



## **An Analysis of the Spatial Reflection of Rural Housing Reconstruction after an Earthquake (Case Study: Sina Dehestan of Varzeghan County)**

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### **Abstract**

**Purpose:** The aim of this study was to analyze the spatial reflection rural housing reconstruction after the earthquake in Sinai district located in the Varzeghan county aspects of infrastructure-related, social, cultural and health treatment.

**Design/methodology/approach:** This study is a descriptive and analytical. The data collection was in the library field. In the field, the questionnaire is used. The sample size was 300 and the sampling method is simple random sampling. The validity of the questionnaire was evaluated based on the validity and reliability of the Guttman coefficient (split-half) which is equal to 955/0 and show the reliability of the questionnaire.

**Finding:** After assuring the goodness of fitting the designed model, the standardized load factor test indicates that the measuring instrument has very good validation tools and shows that the coefficients and chi-square ratio are relative to the degree of freedom that has strong correlation, the relationships between hidden variables together and the relationship of obvious variables; Investigating T values of the obvious variables shows that the Infrastructure Index has the most impact on the renovation of rural housing. Which has the most effective coefficients in this case, the variables of "gas supply", "water distribution", and "transport communication network". Finally, the covariance matrix of the independent variables of the research indicates that the path estimates between all the infrastructural, cultural, social, health and physical variables are acceptable and acceptable at the upper limit. In fact, the proposed model can be proposed as a useful tool for reflecting the spatial renovation of rural housing in general, the renovation of rural housing after the earthquake in the Sina village of Varzeghan has caused the infrastructure index to have the highest spatial reflection.

**Research limitations/implications:** The study population dispersion and trouble completing the questionnaires, as well as the lack of necessary resources on SEM and LISREL software.

**Originality/value:** research innovation combined two important issues the village, housing "and" disaster "and interpret the results using a combination of software LISREL structural equations and multivariable regression analysis using software SPSS.

**Keywords:** Modernization of housing, spatial reflection, seismic, structural equation, Varzeghan.

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## 1. Introduction

Housing is one of the geographical phenomena which, first and foremost, is affected by the natural and human conditions of the surrounding environment and the activities carried out therein; This means that housing is formed as a result of the relationship between man and his surroundings, and as a result of the occupation of space and the placement and deployment of the environment, it is now embraced in the field of geographic studies. Accordingly, the establishment of solidarity, the linkage and the logical order between the natural, social, economic and housing factors and, in general, the creation of a reasonable and proportionate relationship among the various elements and elements affecting the housing, is in the field of geography (Zaheri, 2009). Along with the housing and rural housing architecture, it is proposed to renovate and improve rural housing. It is worth mentioning that this plan was started by the [Islamic Revolutionary Housing Foundation](#) in 1995 to improve the quality of housing and rural texture and promote the level of safety, health, well-being, and comfort of rural housing. This important element, combined with the provision of facilities and infrastructure, made it possible to create a sense of belonging to the site, preserving the population density of the household, improving the visual image and the village landscape, rehabilitating housing and, consequently, improving rural life. However, it was faced with many ups and downs and administrative problems, but in order to accelerate the implementation of rural housing improvement and achieving the goals of this plan, and in light of the valuable experiences and identifying the weaknesses and deficits of past years, a special scheme for rural housing improvement in year 2005 was approved by the cabinet of ministers and approved by the government. Based on this plan, the rehabilitation of low-durable residential buildings in the villages of the whole country will be carried out, and 200,000 rural residential units will be built annually, and during the two five-year plans of the government, two million rural housing units will be retrofitted ([Revolution Housing Foundation Islam, 2004](#)). Rural housing as a part of the spatial system of the village has certain characteristics that have already been exposed to change due to the expansion of civil activities. The

housing renovation project is also one of the projects that have played a clear and tangible role in changing its space and evolving its functions. Changing that time and place will be more tangible, which is another factor in accelerating the process of this scheme, which in this case leads to the overall disturbance of the plan and affects its elements from time to time and in terms of urgency. The result is that it will change the integrity, order, and hierarchy of the village and because the elements of the village are in crisis due to the occurrence of unexpected incidents, so they are not happy with each other, the high correlation coefficient and its shape and nature, and the spatial reflection of this change, will change the natural landscape of the village so this change can create a new face in space from a social, cultural, infrastructure, physical and health perspective. The secondary cause, due to its accelerated and accelerated modernization, is the occurrence of natural hazards, including earthquakes, causing damage to physical and physical infrastructure, and renovation of housing as an urgent and with better and different facilities and facilities, in command the reflection of the space resulting from these changes accelerates the transformation of the face of rural space.

In the past half century, we have witnessed a major change in the image of the country's villages, most of which are related to their residential architecture. When faced with new faces of the places that remain behind the role of their history in the memory, constantly asking questions about why "the face of the countryside has changed so rapidly?", "Do not do anything to keep the traditional appearance of the villages? ", "What has caused this change, and is it necessary for all this change? " Questions of such a kind that are fundamentally in the face of rapid changes in the countryside are disturbing us ([Anabestani, Anzaie & Behzadi, 2016](#)). One of the basic problems of rural houses in the country is the low quality in terms of construction methods and the building materials. These are the main problems of the vulnerability of rural buildings to natural disasters, such as floods and earthquakes, on the one hand, and landslides and landslides on the other ([Shahbazi, 2010](#)); Therefore, recognizing the elements of elements and factors that are effective and effective in the environment is a prerequisite and precondition for any human thought

(Makhdoum, 2006). One of the most important factors affecting the physical-spatial dimension of rural settlements of the country is performing construction projects executed by the public sector in rural settlements. The desirable effectiveness of these designs has always been one of the main concerns of their executives (Darvishi, Azizpour, Rahmani Fazli & Beyranvandzadeh, 2013). Village imagery is a manifestation of the internal and external relations between rural settlements. This set of elements and components with its own systematic characteristics adheres to the general rules of the settlement system, which provides a change in each component, the field of transformation of other components. It suggests that changing the rural system that it can have a pleasant or unpleasant reflection of space. Such changes are realized during different time-space trends, hence, rural communities have spatial nature; Understanding the housing and texture and the rural system depends on how to reflect the in space. All the political, social, and economic changes cause spatial changes in the villages that affect other fields of the lives of residents. One of the plans to improve the physical condition of villages in the country is to implement the Housing Renovation Plan, which is most often implemented in the context of the rural conduct scheme but in the studied area, the earthquake has accelerated and intensified housing renovation over the last two years.

