

An Investigation of the Relationship between Economic Components and the Increased the Resilience of Local Communities in Birjand

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Abstract--- *Examining the issue of societies' social vulnerability to environmental hazards can reduce both human suffering and economic loss. More than half of the world's population lives in urban areas, and many of them live in areas with potential risks and accidents. Birjand is the capital of South Khorasan province with various adjacent faults that have provided conditions for seismicity in this city. This research has investigated the relationship between economic components and increasing the resilience of local communities in this city with a descriptive and analytical approach. Due to the spatial distribution of vulnerabilities is located in the suburbs and northern neighborhoods of the city and over time have achieved a relatively better economic situation, but the results of the study and evaluation of the economic vulnerability of Birjand neighborhoods to earthquakes show that the satisfaction of the new generation with life is very low. The reason for this is that over time the overall living conditions and absolute poverty have decreased but relative poverty is increasing.*

Keywords--- *Community Resilience, Birjand, Economic Vulnerability.*

I. INTRODUCTION

Today, the occurrence of natural disasters and the damage and casualties caused by these disasters in different parts of the world has made making cities and urban areas safer a long-term but achievable challenge. In order to quickly return to the pre-crisis situation at the time of natural disasters, urban communities have decided to reduce the damage to some extent. Meanwhile, resilience is an important way to strengthen communities and cities by using their capacities. Although it is not possible to avoid a crisis, but the damage of these crises can be reduced with proper design. Therefore, the study of urban resilience is one of the vital issues for the preparation of the city against natural and man-made disasters. By increasing the degree of economic resilience of cities, the damage caused by hazards can be minimized.

Increasing the resilience of cities to natural disasters, especially earthquakes, is very effective in reducing these damages as well as the recovery time of communities.

It should always be considered that tissue reconstruction and renovation projects that are implemented with the aim of solving the social, economic and physical problems of these tissues and improving the living standards of its inhabitants, lead to reducing the risk and potential damage to natural disasters such as earthquakes, floods, etc. [1]. Birjand is one of the most dangerous centers in terms of the possibility of earthquakes and floods in Iran. This issue is a serious threat to the stability and development of this city.

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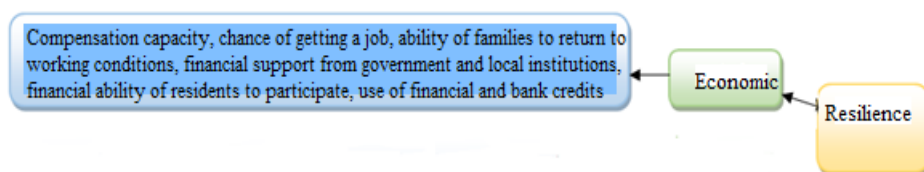
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Resilience and Risks

The concept of resilience was first introduced in 1973 by Holling in an article entitled “Resilience and Stability of Environmental Systems”, published in the Annual Journal of Ecology and Systems. He was the first to introduce the concept of resilience in the field of disasters and hazards. This concept has been widely used since the adoption of the Hugo Framework for the period 2005-2015. Therefore, it has led to an increase in the number of studies and scientific works related to the concept of resilience as a new approach in crisis and disaster management [2]. Resilience can be seen as the ability of an economy, community, organization, or individual to return effectively after an unexpected shock.

Economic resilience:

Economic resilience is the inherent response and adaptation of individuals and societies to risks, so that they are able to reduce the potential losses caused by risks. Due to the wide interconnectedness at the macroeconomic level, economic resilience depends not only on the job capacity of individuals but also on the capacity of all institutions. Also, it is also defined as the ability of society to adapt socially and economically to natural hazards. This resilience has two components: the capacity of society to return to pre-accident economic conditions and the second is the capacity of communities to reduce the risk of future accidents and hazards, whether in response to an accident that society has experienced or in predicting the occurrence of events that it has not yet experienced. Thus, economic resilience depends on the severity and extent of the damage, the capacity or ability to compensate and the ability to return to appropriate employment and income, the amount of household capital and income convertible into capital and employment, housing status, access to financial services, insurance, grants and the ability to resume household economic activity after an accident. After resilience, it increases or decreases economic stability, especially livelihood stability at the community level. In the economic dimension, resilience is defined as the inherent response and adaptation of individuals and communities to risks in a way that enables them to reduce the potential loss and damage caused by risks [3]. In this dimension, resilience shows the economic viability of societies, such as the severity and extent of damages, the capacity or ability to compensate, the ability to return to suitable employment conditions and income, capital, access to services, convertible income into capital and employment. The variables of this component include (intensity and amount of capital loss, capacity or ability to compensate for losses and ability to return to suitable working conditions and income in the form of income source, capital, access to property services, savings and household capital, insurance, allowance, the resurgence of economic activity after an accident involves the participation of women in the labor force. These indicators allow us to examine the links that increase or decrease economic sustainability, especially livelihood sustainability at the community level.



