Quing Wang (2014) in a study titled "Co-evolution: A model for the renovation of traditional villages in the urban fringe of Guangzhou, China", suggested a model for revival, regeneration, and renovation. This model includes protecting cultural heritage and vernacular architecture, maintaining social networks, eliminating hidden social danger, and creating new employment opportunities. Shipai village was considered a good case for explaining the active model. The major achievements of this model led to the following objectives:

1. Protecting cultural heritage (traditional and vernacular architecture)

2. Achieving land value appreciation, enhancing the skills of villagers, and building low-cost housing with vernacular patterns based on cultural and behavioural studies for the villagers and even the migrants.

Many studies have been carried out on rural housing and its evolution. Their results, such as preserving the original characteristics of vernacular architecture, renovation, providing adequate housing, and changes in the housing pattern, align with the present research. However, the study of using indigenous components in housing renovation and intervention in changes and rehabilitation has received little attention.

3. Methodology

The present study is descriptive-analytic research. Thus, after reviewing the related theoretical framework of the topic, library research is used, providing background information. It is a comparative study in terms of purpose because a judgment is made by examining the existing conditions and a specific set of rules and standards. Field study (field method) through observation to comprehend the dominant patterns of Sistan as well as the renovated texture and a questionnaire to understand the opinion of the residents about the vernacular patterns required for the transformation in new constructions are

used as research tools. We used the Sampling Cohran formula to estimate sample size for qualitative variables. The statistical population of this research consists of the households of the Ghale-Now, Dehnow Piran, and Deh-Arbab villages (Figures 1 and 2). One hundred fifty questionnaires were prepared and completed in the target population (rural areas of Sistan). The Likert scale did the rating scale of the questionnaire. Significant tests with different variables and SPSS software were used for hypothesis testing. The correlational method was employed to study the relationship between rural housing and indigenous architectural components in the field of data analysis.

The geographic location of the three villages:

Ghale-Now village: Ghale-Now is a village in Jazinak district, Zehak county, and is one of the 9000 villages of Sistan and Baluchestan province, located about 64 kilometres from the Zabol route and Jazinak three-way junction. Ghale-Now is the only village in the Sistan region in which all its houses' architecture is old and is built from clay. And due to its type of architecture, is known as Iran's southeast Masuleh.

Deh-Arbab village is located 10 kilometres from the centre of Zabol province and five kilometres from the centre of Bonjar district. It is bordered to the north by Aghajan village, to the south by Eskel village, to the west by Emamieh village, and the east by Deh-e Mardeh. The architecture of Deh-Arbab village is derived from the region's environmental conditions and is formed from clay with the same dominant style of the region's villages.

Dehnow Piran village is a village in Adimi district, the centre part of Nimroz city, Sistan province. It is located 8.5 kilometres southwest of Zabol and four kilometres northwest of Aliabad in plain lands. Using more traditional materials, including water, mud, and clay, can be seen in the housing architecture of this village.

The reasons why these three villages were chosen were that they had criteria of research in data collection, including:

1. Physical rehabilitation was done based on the vernacular patterns of the region regarding the basic needs of the village's residents.

2. Rural residents' understanding of the new environment and similar architectural features as well as access to these three villages.

The architecture of Sistan has had a unique identity over time and less fluctuation. The architecture of Sistan is derived from the climatic conditions of this region. Due to its geographical location, it has always faced the drought phenomenon, destabilizing all Sistan villages' economic fundamentals. The issues of poverty among the villagers in Sistan affect the dimensions and size of their living spaces. Thus, the square footage of vernacular housing is very small. Most Sistan houses are made of vernacular materials, including water, mud, and clay, which retain their heat and cold. In all the villages of this area, simple and cheap houses can be seen with high fence panels and single-arched and vestibule entryways to provide a high level of privacy and security in the inner space and yard of the house (Figure 3).