The occurrence of accidental incidents, including earthquakes, has led authorities to focus on the improvement and safety of residential units against natural disasters. The rural areas of Varzaghan city were paid attention to, for renovation of rural housing, after the earthquake that occurred on the evening of October, 2013, at a magnitude of 6.2 (which, in addition to killing and injuring a number of people in the area, resulted in a loss of one hundred percent of the 6,000 residential units). What the authors have done to investigate this is that after rebuilding and renovating some 44,000 rural residential units, the shape of the villages has changed, and in the process of modernization in the form of easy loans, in addition to changing the type of villages, developments and the social, cultural and economic changes have reflected in the rural environment. The purpose of this study is to investigate and analyze these reflections arising from the process of housing renovation in the

region under study, seeking the answer to the following question from the villagers themselves: *"What has been the reflection of the housing renovation in the villages of Sina village regarding the infrastructure, communication, social, cultural and health-therapeutic aspects?"*

## 2. Research Theoretical Literature

Housing is one of the main and most important topics in the collection of economic, demographic and social studies. The lack of accountability and lack of understanding of this important issue can bring irreversible impact on society as a whole. At the moment, housing is a global issue and different countries face housing problems (Gallant, Shucksmith, & Tewdwr, 2003). Housing is, however, a major factor in the socialization of individuals towards the world and a decisive commodity in the social organization of space, which plays a decisive role in shaping individual identities, social relationships, and collective goals (Short, 2006). Proper housing is an indicator of the general welfare of the community, and undesirable housing leads to harmful consequences, such as illness, neglect, and youth corruption (Rangwala, 1998). In fact, the existence of suitable housing responds to the basic needs of humans and improves the quality of human life (Maliene & Naglis, 2008). According to Le Corbusier, both the physical and mental needs of man must be answered by organizing spatial housing (Boshagh et al., 2013; quoted by Yagi, 1987). Space is also the objectivity of the role and effect of human beings and individuals in the place or, in other words, the outcome of the interactions between the two natural, ecological and socioeconomic environments (Saeidi, 2010). In other words, structures in rural settlements, whether private or public, are affected by a diverse and complex set of environmental factors, livelihoods, social interactions, beliefs and rituals. The geographical outlook of the countryside and the city can be considered as the most sensitive phenomena arising from the linkage of thought and thinking of the place. Urban and rural spheres, and in other words, geographic outlooks are locative spatial spaces that crystallize the intellectual capacities according to the time conditions in their structure and function. In fact, functional and structural features of biological fields are manifested through the influence of theories and paradigms derived from human thought (Azizpour, 2016). The

physical characteristics of villages are formed by the influence of two general groups of factors related to the environment or nature and man. The rural housing architecture is connected with issues related to the natural environment, the type of livelihoods and the form of production, the evolution of social life, and rural technical power. On the other hand, artistic taste, social standards, family and kinship foundations, traditions and beliefs have given them a new and special design on rural architecture (Ghateyi & Kabiri, 2016). However, rural communities in Iran have long been faced with the phenomenon of modernization. This confrontation was initially very slow, but it always proceeded in a dialectical way between tradition and modernism; it has been stable in the four Qajar periods, the first Pahlavi, the second Pahlavi, and the Islamic Republic (Rouzi Bidgoli, 2003). The improvement of housing means structural improvements so that their behavior improves against increased forces such as environmental hazards that this does not necessarily occur with increasing building resistance, in other words, improving the quality of buildings that are short or very weak and vulnerable, in terms of materials. Housing renovation also means renovating buildings that cannot be retrofitted and refurbished, which in many cases modernizes rural housing (Bakhshi & Motiei Langroudi, 2009). Planning for renewal and upgrading, considering the concepts, variables and indexes, to look at the physical-spatial organization, taking into account the geographic area of the target, and providing the material and spiritual well-being of the stakeholders by creating a better, more favorable and healthier environment. Today, the expansion and complexity of social life issues and the increasing needs and awareness of other societies have increased the expectations of people for a better life. According to these factors, planning and modernization can be divided into several stages: Purposefulness, predictive analysis and retrofitting, evaluation, systematicity, the innovation of ability to adapt to the conditions, and harmony (Shamaei & Pourahmad, 2006). Therefore, recognizing the village, rural housing, and the features that govern it shows that rural life has the unique features that have shaped the special tradition in housing construction. Therefore, any planning for this process must be shaped in the context of this tradition and the logic governing it.

The main focus of the approaches to build rural housing should be focused on preserving the indigenous continuity of construction, emphasizing the demands and needs of residents, and defining the boundaries of responsibility and defining the responsibility of residents in construction (Raheb, 2013). Housing as a shelter and residence is one of the basic needs of human societies whose constructive elements have been influenced simultaneously by the natural environment, living standards and social relationships and the culture of the community in question. This effect of the environmental and ecological conditions in the buildings, and dwellings of the rural areas is very tangible in such a way that not only the form and the type of building and building materials, but also the way of locating the houses, and each of its components and annexes are determined to fit the function of each settlement. Thus, based on the system's attitude, the cognitive-functional functioning of each of the elements and components of housing, it creates a link that acts as a dynamic system and gives a special identity to rural dwellings, ultimately in the overall context and the outlook of the settlements It manifests itself (Salahi Isfahani, Mirzaali & Sadin, 2017). The history of measures to improve the physical texture of rural housing in Iran is not long. The first time it was launched in 1982, the design was titled "Rural Rehabilitation Plan for Villages". The reflection of the physical changes of the project in the villages of the region was so widespread that it attracted the attention of many officials and paved the way for its development. In this regard, the government was obliged to submit a bill to parliament in order to improve the villages and rebuild them in order to provide health services, cultural, industrial and production facilities. Then, in 1362, "A comprehensive plan for the improvement of 59 villages over 500 households" was developed (Rezvani, 2011). Looking at development plans after the Islamic Revolution, we realize that in the first post-revolution development plan, it was anticipated that the preparation and implementation of conducting plans, the assignment of land for the construction of rural housing, and the repayment and repair of buildings. In the second program, the forecast was foreseen to construct 612 thousand residential units free of charge and 374 thousand units supported by bank