Background research:

Mahmoudzadeh and Harischian (2018) measured and prioritized resilience indices using a combined method of structural equations and fuzzy multivariate analysis in region one of Tabriz [4]. The results showed that the north of the city is at a lower level in terms of resilience indicators and is the most important component of economic resilience. Salimi (2016) studied the rate of physical resilience of worn tissues against earthquakes in the central part of Bushehr [5]. The study showed that neighborhoods in terms of physical indicators of resilience are significantly different from the ideal situation. The results also show that the study area are different in terms of physical characteristics. Dadashpour and Adeli

(2016) studied the resilience capacity in Qazvin urban complex [6]. Their study showed that among the various dimensions of resilience, Qazvin urban complex has more unfavorable position in terms of institutional and physical-spatial dimensions with 48% and -45% distance from the optimal limit. In another study, to determine and quantify the effects of the proposed reforms on increasing resilience, a factor-based computer model was developed, which results in a significant increase in evacuation security and increased evacuation speed due to the proposed reforms [7]. Salmani et al. (2016) identified and analyzed the impact of variables and resilience indices in the north and northeast of Tehran. Zang et al. 2013 in an article emphasized the indicators of the creation of non-governmental educational institutions of society in the face of crisis, production and transfer of knowledge, the creation of organizations. Cutter et al. 2011 conducted another study on the design of criteria and indicators of resilience to natural disasters, which the main purpose was to develop a resilience index in the dimensions of socio-economic and institutional resilience and infrastructure and capital of society.

Introduction of the study area

Birjand is the capital of South Khorasan province and the center of Birjand city in eastern Iran. In 2016, this city had a population of 203,636 and was the 49th city in Iran. The area of this city is 3362 hectares. The city of Birjand is located in the middle of a wide valley in the south of Khorasan at 32 degrees and 53 minutes north latitude and 59 degrees and 13 minutes east longitude. It is located at an altitude of 1470 meters above sea level. Birjand is a relatively mountainous city surrounded by the Bagheran and Mo'menabad mountain range in the south and north. The climate of this city is desert and semi-desert (Vafaeifard, 2005). Birjand city can be divided into new and old parts. The old part of the city with its integrated and interconnected spatial connection has formed the main and central part of the city (Map 1) and the new part is influenced by new architecture and urban planning, which is mainly located in the south. Is [8].

The relatively long interval between the end of the subduction to the Oligocene volcanism and the fragmentation of the ophiolite mixture by volcanic and semi-volcanic units in some areas casts doubt on its direct relationship to subduction. The eruption of Birjand volcanic rocks is consistent with low-pressure or tensile zones resulting from the operation of left-handed shear zones and indicates that the pressure reduction occurred in these places provided suitable conditions for magma to exit to the surface. Micritic limestones with Lower Maastrichtian index microfossils indicate that an arcuate sea basin existed at the site of the bergamot at this time, which was later mixed with melange ophiolite.



Figure 1 Distribution of minor and major faults in the plain and city of Birjand

Economic characteristics

According to the statistical results of 2011, the economic participation rate of Birjand city was 40.52%, which has decreased by about 3% compared to 2006. However, out of 86,341 active population, about 92% were employed and the unemployment rate was 8.2%. The number of employees in 2006 compared to 1996 has increased by about 20% and in 2011 compared to 2006 has increased by about 9%. Also, the service sector and the agricultural sector had the highest and lowest number of employees.