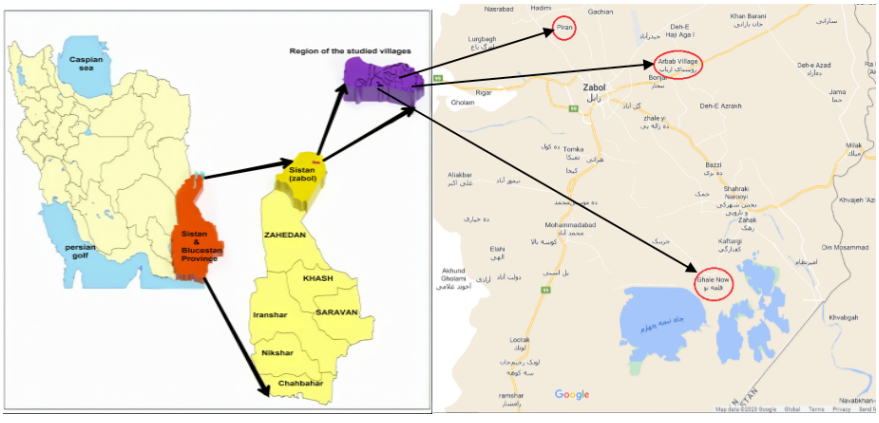


Figure 1. Map of the study area

Figure 2. Images of the renovation of the under-study villages of Ghale-Now (Housing Foundation of Islamic Revolution, 2016).

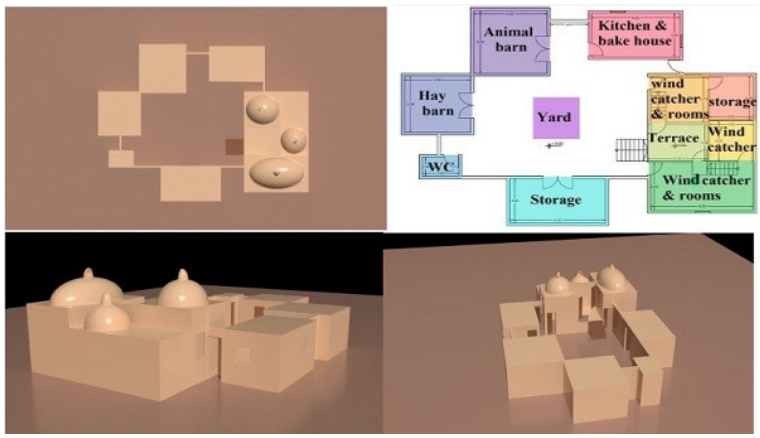


Figure 3. Planning and modelling sample of Sistan's houses

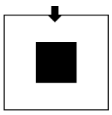
The residential texture of the villages in Sistan is very dense. The roof of these regions' buildings is doom and has a barrel vault design. In the architecture of Sistan, L-shapes and linear programs are the major house plan. Rooms are located in the corners of the yard and are only accessible through the yard. In some buildings, a U-shape plan is designed. In such a case, rooms are located around the central courtyard.

Moreover, there is a space in the Sistan region, like a porch working as a separating filter. This space is used as a rest, sleep, and workspace, as well as a space division. The local name of this porch-like space is "one bend and two earrings". The porch is known as bend, and two adjacent rooms as earrings. The dominant patterns in Sistan's architecture are examined in Table 1.

In this region, passage orientation is based on the wind direction to transport the sands. In the narrow passages with the surrounding tall buildings, the wind flow increases, which can irritate. Moreover, structures are perpendicular to the wind direction, accumulating sand in the passages and behind the walls. Such cases can hardly be seen in vernacular architecture. Many houses in Sistan are built in the northwestern and southeastern and even on north-southern fronts. Short buildings are generally built in this region, and the height restriction of buildings on both sides of the passages prevents the formation of wind tunnels on routes in the direction of the wind. The wind of 120 days of Sistan often blows from the northwest to the southeast and carries abrasive sand particles. Houses are generally built in the northwest-southeast direction to be protected against wind-blown sands. Moreover, windcatchers are placed at the top of homes parallel to the 120-day wind to create cross ventilation resulting in fresh air entering the house. For the above reasons, "Koulak"[1], "Sourak" 6, "Dorche" 6, and "Kharkhaneh" 6 are embedded in dwellings.