facilities and immunization of 500 thousand rural residential units. In the third plan, in addition to the construction and renovation, the revitalization of the body tissues of the villages was the new action. The fourth plan, inspired by the Long-term Development Outlook document, announced the major goals of rural housing development, which included immunization, rehabilitation, comprehensive housing plans, and so on. This program has had a significant upsurge in terms of development (Sartipipour, 2006; Rezvani, 2011). Despite modernization policies in development programs, an important part of the renovation and improvement of rural housing in the country is devoted to the reconstruction of damaged areas, which is assigned to the **Housing Foundation of the Islamic Revolution**. In this regard, the Housing Foundation has put in place its own legal obligations to deal with natural disasters, has implemented its pre-disaster prevention operations through the implementation of a special plan for the upgrading and renovation of vulnerable rural settlements as well as reconstruction of disaster areas. Policies and plans for rehabilitation of damaged areas in the area of rural renovation have

changed the structure, spatial problems and roles of rural areas and environments, which have been reflected in road, settlement, occupation, adverb, and eventually environment. In the study area, this point is reflected in a large number of factors due to various factors such as the hurry in the reconstruction and the absence of local experts and the implementation of certain headquarters of the surrounding provinces, the proximity to the cold season, the inconsistency of the reconstruction headquarters and the foundation, and many other factors. The present study will examine these issues.

In the field of housing and architecture, renovation of housing, numerous articles and books have been published in various fields and even in the case of earthquakes and the dangers resulting from it, extensive articles have been included in the books, journals, and other scientific activities. However, there has not been much work in connection with the topic under study. Nevertheless, in **Table 1**, due to the importance of the topic, some works are presented that are similar to the present study to some extent.

**Table 1. Review the theoretical background of the research**

References: Research findings, 2016

Researcher	Type of research	Research title	Research results
Bromberger (1991)	Book	Housing and architecture in the rural community of Gilan	Investigates the housing and architecture of Gilan's homes and points out that building housing in the area should be responding to a set of requirements that imposes a highly undesirable biomedical environment.
Taleb (1996)	Book	Housing and Rural Housing Options	It emphasizes that the internal and external context of rural houses reflects the natural-ecological and socioeconomic relationships of the inhabitants and indicates the organic relationship between their appearance, their structure and their functions.
Memariyan (2005)	Book	Familiar with Iranian Residential Architecture	Has studied the housing architecture of Masouleh and Abyaneh cities and states that nature is the determining factor in housing architecture in these two areas. Because most dwellings are located on a sloping surface and have expanded in height due to the limitations of expansion in the surface.
Zolghadri (2007)	Book	Kandelouse is a relic from the past, a legacy for the future	The study of the architecture of the residential buildings in the village of Kandlous (located in the village of Zanous Rostagh in the district of Kojur, Chalus), states that the potential and attractions of the region and, consequently, the entry of non-native (seasonal population) to the countryside have led to different houses and monuments Create native architecture.
Sartipipour (2009)	Article	An Analytical Study of Rural Housing in Iran	The results of the evaluation, while highlighting the acute and hidden deficiencies in some provinces, prove the necessity of regional policy in rural housing projects, as well as the results of the evaluation, which show some architectural and architectural features of villages in the provinces. Which can be considered valuable in order to preserve the identity of the national and native architecture in the design and construction instructions.

Table 1.

Researcher	Type of research	Research title	Research results
Zaheri (2009)	Article	An Analysis of the Relationship between Environmental Factors and the Desirability of the Physical Structure of Rural Homes	There is a significant correlation between environmental variables and physical structure of houses, and the effect of topographic variables as a natural basis for the formation of activity and life of human groups is more than other variables (climate, land, etc.).
Boshagh, Salarvan & Seydaei (2010)	Article	Spatial Analysis of Rural Housing Status in Kohgiluyeh and Boyer Ahmad Province	The present study utilizes the census data of population and housing in 2006 in Kohgiluyeh and Boyerahmad province using geographic information system software. The result of sectional mapping is presented as a spatial map of the rural development status of the province. The position of each section of Kohgiluyeh and Boyerahmad province In the development of rural housing development, the province has been identified.
Sartipipour (2009)	Article	Reconstructing Native Architectural Execution Procedures in the Event of an Earthquake	Due to the fact that it has not changed, the nature of the earthquake and its effect on the buildings; the recognition and rehabilitation of indigenous knowledge of earthquake encounters can provide the grounds for their re-use in conventional buildings. He focuses on the knowledge and skills of indigenous peoples in the face of earthquakes, seeking to recognize these patterns and re-create them for rehabilitating and reducing the vulnerability of buildings.
Anabestani (2013)	Article	Analysis of the Effects of Social Change in the Life of Villagers on the Pattern of Rural Housing (Case Study: Binalood Town)	Based on the results obtained from Pearson Brigade correlation tests, the findings of the study indicate that there is a significant and relatively significant relationship between social change factors and rural housing patterns. In spatial distribution, between social change and housing pattern in six villages, there is direct and relatively solid correlation.
Anabestani et al (2016)	Article	The Effect of Rural Housing Pattern on Cultural and Social Change in Villages Case: Neka city	The results show that there is a significant and relatively significant correlation between cultural and social changes to the rural housing pattern; there has been a spatial distribution. The relationship between social change and housing pattern in eight villages is a direct and fair correlation.
Franklin (2006)	Book	Housing Transformation	In this book, in addition to describing concepts and models, the author examines the changes in the present time of housing in relation to culture, economic and political conditions, and considers the production of different types of houses not in empirical research but in the interests of consumers.
Banski & Wesolowska, M., (2010)	Article	Transformations in housing construction in rural areas of Poland's Lublin region -Influence on the spatial settlement structure and landscape aesthetics	The evolution of housing construction in the rural areas of the Polish Lublin examined the impact of the region on the adjustment of the spatial structure and landscape beauty and concluded that most new housing developments in rural areas near the main transport artery, as the belt of economic activity, and considers the level of economic development to separate regions in terms of building a housing pattern.

In general, studying the conducted researches, it can be concluded that all activities carried out in the field of housing renovation have some reflections in space that could impact on factors such as the ecosystem, physical environment, architecture, or other special issues. The emphasis of this paper is to analyze the spatial reflection of rural housing renovation after the earthquake of 1392 regarding cultural, social, economic, physical and health

indicators. In addition to analyzing the reflection of each of the variables, the priority of the impact of each of the variables is also considered. It should be noted here that the tendency of rural people to retrofit and use appropriate materials in rural construction has been very positive considering the impact of these projects on the promotion of educational activities. The same from one point of view is one of the encouraging backgrounds for this

topic, but from another perspective, the nature of the design, implementation, and monitoring of the initiation and implementation of such plans is such that it requires technical evaluations and continuous scientific evaluations; because plans are one that affects the economic and social conditions of people, they are always vulnerable to harm. Therefore, their design, planning and evaluation are related to the level of knowledge and understanding

of the designers, planners and administrators related to current problems in rural communities, and the existence of rural researchers is dependent on scientific evaluation of projects such as rural housing improvement projects in rural areas. (Shahbazi, 2010).