Table 1: Comparison of the number of employees in Birjand city in the statistical period of 1996, 2006, and 2011 by major occupational groups

Birjand city						Occupational groups
2011		2006		1996		
Percentage	Number	Percentage	Number	Percentage	Number	
18.52	14773	16.91	12427	30.97	18958	Agriculture
22.53	17966	25.56	18779	41.81	25590	Industry
58.93	46994	57.51	42249	52.33	32028	Services
100	79733	100	73455	100	61200	Total

Source: Hajinejad et al., 2014 [9]

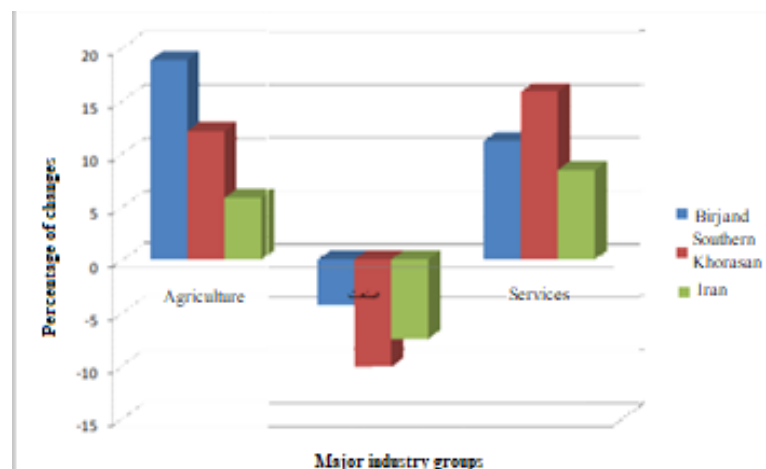


Figure 1: Analysis of Birjand economic situation in 1996-2006

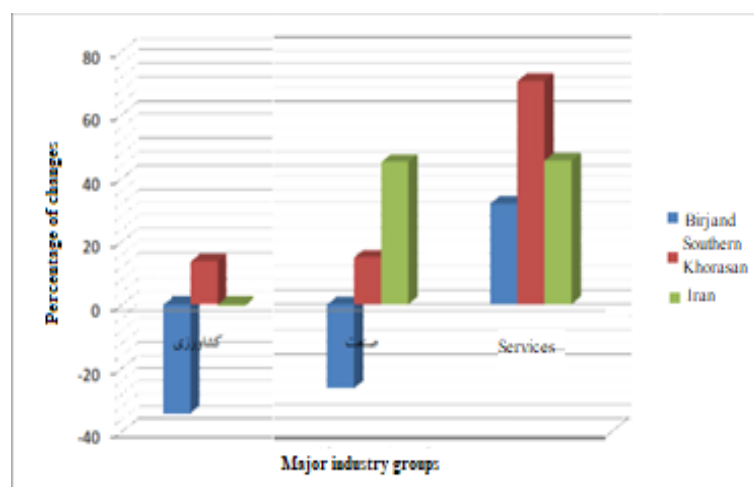


Figure 2: Analysis of Birjand economic situation in 2006-2011

During the years 2006 to 2011, the average economic growth (employment) of Birjand reached 8.54 percent, due to positive changes in the agricultural and services sectors. In the province, the growth of the service sector has been higher than the average economic growth of the province in both periods. At the national level, the agricultural and services sector has a positive growth and during the period 1996 to 2006, the agricultural sector has a negative growth at the national level, but in the years 2006 to 2011 has a positive growth of about 6 percent.

In general, the study of average economic growth (employment) in the years 1996 to 2011 indicates that economic growth (employment) has decreased at the national and provincial levels, but at the local level has had a positive trend. Considering the spatial coefficients of the sub-sectors of industry in Birjand city, it can be acknowledged that using the data of the province, mining activities, construction and supply of water, electricity and gas have the highest comparative advantage and export capability in Birjand city and using country-level data, mining, electricity, gas and building activities have a comparative advantage. Therefore, we can see positive changes in industrial activities in Birjand city by investing and optimizing the infrastructure in these sub-sectors [9]. In the services sector, Birjand city is under the sub-sectors of wholesale, retail, finance and insurance, real estate, administrative and support activities, public affairs and defense, educational and scientific activities in the province, and sub-sectors of finance and insurance, public affairs and defense, education and assistance in the country has a comparative advantage [10].

II. METHODS

The research method is descriptive-analytical and in terms of purpose is practical. First, indexing to identify the dimensions of resilience and vulnerability and then to measure the vulnerability of the neighborhood using the relevant experts, the McGranaghan and TOPSIS hierarchical analysis model is used and to measure the degree of resilience and vulnerability in the city of Birjand, the opinions of neighborhood residents and experts of the executive apparatus have been used by distributing a questionnaire among them. In this study, to achieve the objectives of the study, local managers such as city council members and municipal experts were considered as a responsible community. Also, local managers and experts were asked to standardize the questionnaire questions by attending the studied urban areas.