1. Indigenous elements of Sistan local architecture.

Table 1. The dominant patterns of Sistan's architecture

Name of the pattern	Physical manifestation	Descriptive representations	Formation reason	Row
Having Dakon-cheh		Spatial separation on two different fronts Placement of livestock living space in the opposite direction of the wind	Livestock and human living space	1
Having belvedere		Creating a roofless enclosed space between rooms Living space on the top floor and livestock on the bottom floor		
Primary cell		Presence of single cell in space	Following the archaic form of housing in the region	2
Linear		Placements of rooms in a row Vast open space Seen in villages with connected texture	Utilizing wind energy	3
L-shaped		The linear pattern became more complete Shorter flange with entertainment use	A more favourable economic condition	4
U-shaped		A more comprehensive sample than previous ones Northern fronts close to the walkway Southern fronts close to open space The existence of a porch for interior ventilation	Position of the open space compared to closed space	5
Courtyard		Introvert architecture Wind ventilation Used in villages with dense texture the level difference in shell for shading	Climate	6
Kiosk pavilion		Import architecture Enclosed plan in a courtyard with tall walls Entering the building through a porch from the southern front	Social class	7

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4. Findings

The investigations show that providing adequate housing requires a comprehensive and systematic approach to all the quantitative and qualitative dimensions of housing. Thus, the formation of the rural settlement texture of Sistan and Baluchestan province is a coordinated set of social, economic, geographical, and physical elements such as residential, religious and cultural, educational and health, service, and road network. Considering the villages of this region as a single system and focusing on policy priorities in all three social, economic, and physical dimensions of housing is of fundamental importance. It is noted that the basis of the investigation and Analysis of this research is the current situation of rural housing formed mainly by the vernacular patterns. Therefore, if the preservation of sustainable values of vernacular architecture is intended, it is necessary to preserve the basis of vernacular architecture and find solutions only for its complex components.

On the other hand, to achieve new technology and consideration of structure, strength, and stability, it is necessary to pay attention to policy priorities such as adaptation to climate, provision of livelihood spaces, use of natural energy sources, etc. Presenting adequate housing patterns for the villages of this province requires inspecting the architecture of housing patterns to prepare the principle and standards of good design with the inspiration from sustainable elements and identity formation present in them. Studying the related sources of the undertaken issue, we can divide the components of hous-

ing renovation into four categories: social, economic, physical, and environmental. The issue is presented in Figure 4.

Valuation of data, indicators and rural housing profiles indicate the different housing situations of the provinces. The differences in various regions are to such an extent that they can be classified into four degrees in terms of alliance (Sartipipor, 2005). In comparison with other provinces, Sistan and Baluchestan placed in the fourth group regarding all leading indicators. This classification is done by relative comparison of provinces[2]. To analyze the policy-making for solving the problems of the four main dimensions of rural housing, the resident's point of view is necessary for the priorities of policy renovations. The residents filled out a questionnaire based on their life experiences in this region to extract the transferable components from vernacular architecture to the renovated and rehabilitated environments and to increase the desirability of this product. In this study, out of 150 questionnaires, 80% of the respondent were men, and 20% were women. Among the respondents, 70% of them considered renovation and rehabilitation as a factor in improving life quality (Table 2).

Moreover, the responses show that the major problem of the residents of these villages has been poor facilities, insufficient space, and social and cultural issues (Table 3).

Investigation through the questionnaire shows that people's view in the most approaches for prioritizing the solutions to these problems was improving road conditions, providing the residents' needed services, homogeneity of village texture, and renovation. The findings emphasized that residents' attitudes, preservation of the village's identity, and turning to indigenous issues should be placed at the top of the actions. Moreover, they argued that the primary reason for the migration of villagers to urban areas is poor living standards in rural areas.

2. Grading provinces in rural housing is based on the indicators for prioritizing renovations in which Sistan province is placed in the fourth group: "Rural housing rehabilitation plan, 1995".