Figure 1 shows the conceptual model of the research.

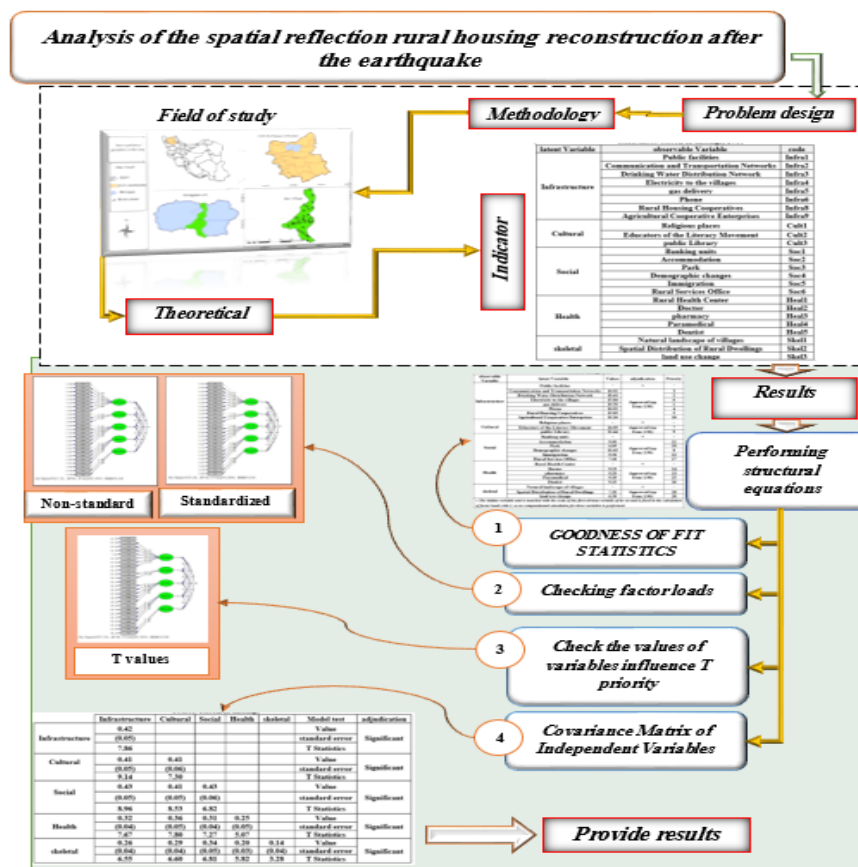


Figure 1. An Analytical Model of Research

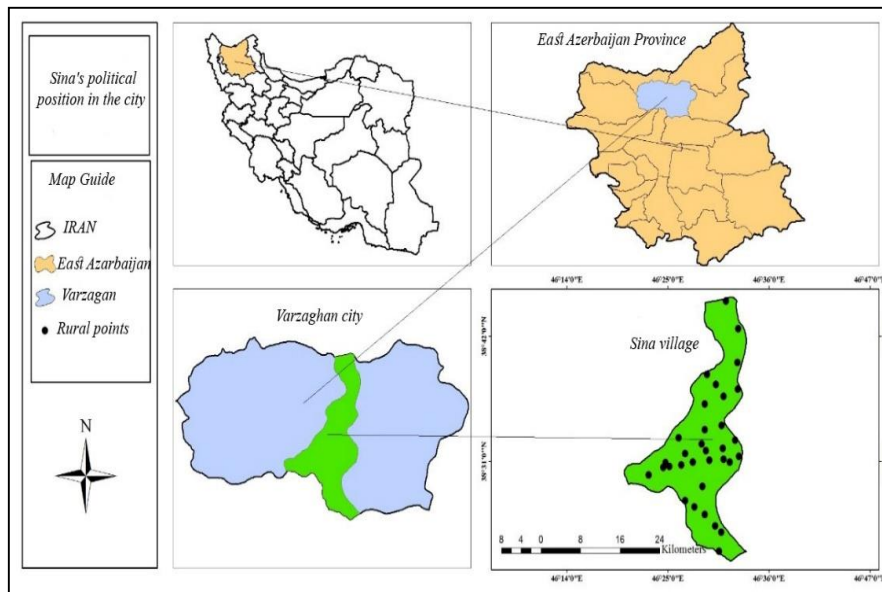
Source: Studies of Writers, 2016

### 3. Research Methodology

#### 3.1 Geographical Scope of the Research

Varzaghan city is located in the northern part of East Azerbaijan province with a total area of 2368 squared kilometers in 38 degrees and 23 minutes in 38 degrees 47 minutes in latitude and 46 degrees in 2 minutes in 46 degrees and 52 minutes in longitude. The average altitude of this city is 1670 meters

above sea level. (Mahdavi & Karimzadeh, 2006). Based on the results of the general census of population and housing in 2011, the population of Varzaghan city is estimated to be 45,708 (1.2% of the province's population) and the population of the center of this city is 5,385. The urban population of this city is 6,758 and its rural population is 38,850 and the household has 12,244 households (Statistics Center of Iran, 2011).



**Figure 2. Geographical location of the study area**

Source: Studies of Writers, 2016

Sina village is one of the villages of Varzaghan city, which is located in the central part of the city and consists of 28 villages. According to the statistics of

the population census of 2011, the demographic characteristics of Sina village is presented in [Table 2](#).

**Table 2: Population composition of Sina village**

Source: Tabriz Information and Statistics Bureau, 2011

Village	The household	The population			Literacy status					
					Literate population			Uneducated population		
		Whole	Man	Woman	Whole	Man	Woman	Whole	Man	Woman
Sina	1998	6549	3222	3327	3616	2093	1523	2237	765	1472

**3. 2. Methodology**

This research is an applied study in terms of its purpose, and descriptive-analytic in terms of its nature. Data collection has been done in both library and field. In the field method, a researcher-made questionnaire was used. The statistical population of this study consists of residents of Sina districts of Varzaghan city. The sample size,

using the Cochran formula, with a confidence interval of 95%, is 300, and the sampling method is simple random. The validity of the questionnaire based on formal validity and its reliability with Gutman coefficient (half division) has been evaluated which is equal to 0.955, which indicates the desired reliability of the questionnaire. [Table 3](#) shows the output of the SPSS software.

