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# Analysis and Evaluation of Urban Regeneration Indicators in QESHM

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**Abstract:**

Cities are currently facing many challenges. Urban regeneration seeks to improve the physical, social, economic and ecological aspects of areas through various measures including redevelopment and reconstruction. Therefore, the present study investigated and evaluated the indicators of urban regeneration in Qeshm. For this purpose, a researcher-made questionnaire was created based on the research literature and consultation with experienced people in the civil fields, and then the questionnaire was distributed among 12 experts in this field. The collected data were evaluated and analyzed using the factor analysis method to identify the main effective factors and loads and the role of each of them in the development of urban regeneration indicators. Based on the obtained results, the infrastructure component was identified as the first and most important and effective factor of Qeshm urban regeneration with an average of 3.68. Based on this, the component of improving the security of residents was identified as the second factor with an average of 3.65. Also, among the main factors of urban regeneration, the economic dimension has the highest load with an average of 0.14, followed by social, environmental and physical dimensions with an average factor load of 0.13, 0.12 and 0.11.

**Keywords:** urban regeneration - main indicators - regeneration framework - factor analysis – Qeshm .

## 1. Introduction

Urban regeneration has been an important strategic option in promoting urban development globally. As urban regeneration is inextricably linked to social, economic and environmental sustainability, it is accepted to be considered in the context of a wider discussion on sustainable development. Population growth and urban displacement are two processes that greatly affect the quality of life of residents. In this context, urban regeneration has been proposed as the main driver of sustainable development of cities. Urban regeneration seeks to improve the physical, social, economic and ecological aspects of areas through various measures including redevelopment and reconstruction (Yang et al., 2022). Implementation of sustainable regeneration strategies is an important tool to achieve high quality urban development. Such strategies are of great importance for actors who seek to improve urban functions and optimize urban structures. Due to the failure of key urban regeneration projects in the 1980s, the concept of sustainable development was included in the urban regeneration agenda in the 1990s. Furthermore, this concept provides us with a wide range of policies and strategies to improve the socio-economic and spatial organization of cities with little or no adverse effects on the environment. Other important goals of regeneration include improving the quality of urban life, preventing displacement of the local population, and supporting the participation of governmental and non-governmental actors. It should be noted that recent examples of urban regeneration methods have an obvious dimension of climate change. In some countries, recent regeneration projects aim to create resource-efficient and climate-

friendly urban neighborhoods where environmental damage from urban development has been reduced (Yang et al., 2022). Old and undeveloped tissues in cities have faced a wide range of physical, social, economic and environmental problems. Therefore, from all these dimensions, they need a controlled movement to continue their life, but planning to organize these tissues is only in the direction of physical renovation, and other social, cultural, economic and environmental factors have been forgotten. Because physical reconstruction alone cannot solve the problems related to the texture and wear and tear of these areas, and more importantly, the needs of the residents and people of the area (Pascual et al., 2022). Therefore, the intervention method to organize this type of tissue should also be with an integrated approach and considering all dimensions. While the researches conducted in recent decades show that the regeneration approach can be pursued and realized at the level of a targeted conceptual framework, but the main focus on the distribution of minimal regeneration credits has led to the marginalization of the conceptual framework of researches and urban regeneration to a It has become a socio-cultural invalid concept. Therefore, even though university researches correctly deal with the issue of regeneration and pay attention to various and effective aspects of this process, in the field of decision-making and power, it is done in a different way, in a way that does not follow the people's support. This method of the entry of governance into the issue of regeneration is combined with interference in the cultural and social system of cities, this maximum reductionism in the main concepts and components of the regeneration process along with the withdrawal of people from the cycle of regeneration and the role of the government at minimal levels and to the extent of relief in Inefficient tissues.

On the other hand, sustainable urban regeneration is actions, policies and processes within the city that deal with physical, spatial, social, cultural and economic issues related to environmental effects, in order to reduce environmental risks and improve the environmental quality of urban systems, lifestyles and assets (Mareeva et al., 2022). In most political and