Minitab and SPSS statistical software are used to process meteorological data such as precipitation and number of floods and time series analysis of this data. ArcGIS software often calculates flood measurement indices and generates time series of indices at different time scales. It creates spatial and descriptive databases related to earthquakes and population points and prepares specialized maps.

Different dimensions of resilience are assessed using questionnaires and interviews with elites, experts and people. In the library and documentary studies section, scientific sources and documents such as: books, articles, master's and doctoral dissertations and research-related pamphlets have been used. In this section, the required statistics and maps have been prepared from the database of the Statistics Center and related executive bodies. The statistical population of this research is the elite group, professors of Azad, public and Payame Noor universities, experts of related executive bodies and citizens living in Birjand city, which has been selected for each sample community based on Cochran's formula and Study siz software. The questionnaire for each group was distributed and collected by simple random sampling between the two groups. Finally, the data were processed by SPSS software and analyzed through GIS. Due to the nature of the present study, the data collection method is both library and field and one of these two methods or both has been used according to the necessity in each of the research stages.

To analyze the data collected using a questionnaire, descriptive and analytical statistical final tests were used after coding the data. For Birjand floodology, a method based on the interpretation of aerial photographs with emphasis on geomorphological criteria was used.

Table 2. Used criteria in the study

Relation to flood risk	Criterion type	
Basically, there are flood spreading levels, but the possibility of flood spreading is not the same everywhere.	Alluvial fan	Geomorphology (type of complication)
Floods are one of the most important complications.	Flood plain	
They are the natural channel for flood passage.	floodway	
Flood surfaces are seen due to lack of desert polish, lack of soil, polishing of rocks and deposition of light-toned dried clays.	-----	Photogeological (ton)
In alluvial fan and floodplain surfaces, according to topography (difference in height of points), areas with different flooding can be distinguished.	-----	Topography

Part of the studies has been done from field studies and in order to measure and evaluate the surface runoff of Birjand city, natural and human environmental indicators were comprehensively considered. According to the research and the views of domestic experts (based on the questionnaire), the most important indicators of urban planning affecting surface runoff in Kerman were explored and confirmed in Table (3).

Table 3: Results of the questionnaire analysis to determine the urban planning criteria affecting surface runoff

Frequency of expert opinions (percentage)			Sub-criteria	Criteria
High	Medium	Low		
62.3	27	322.4	Duration of rainfall	Atmospheric factors
55.9	20.5	8.1	Rain time	
61.3	24.2	13.2	Rainfall intensity	
55.4	20.3	23	Rainfall amount	
59.5	24.2	15	Surface slope	Environmental factors
48.2	21.6	16.4	Topography of the area	
57.2	29.6	11.8	Soil permeability	
50.8	28.8	19.1	The physical shape of the city	Human Factors
65.5	10.9	12.4	Construction in the river area	
65.5	10.9	12.4	Population density	
55.5	20.9	12.4	The width of the streets	
66.8	20.9	10.9	Presence or absence of surface drainage network	
60.8	21.6	13	Urban land cover (built and unbuilt spaces)	

Flood zoning

In this research, different spatial layers have been used to zoning the risk of urban flooding in Birjand in ArcGIS software environment.

Vulnerability and resilience indicators of Birjand city

Table 4. Dimensions, criteria and components of urban resilience and vulnerability

Components	Criteria	Dimensions
The degree of security of equipment arrangement and location of the building against floods and earthquakes; Job vulnerability and loss in case of earthquake and flood; The level of safety of Birjand city property (shops, houses, etc.) against earthquakes and floods	Severity of damage	Economic
Possible amount of support from government and local institutions to compensate for financial emergencies	Ability to compensate	
Status of ability to return to working conditions and adequate income of citizens after the earthquake; Forecasting when to get a new job in case of losing the first job due to risk; The level of job and specialized skills of citizens	Ability to return to appropriate working conditions	

Source: Mohammadi and Pashazadeh, 2017; Rezaei, 2010; Mu'azzam, 2014; Salehi et al., 2011; Fallahi et al. ; 2013; Davis et al., 2006 [11-13]

III. RESULTS

The old texture of the city, which is mainly located in the central part of the city and the lack of necessary attention in previous constructions in this city has caused the vulnerability of this city in case of an earthquake is high. It should be noted that the reason for the unfavorable condition in terms of physical and environmental, including incompatible uses, lack of green space and its inappropriate distribution, are its long history and organic and old texture, the use of low-durable materials in construction and social, economic and managerial problems. Therefore, its effect will be doubled, which can cause irreparable damage to the central sector.