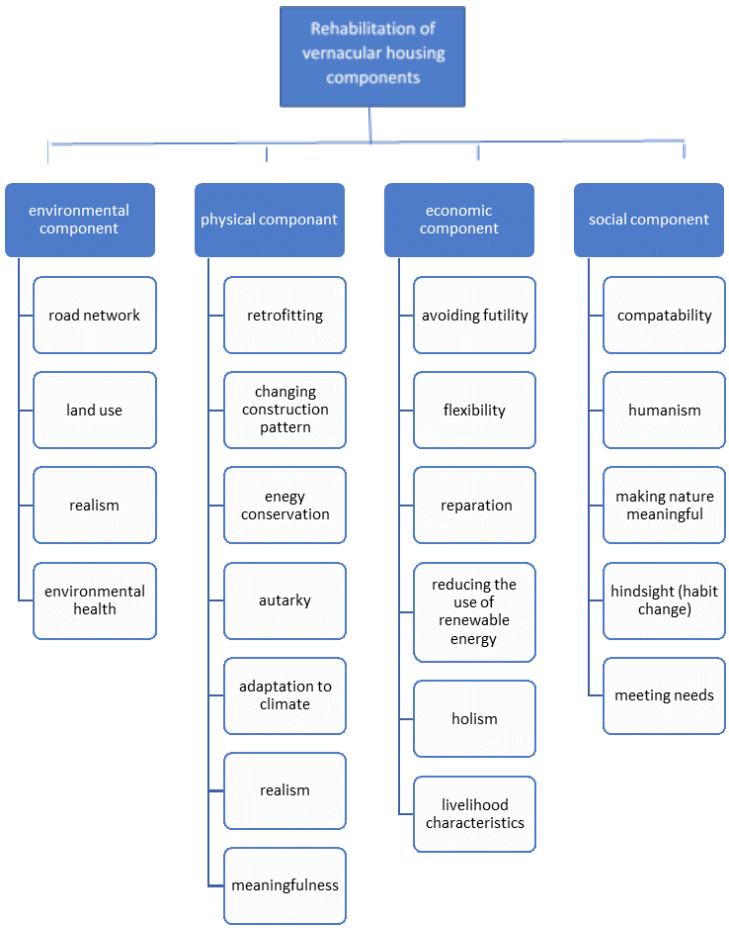

Figure 4. The conceptuComponents of rural housing renovation. Source: Pirniya (1997 a), Memarian (2018 b), Sartipipor (2005), Rostami et al. (2021)

Table 2. Frequency distribution of respondents based on the effects of renovation and rehabilitation on housing quality

Cumulative frequency percentage	Per cent	Frequency	The effect of renovation and rehabilitation on housing quality	Row
50	50	75	Very much	1
70	20	30	Much	2
100	30	45	To some extent	3
100	0	0	Slightly	4
100	0	0	Very little	5
100	100	150	total	6

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Table 3. Frequency distribution of respondents based on residential problems

Cumulative frequency percentage	Per cent	Frequency	Residential problems	Row
10	10	15	Poor lateral communication routes and orientation between houses and basic needs	1
20	10	15	Abandoned and dilapidated houses in the rural texture	2
50	30	45	The poor operation, thermal comfort, and facilities	3
70	20	30	Social, cultural, and security issues	4
80	10	15	Lack of basic needs	5
100	20	30	Poor services and poor use of education, green space, etc	6
100	100	150	total	7

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5. Discussion

The combination of livelihood and physical housing is one of the differences between rural housing and urban housing. Part of the rural households' economic activities is performed in the physical aspect of housing which leads to combined living spaces. Evaluating the economy and livelihood is of utmost importance for presenting a comprehensive image of rural housing. The investigations indicated that providing adequate housing requires a comprehensive and systematic approach to all the quantitative and qualitative dimensions of housing formation. Further, considering villages of the region as a single system and focusing on policy priorities in all three social, economic, and physical dimensions of housing are fundamental. The rural housing of the province follows the vernacular housing pattern; thus, preserving sustainable values of vernacular housing requires inspection. It is necessary to protect the basis of vernacular architecture and find solutions only for its complex components. An approach to the vernacular housing pattern for the preservation of sustainable values of rural housing requires the utilization of new technology, maintenance of the structure, strength stability of the construction, adaptation to climate, providing livelihood spaces, and use of natural energy sources. Presenting good housing patterns for the villages of the province requires inspecting the architecture of housing patterns, especially the typology of rural housing, and preparing the principle and standards of good design with the inspiration from sustainable elements and identity formation present in them.