academic circles, it is agreed that urban regeneration can be defined as a set of four basic pillars: economic, physical-environmental, social and urban management. Evaluation of urban regeneration can be a guide for managers and activists involved in urban regeneration. Urban regeneration leads to rebuilding the economic base of urban areas and improving the physical environment to improve the quality of life and return the population to urban areas. As a result, it turns the urban area into an active space. Downtown can act as a catalyst for urban revitalization. Economic, social, physical and environmental revitalization of urban neighborhoods by introducing or creating new functions in an existing city that is declining due to changes in the industrial structure and urban development focusing on new areas. Currently, the assessment of the sustainability of urban regeneration is mainly based on the evaluation framework of the 4 main indicators of economic, environmental, social and physical sustainability in urban regeneration projects (Ricciardelli et al., 2021). In the situation that so far none of the upstream documents in the field of regeneration, including the "National Document for Empowerment and Organization of Informal Settlements" and the "National Strategic Document for Revival, Improvement and Renovation of Dilapidated and Inefficient Urban Tissues", so-called sustainable urban regeneration document, are of concern to the management. A city has not been completely destroyed, the issue of developing a conceptual framework for urban regeneration, especially within the limits of its dilapidated context, has a new and different effect because of a special type of parallel governance between two government institutions called the Free Zone Organization and the Municipality, because each of these Institutions have their own urban management policies and methods, which are sometimes inconsistent and even contradictory. This has led to problems in the field of urban management in general and urban regeneration in Qeshm city in particular. While due to greater economic benefits, programmatic and budgetary attention The free zone is focused on new urban contexts, the level of management ability, facilities and budget of the municipality has prevented this institution from entering the topic of regeneration of this part of the city. This is despite the fact that in addition to these two official institutions, informal institutions such as individuals and local councils and real estate activities also play their own role in various urban regeneration policies. In this research, for the purpose of detailed investigation, by studying and analyzing the factors affecting urban regeneration and choosing the appropriate approach, the urban fabric of Qeshm has been selected as the study area. This research seeks to examine the state of regeneration of Qeshm city in terms of physical, social, economic and environmental dimensions.

## 2- Research background

Hrantes-Pascal (2022), examining the integration of soundscape criteria in sustainable urban regeneration processes: an example of improving comfort and health, this research presents an example of a sustainable urban regeneration process in a small open field following the soundscape approach in urban design and includes a multidisciplinary team reports. The renovation of this urban public space brought changes in the acoustic environment and

improved the perception of the soundscape in a much more pleasant way (more comfort). Mareeva et al., (2022), in sustainable urban regeneration of damaged neighborhoods in Alghanim neighborhood, Doha, Qatar, identified factors that contribute to creating a sustainable neighborhood based on urban qualities such as integrated networks and walkable, open and green streets. Yang et al., (2022), in the study of community participation strategy for sustainable urban regeneration in Jamin China, presented a development plan with a participatory planning approach for sustainable community development, which can be used as a reference for community management in China and other countries in being developed Ricciardelli et al. (2021), examined three important environmental, economic and social indicators in sustainable urban regeneration. The results provided important concepts and guidelines for municipalities in the implementation of urban regeneration plans. José Ruá et al., (2021), a model for prioritizing sustainable urban regeneration in vulnerable areas using SWOT and CAME methods, provide suggestions and general guidelines for sustainable urban regeneration in complex contexts, which are urban environments, that physical conditions, Social and economic are clearly related. In their study, Lak et al. (2021) developed a conceptual framework for implementing sustainable urban regeneration using different types of ecosystem services (ESs). They stated that adopting new approaches for sustainable urban regeneration is necessary and can provide effective and efficient solutions for these problems. In this study, the important concepts of sustainable urban regeneration were investigated and the Delphi hierarchy process was used to identify and measure the sub-dimensions and criteria of sustainable urban regeneration. In the next step, these items were verified and evaluated by 21 international researchers to extract suggestions in a conceptual framework. The three main dimensions of sustainable urban regeneration in this framework are quality of place, quality of life and good governance. Also, five types of ecosystem services include regulating, providing, supporting, cultural and economic services. The findings of this study can help local authorities as well as urban planners and designers to gain a better understanding of the importance of ecosystem service capabilities in implementing sustainable urban regeneration in urban areas. Furlan et al. (2020) in their study presented a conceptual framework for urban regeneration and stated that in the past two decades, Doha, the capital of Qatar, has undergone rapid urban transformation. In 2013 and 2014, respectively, the Qatari government began construction of the Doha Metro and launched the Qatar National Development Framework (QNDF), an action plan to manage sustainable urban development at the national level. That is, the QNDF emphasizes the importance of linking the Doha Metro system with urban growth through Transportation-Oriented Developments (TODs), a model that maximizes the integration of transportation systems and land use, through sustainable, vibrant, livable, compact, and sustainable development. Emphasizes mixed use. Communities This research study focuses on Al Sadd, a mixed-use neighborhood located in the center of Doha. Al Sadd is an important place to examine the extent to which the TOD model can help improve urban living standards and strengthen long-term urban sustainability. The strategy for monitoring and evaluating the potential benefits of TOD is based on an on-site analysis (based on graph theory) of two

indicators: (1) diversity and density of the built environment and (2) travel behavior. The comprehensive approach revealed for Al Sadd TOD urban regeneration is based on a framework to strengthen (1) its mixed-use urban fabric and (2) its multimodal transportation systems. In turn, the proposed framework provides insights to gradually move towards interdisciplinary research and governance for TOD in Qatar and in the globalizing GCC through a long-term sustainability perspective.