Table 5. Influential indicators in earthquake zoning of Birjand city

Weighting assumptions	Delphi rating	Criteria	Row
More proximity = more vulnerability	1	Danger of faults	1
More distance = less vulnerability	3	Distance of buildings from explosive stations (gas and gas stations and fuel tanks)	2
Low-strength materials and structures = more vulnerability	4	Type of materials and structures used in buildings	3
Higher density = more vulnerability	5	Density of buildings	4
More user incompatibility = more vulnerability	6	Type of use of buildings	5
Older = more vulnerable	2	Dating of buildings	6
Higher altitude = more vulnerability	7	Height of buildings	7

Table 6. Floors types of building characteristics

Floor	Criteria	Row
Metal and concrete	Type of materials and structures of buildings	1
Brick		
Brick and mud		
Less than 100	Building Density	2
100 to 200		
More than 200		
Compatible	Type of use of buildings	3
Indifferent		
Inconsistent		

Less than 5 floors	Height (number of floors) of buildings	4
5 to 10 floors		
More than 10 floors		
Under 10 years of construction	The age of the building	5
10 to 20 years of construction		
Over 20 years of construction		

Table 7. Vulnerability of Birjand city

Vulnerability rate	Score	Area per hectare	Percentage
Very low vulnerability	1	0.47	0.2
Low vulnerability	3	2.56	1.3
Moderate vulnerability	5	37.64	19.1
High vulnerability	7	135.34	68.7
Too much vulnerability	9	20.95	10.6

Source: Authors' Findings

Assessment of Birjand urban resilience against earthquakes and floods

Therefore, considering the nature of the problem and the research method “quantitative-survey” and “relational” research, first we describe the dependent and independent variables of statistical samples through descriptive statistics with emphasis on mean and standard deviation. The descriptive analysis was performed according to the research opportunities as a comparative comparison of the descriptive statistics of the sample groups (households of 9 neighborhoods) with emphasis on mean and standard deviation indices. The frequency and percentage of sample households in each neighborhood are shown in Table 8.

Table 8. Frequency and percentage of sample households in different neighborhoods

Percentage	Frequency	Neighbourhood
15.6	51	Mehrshahr
12.9	42	Moalem
18.4	60	Bazar
19	62	Avini
10.7	35	Zafar
9.2	30	Masoumiyah
9.2	30	Administrative site
8.3	27	Army lands
14.1	46	Sajadshahr
100	383	Total

Distribution of heads of household respondents by age

The age status of the head of the household is presented in Table 9.

Table 9: Frequency distribution of the sex of the head of the household of the respondents by neighborhoods of Birjan

Percentage	Frequency	Age of head of household by neighborhood	
36.9	24	Less than 40 years	Mehrshahr
46.2	30	Between 40 and 60 years	
16.9	11	Over 60 years	
36.6	30	Less than 40 years	Moalem
52.4	43	Between 40 and 60 years	
11.0	9	Over 60 years	
41.4	46	Less than 40 years	Bazar
45.9	51	Between 40 and 60 years	
12.6	14	Over 60 years	
32.9	23	Less than 40 years	Avini
52.9	37	Between 40 and 60 years	
14.2	10	Over 60 years	
34.1	15	Less than 40 years	Zafar
52.3	23	Between 40 and 60 years	
13.6	6	Over 60 years	
37.1	138	Less than 40 years	Masoumiyah
49.5	184	Between 40 and 60 years	
13.4	50	Over 60 years	
32.9	50	Less than 40 years	Administrative site
52.9	29	Between 40 and 60 years	
14.2	42	Over 60 years	
34.1	34	Less than 40 years	Army lands
32.9	45	Between 40 and 60 years	
52.9	39	Over 60 years	
14.2	37	Less than 40 years	Sajadshahr
13.6	60	Between 40 and 60 years	
37.1	29	Over 60 years	

Distribution of heads of household respondents by gender

Gender status of the head of the household, 229 (69.7%) are male and 154 (31.2%) are female.

Distribution of respondents according to the level of education in some of the studied areas

The level of education of the head of the household is presented in Table 10.