Investigation into the renovation of the three villages: Ghale-Now, Dehnow Piran, and Deh-Arbab, shows that the value of vernacular architecture has drastically decreased. Ignoring the vernacular architecture approach leads to the renovated houses being designed with the psychology of the urban designers, which is a far-fetched psychology because of a villager. These mismatches are mainly seen in village and road texture, occupancy, and living spaces in everyday life. Meeting the needs in the social category, holism in the economic category, adaptation to climate, and providing thermal comfort in the cat-

egory of physical components, and a good road network, as well as tenure-responsive land use for residents, were the most important factors in which residents insisted on its continuity in vernacular architecture for their housing renovation. In this case, the challenges facing housing renovation include the following:

Rural individuals will be forced to change their behaviour patterns due to a lack of confidence in their culture and gradually lose their indigenous culture and identity.

The individual begins to make changes in the renovated dwellings, and sometimes these changes are not only in the physical aspects but also in social and cultural fields and cause many problems. The person cannot adapt to the new pattern.

Sometimes, the individual decides to leave the renovated space and return to their former dwelling. This return can be permanent or temporary.

In short, the new achievements of the study on the use of indigenous components in the renovation of vernacular housing in the region include the adaptation of occupancy and living spaces based on improving the environmental quality. In addition, other achievements include changing behaviour and lifestyle habits, enhancing communication routes by considering the residents' priorities and lifestyle, and the physical manifestation arising from these habits in the recommended conceptual model.

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Conflict of Interest

The authors declared no conflicts of interest.

References

Aghazadeh, A. (2014). Worn-out urban texture: challenges and solutions for achieving sustainable urban development in physical dimensions (Case study: Rasht city). 2nd international congress of structure, architecture, and urban development.

Ahari, Z. (1988). Minimum housing. Ministry of Housing and Urban Development Research Center Building and Center, Tehran.

Falamaki, M. M. (2005). Vernacular Architecture, Tehran: Space Science and Culture Institute, Third Edition.

Fazelniya, GH., kiyani, A., Khosravi, A.M., & Bandani, M. (2011). Investigation of the rural vernacular pattern of physical development of Tambaka village of Zabol on the contrary windy sands, Journal of housing and environment, No. 136, 3-16.

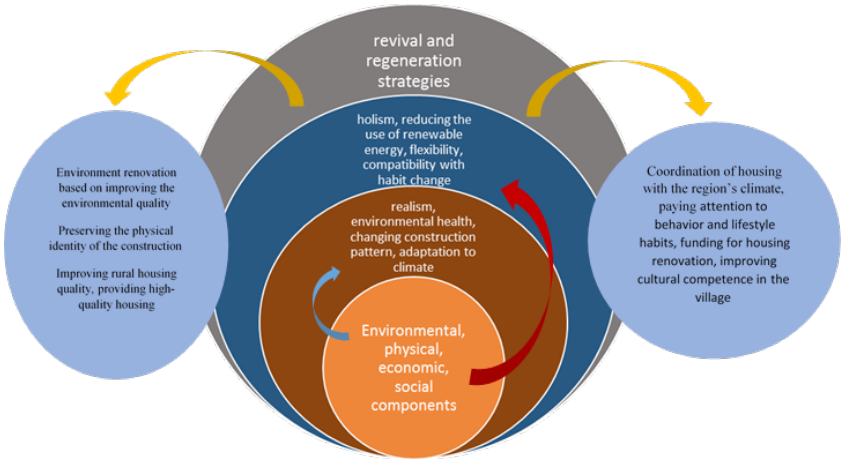

Figure 5. The conceptual model of the renovation of vernacular housing strategies in the Sistan region.