In their research, Alvanchi et al. (2021) develop a comprehensive PPPP framework for urban neighborhood regeneration projects in Iran. They stated that the regeneration of urban areas is the subject of every municipality over time. Reconstruction projects are usually costly and directly affect many vulnerable members of society. Public-Private-People's Partnership (PPPP) is one of the methods adopted by different municipalities in these projects. Several influential entities with different backgrounds and uncertainties involved complicate the development process of PPPP projects. A carefully designed framework is needed to successfully deliver these projects. The collective experience of urban regeneration projects from field experts

has been used in the proposed framework. This framework specifies the feasibility study requirements that the government should conduct in the early stages of projects. Three standard form contracts designed in the framework regulate stakeholder relationships throughout the project life cycle. Field experts reviewed the capabilities of this framework and found it useful for future urban regeneration projects in the country. Although the identified issues are addressed in the proposed framework, prospective implementations of the framework require careful observation to identify potential improvement points. Lin and Meulder (2019) in their study presented a conceptual framework for a strategic urban project approach to the sustainable development of "Villages within the City" (ViCs) in Guangzhou. This conceptual framework attempts to introduce the methodology of the strategic urban project approach to the Chinese context. Adapting the methodology to deal with the multi- stakeholder environment and complex issues in ViCs is indeed essential in order to achieve sustainable redevelopment of ViCs. In this conceptual framework, attention is paid to the roles and participation of key stakeholders, perspectives at different levels, and specific actions that deal with opportunities and issues in strategic locations. In their study, Wang et al. (2018) develop a conceptual framework of factors identified from the literature that influence the decision-making process for sustainable use planning of urban renewal and regeneration projects. Urban renewal is an emerging issue in almost all developed cities with a long history. To revive the vision and function of old areas in these cities, many urban renewal projects have been launched by local governments in recent years. In this study, three typical redevelopment projects in Hong Kong are studied to contribute to the practical understanding of such projects and the actual factors involved. Also, based on the difference between the factors in the theoretical framework and the factors found in real cases, the work needed to improve sustainable site planning in urban renewal projects is discussed. In their research, Norashekin et al. (2018) designed a conceptual framework for the development of heritage city indicators using indicator selection methods with a strong emphasis on intangible culture. The elements

of this framework include policy context, theoretical perspectives and local issues. The framework was developed based on a bottom-up approach using a stakeholder consultation model. It is a community-oriented and holistic approach that focused on the participation and accompaniment of the local community with the government's policy goals, for this purpose in this study, a methodological process is presented to ensure all the necessary aspects. Zhang et al. (2021) stated in their study that urban regeneration involves several stakeholders with different interests, such as the government, companies, communities, and residents, which is a complex collective action. Therefore, how to coordinate the complex demands of different stakeholders in urban renewal, improve the efficiency of urban renewal projects, and ensure the orderly progress of urban renewal is very important. To address this issue, a network model of urban renewal has been built using the social network method. Urban renewal project networks were compared and analyzed with UCINET6 software. This study considers the governance of the urban regeneration project as the research objective and conducts a more comprehensive analysis of the problems in urban renewal. The results show that the cooperative relationship of multiple institutions in the process of urban renewal affects the result of urban renewal. Improving cooperation relationships between multiple institutions in urban renewal facilitates the successful implementation of urban renewal projects and improves the effect of urban renewal. Finally, to promote the realization of diverse urban renewal goals, this study proposes strategies to improve the governance of urban renewal from various aspects: optimizing the urban renewal negotiation platform, increasing the participation of multiple institutions in urban renewal, regulating the behavior of participants in urban renewal through policies. And Regulation. Goudarzi et al. (2021) conducted their study with the aim of providing a framework for the management process of urban regeneration. The literature review of urban regeneration theories and its development process, especially emphasizing the procedural dimension and institutional aspects of these approaches, regarding global experiences, shows a change in attitude and actors involved in this process. The purpose of this study is to design a high-level model for the management process of urban regeneration based on the governance approach of urban regeneration. Qualitative method (parasynthesis) was used to answer the research question. 7-step metasynthesis was performed based on the model of Sandlowski and Barroso. During the process of research and selection of entry and exit protocols, from 9189 identified documents (papers, reports, books, etc.), finally, 46 documents were analyzed using the latent content analysis strategy, and 57 primary codes, 14 concepts And 5 categories have been extracted. Then, to calculate the reliability of the codes, the Kappa coefficient formula was used, and its value was calculated to be 0.787. Shannon's entropy formula was also used to prioritize research codes. Finally, after completing the research stages, based on the integrated approach of the PCF framework, the golden cycle, Porter's value chain and the governance framework

of urban regeneration were designed.