Table 10. Frequency distribution of education level of the head of the household of the respondents by neighborhoods

Theological	Doctorate	Masters	Bachelor	Associate Degree	Diploma	Guidance	Primary	Illiterate	Education by neighborhood	
2	4	4	17	5	17	4	8	4	Frequency	Avini
3.1	6.2	6.2	26.2	7.7	26.2	6.2	12.3	6.2	Percentage	
3	3	12	22	2	12	14	5	9	Frequency	Sajadshahr

3.7	3.7	14.6	26.8	2.4	14.6	17.1	6.1	11.0	Percentage	
4	3	14	21	9	25	19	10	6	Frequency	Bazar
3.6	2.7	12.6	18.9	8.1	22.5	17.1	9.0	5.4	Percentage	
2	3	11	15	8	13	8	7	3	Frequency	Moalem
2.9	4.3	15.7	21.4	11.4	18.6	11.4	10.0	4.3	Percentage	
0	1	3	12	6	9	8	3	2	Frequency	Administrative site
0.0	2.3	6.8	27.3	13.6	20.5	18.2	6.8	4.5	Percentage	
11	14	44	87	30	76	53	33	24	Frequency	Total
3.0	8.3	11.8	23.4	8.1	20.4	14.2	8.9	6.5	Percentage	

Distribution of quality status and building age of the respondents

According to Table 11, 112 households (30.1%) are newly built, 113 households (30.4%) are acceptable, 89 households (23.9%) are in repair and 58 households (15.6%) are in ruins.

Table 11. Frequency distribution of antiquity and quality according to the neighborhoods of Birjand city

Destructive (over 30 years)	Restoration (20 to 30 years)	Acceptable (10 to 20 years)	Newly built (last 10 years)	Dating according to neighborhoods	
15	14	23	18	Frequency	Bazar
15.4	21.5	35.4	27.7	Percentage	
–	5	26	29	Frequency	Mehrshahr
–	22.0	31.7	29.3	Percentage	
16	30	29	36	Frequency	Avini
14.4	27.0	26.1	32.4	Percentage	
10	17	22	21	Frequency	Sajadshahr
14.3	24.3	31.4	30.0	Percentage	
–	10	13	13	Frequency	Administrative site
–	22.7	29.5	29.5	Percentage	
–	5	26	29	Frequency	Moalem
17.1	22.0	31.7	29.3	Percentage	
16	30	29	36	Frequency	Zafar
14.4	27.0	26.1	32.4	Percentage	
–	17	22	21	Frequency	Army lands
–	5	26	29	Percentage	
58	89	113	112	Frequency	Total
15.6	23.9	30.4	30.1	Percentage	

Table 11. Frequency distribution of material status by neighborhoods

Other	Brick and wood	Stone and iron	Brick and iron	Steel structure	Reinforced concrete	Status of materials by neighborhoods	
1	10	5	20	10	19	Frequency	Bazar
1.5	15.4	7.7	30.8	15.4	29.2	Percentage	
3	4	7	35	15	18	Frequency	Mehrshahr
3.7	4.9	7.5	42.7	18.3	22.0	Percentage	
8	14	6	32	30	21	Frequency	Avini
7.2	12.6	5.4	28.8	27.0	18.9	Percentage	
1	9	9	29	8	14	Frequency	Sajadshahr
1.4	12.9	12.9	41.4	11.4	20.0	Percentage	
3	3	7	16	11	4	Frequency	Administrative site
6.8	6.8	15.9	36.4	25.0	9.1	Percentage	
16	3.7	4.9	7.5	42.7	18.3	22.0	Moalem
36.4	8	14	11	32	30	21	
7.5	7.2	12.6	25.0	28.8	27.0	18.9	Zafar
16	1	9	9	29	8	14	
4.3	10.8	9.1	35.5	19.9	20.4	Percentage	

Correlation analysis between contextual variables and resilience of Birjand urban areas

Correlation between age and resilience

One of the contextual variables that can affect the resilience of individuals is the age of individuals. Therefore, it is intended to determine the correlation between this variable and resilience (Table 12). The results obtained from Pearson correlation coefficient test show that there is a significant relationship between the two variables of age and resilience ($\text{sig} = 0.000$) and it can be said that it can be generalized to the target population. The value of this test is -0.188 that the negative relationship between the two variables indicates that with age, resilience decreases and the level of conservatism increases.