Fazelniya, GH., Taghdisi, A., & Mollanorozi, M. (2016). The investigation of the effect of housing pattern's changes in village-towns (Case study: village-town of Mohammad Abad of Zabol city), journal of geographical space, 16(53), 151-172.

Franklin, Bridget (2006). "Housing Transformation", London, Routledge Great Britain.

Gocer Ozgur (2021). "Rural gentrification of the ancient city of Assos (Behramkale) in Turkey". Journal of Rural Studies. pp 146-159 .https://www.sciencedirect.com/science/article/abs/pii/S074301672100276X?dgcid=rss_sd_all

Habibi, M., & Maghsodi, M. (2020). Urban Conservation, the University of Tehran Press.

Housing Foundation of Islamic Revolution. (2016). A comprehensive plan of housing, analytical document; Ministry of Roads and Urban Development, Tehran.

Jin Tao & Qing Wang (2014). Journal of Asian Architecture and Building Engineering, to link this article: https://www.tandfonline.com/doi/abs/10.3130/jaabe.13.555.

Mahmoudi, M., & Mofidi, S.M. (2008). Analysis on typology and architecture of wind catcher and find the best type, Fine Arts, No. 36, Tehran.

Memarian, GH. (2018). A survey in the theoretical foundation of architecture, Soroush Danesh Publications, Tehran.

Mir Lotfi, A., et al. (2012). The comparative study of the geographical directions of rural housing and energy consumption in Sistan, housing and village environment, No.138.

Mirriahi, S., & Majidi, R. (2011). The process of formation of the structure of the Sangan village (Tehran province), housing and village environment, No. 134, 105-116.

Mosavi, A.B.B., & Salehi, F. (2005). Examining the social dimension of a traditional and new model in rural houses, journal of housing and revolution, No. 112.

Mukomo. S. (1996). sustainable urban development in sub-Saharan Africa, cities. pp 263-271.

Oveisi Keikha, Z., Kavosh, H., Heidari, A., & Davtalab, J. (2020). A typology of Sistan's vernacular housing in terms of open and closed space formation. Journal of housing and rural environment, 39(171), 61-72.

Pirnia, K.M., & Memarian, GH. (1997). Introduction to Islamic Architecture of Iran, Soroush Danesh Publications, Tehran

Pirnia, K.M., & Memarian, GH. (1997). The style of Iranian architecture, Soroush Danesh Publications, Tehran

Raheb, GH. (2007). Pondering over the Concept of Village, 33(41), 105-116.

Raheb, GH. (2015). Analysis of the Concept of Typology in Vernacular Architecture to Categorize Rural Housing Types in Iran, housing and rural environment, No. 150.

Rostami, S., Heydari, K.A., & Piyastegar, Y. (2020). Analysis of the role of livelihoods in the form of rural settlements (Case study: Bustano village of Bandar Abbas city), 11(42), 204-219.

Saidi, A. (2010). Environment, Space, and Development a Discussion on Urgent Integrated Rural-Urban Development, Journal of housing and rural environment, 131, Tehran.

Sartipipour, M. (2005). Rural Housing Indicators of Iran, Journal of fine arts, (22), 43-52.

Sartipipour, M. (2009). An Analyctical Review of Rural Housing in Iran, Soffeh journal, No. 49, Tehran.

Seydayi, E., Sadeghi H., & Fadayi, M. (2015). Investigating physical changes and new housing spaces in village-towns (Case study: Deh Cheshmeh village; Farsan county), journal of studies of human settlements planning 10(33), 77.

Shahbazi, M., & Torabi, Z. (2014). The Comparative Study of Reinterpretation and Requalification of Tradition in the Contemporary Architecture of Iran and Europe, No. 19.

Shamseddin, B., Shahcheraghi, A., & Majedi, H. (2018). The Place of Behavioral Patterns of Villagers in the Method of Village Physical Renovation, 9(4), 203-289.