**Table 3- Summary of the test of reliability testing**

References: Research findings, 2016

Cronbach's alpha	Part 1	Value	0.938
		Number	13
	Part 2	Value	0.938
		Number	12
	Total		25
The relationship between forms			0.934
Spearman-Brown Coefficient	Equal length		0.966
	Unequal length		0.966
Guttman split-half coefficient			0.955



Regarding the reflection of the spatial renovation of housing in the village of Sina, after the earthquake in August 2013, we considered 25 obvious variables in the form of 5 hidden variables (factor). After collecting questionnaires, the information gathered in the statistical software SPSS arrived. Given that the questionnaire is based on the Likert rate range, the rankings 1 to 5 is allocated for each of the indicators. Since the purpose of the research is to show the spatial reflection of housing construction and the renovation and improvement of housing in the area covered by the survey, and to indicate that these structures change the geographic area of the region,

it is attempted to show the spatial reflection of these activities. In fact, the hidden variables in the questionnaire are hypotheses that have been implicated in the mind of the researcher and have been addressed with the development of obvious variables. In order to find the obvious variables in the standard and scientific form, referring to the statistical journal, all of the indicators that are considered as indicators of the infrastructure of Iran as infrastructural, cultural, social and... indicators are considered as a clear variable for data collection. [Table 4](#) shows the hidden and obvious variables of the research.

**Table 4. Covert variables of the research**

References: Research findings, 2016

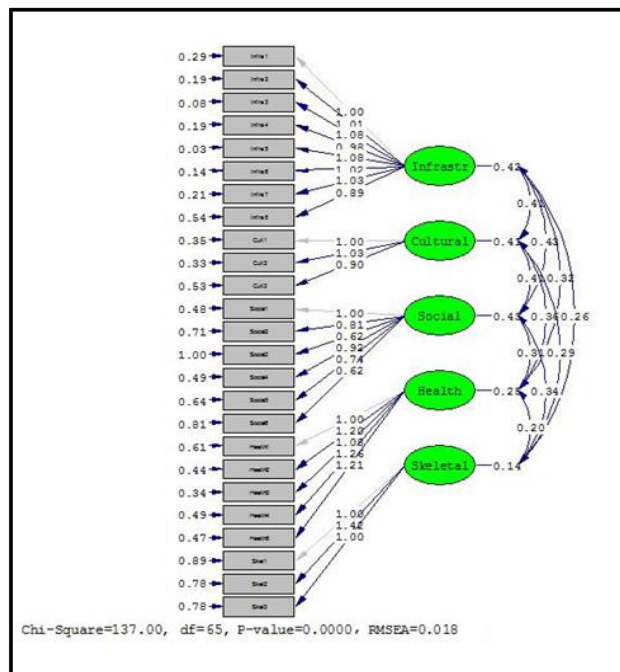
Latent Variable	Observing Variable	Code
Infrastructure	Public facilities	Infra1
	Communication and Transportation Networks	Infra2
	Drinking Water Distribution Network	Infra3
	Electricity to the villages	Infra4
	Gas delivery	Infra5
	Phone	Infra6
	Rural Housing Cooperatives	Infra8
	Agricultural Cooperative Enterprises	Infra9
	Cultural	Religious places
Educators of the Literacy Movement		Cult2
Public Library		Cult3
Social	Banking units	Soc1
	Accommodation	Soc2
	Park	Soc3
	Demographic changes	Soc4
	Immigration	Soc5
	Rural Services Office	Soc6
Health	Rural Health Center	Heal1
	Doctor	Heal2
	Pharmacy	Heal3
	Paramedical	Heal4
	Dentist	Heal5
Skeletal	Natural landscape of villages	Skel1
	Spatial Distribution of Rural Dwellings	Skel2
	Land use change	Skel3

#### 4. Research Findings

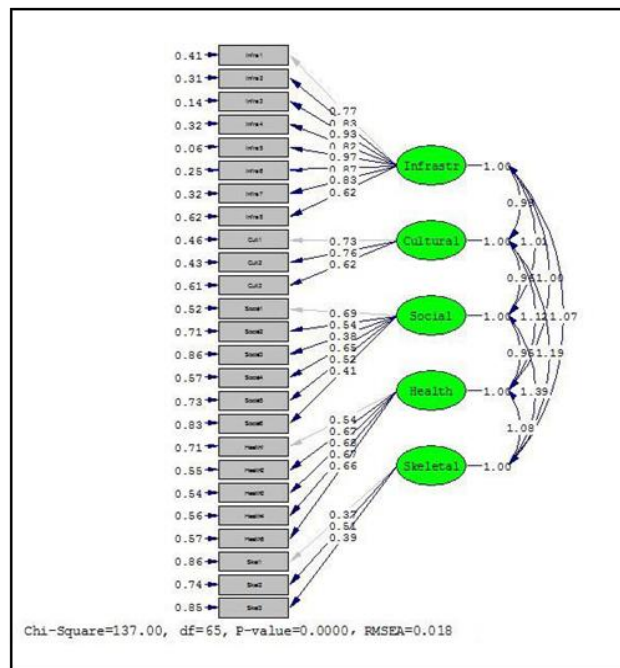
##### 4.1. Data Analysis

For validation through structural equation model, after entering data from the questionnaires into SPSS software and encoding operations on the data, coding data was recalled in the LISREL program

environment and analyzed for the data. [Figure 2](#) shows a nonstandard model and [Figure 3](#) shows a standardized model



**Figure 2. Nonstandard factor loads**  
References: Research findings 2016



**Figure 3. Standardized Load Factors**  
References: Research findings, 2016

As the factor analysis diagram in [Figures 2 and 3](#) with 5 hidden variables and 25 obvious variables represented as standardized and unmatched models, it appears that the standardized load factors indicate that the instrument of measurement of structural

validity is very good. Also, the results of the significant coefficients and chi-square ratio relative to the degree of freedom show that the relationships between the hidden variables and the relationship between the obvious variables are strongly

correlated; then, in the evaluation of the fit of the whole model, we will interpret all the items.