Table 12. Pearson correlation for measuring the relationship between age and resilience

Resilience	Age		
-0.188**	1	Pearson correlation	Age
0.000		The significance level	
383	383	Number	
1	-0.188**	Pearson correlation	Resilience
	0.000	The significance level	
383	383	Number	

** At the level of 0.01 significant

Correlation between income and resilience

Income is also considered as one of the contextual variables and the effect on the economic dimension of resilience. Pearson test is used to correlate these two variables (Table 13). The results obtained from Pearson correlation coefficient test show that there is a significant relationship (0.003) between the two variables of income and resilience rate. In other words, the higher the income of individuals, their resilience is more. Income distribution is inversely related to resilience. That is, the greater the distribution of income in the city and between different strata, the economic resilience is more. The use of income distribution policies with the aim of increasing economic resilience will play an important role in the rapid movement of the city towards the development of resilience against risks.

Table 13. Pearson correlation for measuring the relationship between income and resilience

Resilience	Income		
-0.160**	1	Pearson correlation	Income
0.003		The significance level	
383	383	Number	
1	-0.160**	Pearson correlation	Resilience
	0.003	The significance level	
383	383	Number	

** At the level of 0.01 significant

Correlation between education and resilience

Literacy and education status is considered as one of the characteristics that determines the level of resilience in a society that is directly related to the dimensions of resilience. In this regard, the contextual variable (as an independent variable) and the dependent variable are also at the level of distance measurement, which is used for the correlation of these two variables according to the “Davas” guideline (Table 14).

Table 14. Pearson correlation for measuring the relationship between education and resilience

Resilience	Education		
0.311**	1	Pearson correlation	Education
0.001		The significance level	
383	383	Number	
1	0.311**	Pearson correlation	Resilience
	0.000	The significance level	
383	383	Number	

** At the level of 0.01 significant

Measuring the level of resilience and its dimensions

The dependent variable in this study is the resilience of households living in the neighborhoods of Birjand, which was measured based on the general concept of resilience in the economic dimension. Based on the findings of the household questionnaire, the overall economic resilience status is 3.9 (Table 15). Therefore, in order to better understand the collective situation of the households in each neighborhood, the total resilience rate and also its average dimensions for the

households of the 9 neighborhoods are presented separately in this section. In the study of sub-indices at the neighborhood level, it was found that the three neighborhoods in the north of the city have less resilience than the neighborhoods in the north of the city due to economic conditions. The general results of the research indicate that the city of Birjand has low resilience to natural hazards and needs serious attention. Finally, it can be said that the desirability of urban resilience in Birjand neighborhoods against natural hazards has been weak due to all dimensions and components and therefore this area is not resilient and stable against natural hazards.

Table 15. Resilience rate index and its average dimensions in 5 neighborhoods

Average	Neighborhoods	Resilience rate	Dimensions	Total resilience
2.59	Mehrshahr	Economic 3.5		
3.73	Avini			
3.25	Sajadshahr			
2.65	Army lands			
3.71	Moalem			
2.89	Bazar			
3.15	Zafar			
2.45	Administrative site			
2.27	Masoumiyah			

Testing hypotheses

After analyzing the data and research variables and gaining knowledge about how and the situation of citizens in the regions in terms of independent and dependent research variables, in this section, the relationship between independent variables and the degree of resilience is examined. Resilience of cities in different dimensions is a suitable and efficient way to strengthen the structure of the city to deal with crises and natural and unnatural hazards. Resilience and its promotion is the progress towards achieving the goals of sustainable development, which has received much international attention in the last decade. The results showed that 38% of the city area has moderate to low resilience and is in the danger zone. Also, Avini neighborhood area with 23% has the most resilience and Bazaar and Masoumiyah neighborhood with 37% area has the lowest incidence rate.

It seems that there is a significant relationship between economic components (job position, income level, etc.) and increasing the resilience of local communities (target areas) in Birjand.

To evaluate this hypothesis, the research method was “quantitative-survey” and its “relational” type was used. In relational analysis, “correlation” method and “Pearson correlation” technique were used. Therefore, the purpose of testing the second hypothesis is to determine the significant relationship between resilience and economic components of target households. In this regard, the results of Pearson correlation coefficient test show that there is a significant positive relationship between the two variables of resilience and components of economic dimension such as the amount and severity of damages, compensation capacity and return to suitable job and income conditions (sig = 0.000) and it can be said that the above hypothesis is confirmed (Table 16). In other words, the stronger the economic components among the citizens, their resilience is more.

Table 16. Investigates the correlation between the two variables of economic dimension and resilience

Economic	Resilience		
0.514**	1	Pearson correlation	Resilience
0.000		The significance level	
383	372	Number	
1	0.563**	Pearson correlation	Economic
	0.000	The significance level	
383	383	Number	

** At the level of 0.01 significant

Also, the correlation between the economic dimension and the degree of resilience by neighborhoods is shown in Table 17. According to the results, the highest and lowest correlations between resilience and economic dimension is related to Moalem and Mehrshahr neighborhood.

Table 17. A study of the relationship between two variables of economic dimension and the degree of resilience by neighborhoods

Correlation coefficient value	Coefficient	Neighbourhood
0.323**	Pearson correlation	Mehrshahr
0.000	The significance level	
51	Number	
0.472**	Pearson correlation	Bazar
0.000	The significance level	
60	Number	
0.712**	Pearson correlation	Moalem
0.000	The significance level	
42	Number	
0.519**	Pearson correlation	Army lands
0.000	The significance level	
27	Number	
0.391*	Pearson correlation	Masoumiyah
0.015	The significance level	
30	Number	
0.472*	Pearson correlation	Zafar
0.016	The significance level	
35	Number	
0.518*	Pearson correlation	Avini
0.017	The significance level	
62	Number	
0.442*	Pearson correlation	Administrative site
0.024	The significance level	
30	Number	
0.510*	Pearson correlation	Sajadshahr
0.015	The significance level	
46	Number	

* At the level of 0.05 significant

** At the level of 0.01 significant

The physical dimension is one of the effective dimensions in measuring the level of resilience through which the state of society can be evaluated in terms of physical and geographical characteristics affecting the occurrence of accidents. For this purpose, variables such as accessibility, the ratio of residential units with steel and concrete structures to the total residential units and the inverse of the density of building density in urban areas of Birjand were studied to measure this dimension.

IV. DISCUSSION AND CONCLUSION

The results of the study and evaluation of the economic vulnerability of Birjand neighborhoods to earthquakes show that due to the spatial distribution of vulnerabilities is located in the suburbs and northern neighborhoods of the city and over time have achieved a relatively better economic situation, but the new generation's satisfaction with life is very low. The reason for this is that over time the overall living conditions and absolute poverty have decreased but relative poverty is increasing. These neighborhoods need more attention. Therefore, improving their social conditions and using a partnership strategy to empower citizens in order to improve the quality of urban life in these neighborhoods is very important. Some neighborhoods such as Rajai, Kargaran, Javadiyeh and Musa Ibn Jafar are more vulnerable than other neighborhoods due to economic characteristics such as income, employment, family size, gender composition, etc. Also, unemployment and population density indices and housing units had a great impact on the vulnerability of Musa Ibn Jafar, Javadiyeh and Rajai neighborhoods. The results of this study related to the severity of vulnerability showed that the northern neighborhoods of the city had the highest vulnerability in terms of indicators compared to other neighborhoods against earthquakes. The results of this study are consistent with other studies such as Maleki et al. (2014), Ghadiri and Eftekhari (2012) and Darban Asaneh et al. (2017) [14-16].

Another important point is that the city of Birjand will play a vital role in times of human and natural crises as the main population center of South Khorasan province. However, this city currently does not have suitable conditions in terms of natural environment, and not only the protection of the lives and property of the people living in it should be considered in the existing constructions and planning, but he/she did not forget the relief role of this important population center for other surrounding areas. Households with high and low economic status live in different and distinct areas and there is a kind of separation and also a difference in the degree of vulnerability between them. Although it can be expected that poor and near-poor people will be greatly affected by the crisis due to their high degree of vulnerability and low adaptability, this does not mean that higher income groups are immune to crises.

Table 18. Economic situation of Birjand neighborhoods against earthquakes and floods (coefficients obtained from Coopras model)

Army lands	Avini	Administrative site	Masoumiyah	Mehrshahr	Bazar	Sajadshahr	Zafar	Moalem	Neighborhoods
									Dimensions

Lack of resilience	Somewhat resilient	Somewhat resilient	Lack of resilience	Lack of resilience	Lack of resilience	Somewhat resilient	Resilient	Somewhat resilient	Resilience status	Economic resilience
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