**4. 2. Goodness of Fit Statistics**

The purpose of evaluating the overall fit of the model is to determine how far the whole model is

compatible with and agrees with the experimental data used. To evaluate the fitting of the model in this study, the LISREL program has created fit fitness indices as shown in Table 5:

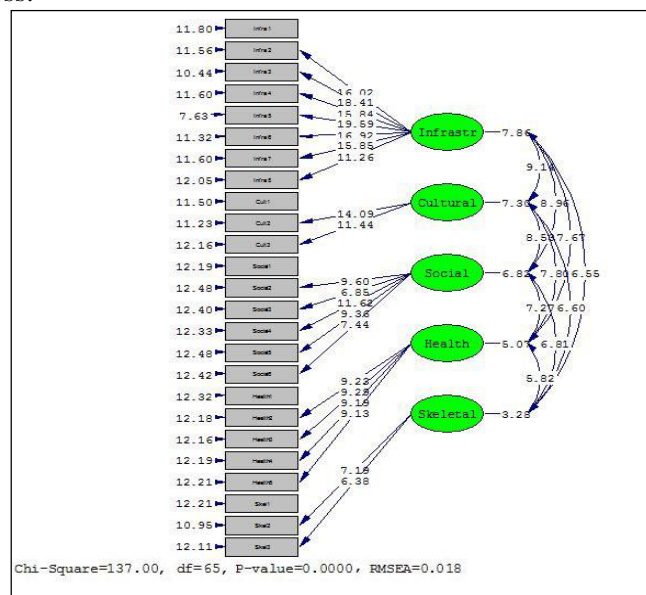
**Table 5. SIMPLIS Model Output Patterns Goodness Indicators.**

Source: The results of research in 2016, using (Kalantari, 2009; Karimzadeh Nkjoo, Sadr Mousavi & Koohestani, 2014; Ghasemi, 2010; Alibabaei, 2012).

R	Indicators	Model status	Standard values	Adjudication
1	Minimum Fit, Function Chi-square	137.00	As far as zero is near, the badge is perfect	A good fit
2	Root Mean Square Error of Approximation (RMSEA)	0.018	When the value of this statistic is less than 0.05, fitness is acceptable, if fit between 0.08 and 0.1, moderately fit and, if greater than 0.1, fitness is weak	Goodness and fit fitness
3	Root Mean Square Residual (RMR)	0.049	When the value of this statistic is less than 0.05, it indicates that model fitness is acceptable.	Fit a very good model
4	Goodness of Fit Index (GFI)	0.93	GFI and AGFI values must be between zero and 1 and a value greater than 0.9 represents an acceptable fit for the model.	Fit fitting
5	Normed Fit Index (NFI)	0.92	A value greater than 0.9 indicates an acceptable fit for the model	Acceptable fit
6	Non-Normed Fit Index (NNFI)	0.92		
7	Comparative Fit Index (CFI)	0.93	Based on the contract, values of less than 90% require revision in the model	Acceptable fit
8	Relative Fit Index (RFI)	0.91	Should be above 0.9 to have a good fit	Acceptable fit

According to the explanation given in the analysis of the data in the LISREL program, we conclude that the proposed model is compatible with the experimental data on the optimal level and the indicators are fit for goodness.

In the following figure, we study the spatial reflection of rural housing renovation in the studied area. Figure 4 shows the degree of effectiveness of each of the variables.



**Figure 4. T values**  
References: Research findings, 2016

In Table 6, according to the results of the output of the Laser Graphic Software (Fig. 4), the explicit

values of the explicit variables of the research are investigated:

**Table 6. Variable Intensity Priority**

Source: Research findings, 2016

Observing Variable	Latent Variable	Values	Adjudication	Priority
Infrastructure	Public facilities	-	*	-
	Communication and Transportation Networks	16.02	Approved (up from 1.96)	3
	Drinking Water Distribution Network	18.41		2
	Electricity to the villages	15.84		6
	Gas delivery	19.59		1
	Phone	16.92		4
	Rural Housing Cooperatives	15.85		5
Agricultural Cooperative Enterprises	11.26	10		
Cultural	Religious places	-	*	-
	Educators of the Literacy Movement	14.09	Approved (up from 1.96)	7
	Public Library	11.44		9
Social	Banking units	-	*	-
	Accommodation	9.60	Approved (up from 1.96)	11
	Park	6.85		19
	Demographic changes	11.62		8
	Immigration	9.36		12
	Rural Services Office	7.44		17
Health	Rural Health Center	-	*	-
	Doctor	9.23	Approved (up from 1.96)	14
	Pharmacy	9.29		13
	Paramedical	9.19		15
	Dentist	9.13		16
Skeletal	Natural landscape of villages	-	*	-
	Spatial Distribution of Rural Dwellings	7.19	Approved (up from 1.96)	18
	Land use change	6.38		20

*\* The hidden variable unit is matched with the scale of the first obvious variable of its set and is fixed in the calculation of factor loads with 1, so no computational calculation of these variables is performed.*

According to Table 7, gas distribution, water distribution, transport and communication network, three variables that have the most important impact on rural housing renovation after the earthquake, have been identified. These three components are the obvious variables of the hidden "infrastructure" variable, and as shown in the table, other obvious variables in the infrastructure section are also more effective than the obvious variables of other hidden variables. So, in general, after the earthquake, Sina villages that are located in Varzaghan have more

reflections on infrastructure aspects. Existing parks, rural land use, and spatial distribution of rural housing are variables that the rural housing renovation has not been able to affect significantly. In other words, physical and health indicators have the least important impact. The extent of the impact of other variables is visible in Table 7. Finally, the results of the analysis and the analysis of the independent variables of the covariance matrix for the path estimates are shown in Table 7.

**Table 7. Covariance Matrix of Independent Variables**

Source: Research findings, 2016

Explain	Infrastructure	Cultural	Social	Health	Skeletal	Model test	Adjudication
Infrastructure	0.42					Value	Significant
	(0.05)					Standard error	

**Table 7.**

Explain	Infrastructure	Cultural	Social	Health	Skeletal	Model test	Adjudication
Infrastructure	7.86					T Statistics	Significant
Cultural	0.41	0.41				Value	Significant
	(0.05)	(0.06)				Standard error	
	9.14	7.30				T Statistics	
Social	0.43	0.41	0.43			Value	Significant
	(0.05)	(0.05)	(0.06)			Standard error	
	8.96	8.53	6.82			T Statistics	
Health	0.32	0.36	0.31	0.25		Value	Significant
	(0.04)	(0.05)	(0.04)	(0.05)		Standard error	
	7.67	7.80	7.27	5.07		T Statistics	
Skeletal	0.26	0.29	0.34	0.20	0.14	Value	Significant
	(0.04)	(0.04)	(0.05)	(0.03)	(0.04)	Standard error	
	6.55	6.60	6.81	5.82	3.28	T Statistics	

According to the results of Table 7, the path estimates show that all hidden variables of the research are accepted by the amount of acceptance and with a standard error of 0.05, 0.04 and 0.03 have a significant upper limit, so that their statistics also it's positive.

**5. Discussion and Conclusion**

Housing is a geographic phenomenon formed as a result of a human relationship with its environment, which is considered to be the key to adopting appropriate solutions for it in rural communities according to their needs. The highlight of the rural housing renovation has also increased the importance of housing in recent years. Occurring environmental hazards, in addition to damaging the physical structure of the villages, also damages other structures; housing renovation after these events reflects its own specific infrastructure, social, cultural, health and physical aspects. Retaining rural housing has been one of the priorities of the programs of the [Islamic Revolution Housing Foundation](#). From the perspective of geographers, the concept of space includes all the actions carried out in the geographic field, which is the task of the geographer, to pay attention to space structures and to describe the differences between different spaces at different scales. This paper reflects the effects of housing renovation in geographic space after natural hazards in the village of Sina, located in Varzaghan. The output of the LISREL program shows that the model provided for research is in a desirable level with the experimental data and the indicators have best fit. Indeed, the work of LISREL is to know if the indicators used and the data extracted from it are

compatible with external reality either? In this paper, the output from the software is a good indication of the fit and outsourcing of this research, and we conclude that the result of this research can be extended to other statistical societies. In the following, after assuring the goodness of fitting the designed model, in the factor load test section, as shown in [Figure 2](#) and [Figure 3](#), with 5 unobservable variables and 25 observable variables, which are represented as standardized and standardized models, The results show that the standardized load factors indicate that the measuring instrument has very good validation tools. Also, the results of quantitative coefficients and chi-square ratio relative to the degree of freedom show that the relationships between the hidden variables together and the relationship between the obvious variables are strongly correlated; in other words, according to the results of the output of the graphic software of LaserLeam ([Figure 4](#)), T-values of explicit variables were investigated. The results of this part of the test show that gas supply, water distribution, communication and transport networks have been identified as the three most influential factors in the renovation of rural housing after the earthquake in Sinai district. These three components are "infrastructure" variables, and other infrastructure variables are more effective than other variables. So, in general, after the earthquake, Sina villages located in Varzaghan have more reflections on infrastructure aspects. Finally, the covariance matrix of the independent variables of the research shows that the estimates for the path of all the infrastructural, cultural, social, health and physical variables are accepted at the upper limit. In fact, the



proposed model can be used as a useful tool for reflecting the spatial renovation of rural housing. It is implied that housing renovation transforms the traditional form of villages by performing construction operations in villages and transforming them from traditional to new bridges, expanding villages, gas supply and water supply operations, and changes in road construction due to the growth of transportation of the face. The village's natural and generally rural landscape has undergone a change. The transformation of the roads due to the repair and improvement of roads, gas transmission lines, electricity and water, etc. There are other factors that the renovation of the housing has caused the changes in the infrastructure of the villages to change from the point of view of the infrastructure and the reflection of the area in question is relatively significant. The impact of other housing renovation, which is the next priority for research, is related to telecommunications and rural housing cooperative companies, which illustrates the expansion of the telephone, and in particular housing cooperative

companies, which worked with other provincial headquarters during and after the earthquake. Renovation of rural housing and facilities has made it possible for those who have previously migrated to cities to return to housing, which has made the space relatively visible and socially visible. Cultural and health factors also have their own spatial reflection due to the renovation of rural housing, which, however, have little impact on the variables mentioned above, which, according to research findings, have a significant reflection on variables such as building healthy houses and religious places. Considering the issues raised and according to the tables presented and the results of the research, it can be concluded that the renovation of rural housing after the earthquake in Varzaghan city has caused Sinai village to have the highest spatial reflection in terms of infrastructure.

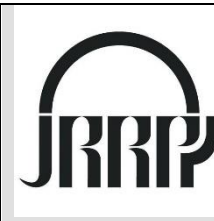
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## تحلیلی بر بازتاب فضایی نوسازی مسکن روستایی پس از وقوع زمین‌لرزه (مطالعه موردی: دهستان سینا، شهرستان ورزقان)

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### چکیده مبسوط

#### ۱. مقدمه

شناخت این مقوله مهم می‌تواند تأثیر جبران‌ناپذیری بر کل جامعه و نظام وارد آورد. فضا نیز عینیتی حاصل از نقش‌پذیری و اثرگذاری افراد و گروه‌های انسانی در مکان یا به سخن دیگر، پیامد عملکردهای متعامل دو محیط طبیعی - اکولوژیک و اجتماعی - اقتصادی است. برنامه‌ریزی نوسازی و بهسازی، با توجه به تبیین مفاهیم، متغیرها و شاخص‌های متنوع به دنبال ساماندهی کالبدی - فضایی با در نظر گرفتن سیستم منطقه جغرافیایی موردنظر و تأمین رفاه مادی و معنوی ذینفعان از طریق ایجاد محیط بهتر، مساعدتر و سالم‌تر می‌باشد. با وجود سیاست‌های نوسازی در برنامه‌های توسعه، بخش مهمی از فعالیت‌های نوسازی و بهسازی مسکن روستایی در کشور مربوط به بازسازی مناطق آسیب‌دیده از سوانح در کشور اختصاص یافته است که وظیفه آن بر عهده بنیاد مسکن انقلاب اسلامی است. سیاست‌گذاری‌ها و برنامه‌ریزی‌های انجام‌شده مربوط به بازسازی مناطق آسیب‌دیده در منطقه مورد مطالعه در زمینه نوسازی مسکن روستایی ساختار، اشکال فضایی و نقش‌های مکان‌ها و محیط‌های روستایی را تغییر داده که به‌صورت تغییر در جاده‌ها، معابر، سکونتگاه‌ها، اشتغال، آداب‌ورسوم و در نهایت محیط‌زیست بازتاب نموده است که در محدوده مورد مطالعه این بازتاب به جهت عوامل مختلفی همچون، تعجیل در روند بازسازی و عدم وجود کارشناسان محلی و اجرا توسط ستادهای معین استان‌های اطراف، نزدیکی به فصل سرما، ناهماهنگی ستادهای بازسازی و بنیاد و خیلی عوامل دیگر بازتاب فضایی گسترده‌ای داشته که در این تحقیق به بررسی آن می‌پردازیم.

وقوع دوره‌های حوادث غیرمترقبه از جمله زلزله، مسئولین امر را بر آن داشته است که به بهسازی و ایمن‌سازی واحدهای مسکونی در مقابل سوانح طبیعی توجه نمایند. مناطق روستایی شهرستان ورزقان نیز که پس از وقوع زلزله در عصر روز ۲۱ مهرماه سال ۱۳۹۲ به بزرگی ۶/۲ ریشتر (که علاوه بر کشته و مصدوم شدن شماری از مردم منطقه، باعث تخریب صددرصدی ۶ هزار واحد مسکونی گردید)، برای نوسازی مسکن روستایی موردتوجه قرار گرفت. آنچه نگارندگان را بر آن داشته تا به تحقیق در این زمینه پرداخته شود این است که پس از بازسازی و نوسازی حدود ۴۴ هزار واحد مسکونی روستایی، شکل روستاها تغییر یافته و در فرایند نوسازی در قالب وام‌های آسان، علاوه بر تغییر تیپ روستاها، تحولات و تغییرات اجتماعی، فرهنگی و اقتصادی در فضای روستایی بازتاب نموده است. تحقیق حاضر با هدف بررسی و تحلیل این بازتاب‌ها که ناشی از فرایند نوسازی مسکن در منطقه مورد مطالعه است درصدد یافتن پاسخی مستدل به سؤال زیر، از دید خود روستاییان می‌باشد:

"نوسازی مسکن در روستاهای دهستان سینا از جنبه‌های زیربنایی - ارتباطی، اجتماعی، فرهنگی و بهداشتی - درمانی چه بازتاب فضایی داشته است."

#### ۲. مبانی نظری

بحث مسکن از اصلی‌ترین و مهم‌ترین مباحث در مجموعه مطالعات اقتصادی، جمعیتی و اجتماعی بشمار می‌آید و عدم پاسخگویی و عدم

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### ۳. روش تحقیق

این تحقیق به لحاظ هدف از نوع کاربردی و به لحاظ ماهیت، از نوع توصیفی - تحلیلی است. جمع‌آوری اطلاعات به صورت کتابخانه‌ای و میدانی بوده است. در روش میدانی، از ابزار پرسشنامه محقق ساخته استفاده شده است. جامعه آماری این پژوهش شامل ساکنان دهستان سینا از توابع شهرستان ورزقان می‌باشد. حجم نمونه، با استفاده از فرمول کوکران با فاصله اطمینان ۹۵ درصد برابر ۳۰۰ نفر بوده و شیوه نمونه‌گیری به صورت تصادفی ساده است. روایی پرسشنامه بر اساس اعتبار صوری و پایایی آن با ضریب گاتمن (تقسیم نصفی) مورد بررسی قرار گرفته است که برابر ۰/۹۵۵ است که نشان از پایایی مطلوب پرسشنامه است.

### ۴. یافته‌های تحقیق

از نظر جغرافیادانان مفهوم فضا شامل تمام اقداماتی است که در عرصه جغرافیایی انجام می‌پذیرد که وظیفه محقق جغرافیا، توجه به ساختارهای فضا و توصیف تفاوت‌های بین فضاها در مقیاس‌های متفاوت است. پس از اطمینان از نیکویی برازش مدل طراحی شده، آزمون بارهای عاملی استاندارد شده، حاکی از آن است که ابزار اندازه‌گیری از اعتبار سازه‌ای بسیار مناسبی برخوردار بوده و ضرایب معنی‌داری و میزان کای اسکوتر نسبت به درجه آزادی نشان می‌دهد روابط بین متغیرهای پنهان با هم و ارتباط متغیرهای آشکار دارای همبستگی قوی است؛ بررسی مقادیر تی متغیرهای آشکار تحقیق نشان می‌دهد شاخص زیرساختی دارای بیشترین تاثیرپذیری از نوسازی مسکن روستایی است که در این بین متغیرهای «گازرسانی»، «توزیع آب»، و «شبکه ارتباطی حمل و نقل» دارای بیشترین ضریب تاثیرپذیری هستند. نهایتاً ماتریس

کوواریانس متغیرهای مستقل تحقیق نشان می‌دهد تخمین‌های مربوط به مسیر بین تمام متغیرهای زیرساختی، فرهنگی، اجتماعی، بهداشتی و کالبدی، با مقدار قبول قبول و در حد بالایی معنی‌دار هستند. در واقع مدل طراحی شده را می‌توان به‌عنوان ابزار مفیدی در جهت بازتاب فضایی نوسازی مسکن روستایی پیشنهاد داد. در کل نوسازی مسکن روستایی پس از وقوع زمین‌لرزه در شهرستان ورزقان، باعث شده است که در دهستان سینا شاخص زیرساختی دارای بیشترین بازتاب فضایی باشد.

### ۵. نتیجه‌گیری

مسکن یک پدیده جغرافیایی است که در نتیجه رابطه انسان با محیط اطراف خود، شکل گرفته که اتخاذ راه‌حل‌های مناسب برای تهیه آن در جوامع روستایی متناسب با نیاز آن‌ها امری مهم تلقی می‌شود. برجسته شدن نوسازی مسکن روستایی نیز در سال‌های اخیر بر اهمیت پدیده مسکن می‌افزاید. وقوع مخاطرات محیطی علاوه بر لطمه زدن به ساختار فیزیکی روستاها، به سایر ساختارهای آن نیز آسیب می‌رساند؛ که نوسازی مسکن پس از وقوع این حوادث خود بازتاب فضایی خاص خود از نظر زیرساختی، اجتماعی، فرهنگی، بهداشتی و کالبدی به همراه داشته است. مقاوم‌سازی مسکن روستاها جزء اولویت‌های برنامه‌های بنیاد مسکن انقلاب اسلامی بوده است.

**کلمات کلیدی:** نوسازی مسکن، بازتاب فضایی، زمین‌لرزه، معادلات ساختاری، ورزقان.

### تشکر و قدرانی

پژوهش حاضر حامی مالی نداشته و حاصل فعالیت علمی نویسندگان است.

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