Table 1. Studies conducted in the field of urban regeneration and the important variables determined for regeneration in these studies

| Row | Factors considered in the context of urban regeneration frameworks | Researcher / year |
|---|---|---|
| 1 | Economic factors and job creation and government budget and budgets of local organizations and government support | Lak et al. (2021) - Furlan et al. (2020) - Wong, 2015 - Kidokoro et al. (2018) - Bin (2023) - Jessen (2019) - Trono et al. (2017) - Mareeva et al. (2022) - Ricciardelli et al)2021( . |
| 2 | Cultural and social works and monitoring and evaluation of effective management perspectives - the level of participation and companionship of the local community - cooperative relationship of institutions - flexibility in governance - social justice - interaction of institutions | Furlan et al. (2020) - Lak et al. (2021) - Lin and Meulder (2019) - Norashekin et al. (2018) - Zhang et al. (2021) - Bin (2023) - Booth (2016) - Jessen (2019) - Ricciardelli et al)2021( . |
| 3 | environmental such as consideration of environmental needs - attention to the environment - attention to sustainable development and the environment - coordination of institutions in the field of environmental needs | Wong, 2015 - Kidokoro et al. (2018) - Amini et al (2018) - Diamond et al. (2015) - Trono et al. (2017) - Yang et al. (2022) - Ricciardelli et al)2021( . |
| 4 | A body like urban policy - orientation and supervision of urban construction - attention of local governance to the problem of urban appearance - managerial skills in urban development - platform optimization - theoretical perspectives in urban fields | Diamond et al., 2015 - Trono et al. (2017) - Amini et al (2018) - Zhang et al. (2021) - Norashekin et al. (2018) - Herranz-Pascual (2022) - Ruá et al . )2021( |

**3-** Research method

To carry out this research, first through library studies and internet sites, surveys were conducted with the aim of identifying the success factors of a project as well as identifying the types of factors affecting urban regeneration, and in the next stage, a semi-structured interview with experts in this field with the aim of Localization of criteria has been done. Also, by using the brainstorming technique and the use of experts, the questions prepared in line with the purpose of the research and distributed to the relevant people through the preparation of questionnaires. The statistical population used in this research are professionals working in civil and urban fields in Qeshm Island. Questionnaires have been distributed among experts. Data analysis based on the factor analysis method has been done in three stages:

1- Unrotated factor analysis on each of the constructs (corporate governance, project success) as a Harman test for possible common method bias

2. Varimax rotation factor analysis (principal component analysis) with an eigenvalue of 1 to determine the factors representing each of the structures used.

3. Regression analysis to test the correlation between independent structures (governance orientation) and dependent structure (project success).

**3-1 factor analysis**

Factor analysis is a technique that enables the reduction of a large number of interdependent variables in the form of a smaller number of hidden or hidden dimensions (factors) so that there is the least amount of missing information. Its main purpose is to summarize the data. This method examines the internal correlation of a large number of variables and finally categorizes and explains them in the form of limited general factors. Therefore, the value of factor analysis is that it provides a useful organizational plan that can be used to explain a multitude of behavior with the greatest economy of explanatory constructs. Factor analysis, unlike multiple regression, diagnostic analysis or focal correlation (in which there are many independent variables and one or more dependent variables), is also a dependent method in which all variables are considered simultaneously (Shrestha, 2020). ).

**2-3 research tools**

In order to evaluate the factors affecting urban regeneration in Qeshm, a researcher-made questionnaire was used. This questionnaire has 33 questions which are shown in table 2. This questionnaire has been validated by the participating experts and is based on a five-point Likert scale. The questionnaire measures the dimensions of the main indicators of urban regeneration, such as economic, environmental, social and physical dimensions. Participating experts will be consulted and approved regarding the relevance of the questions, the clarity and comprehensibility of the questions, and whether these questions are appropriate for the research questions and evaluate them. In order to use this questionnaire, for the purposes of this research, the questions of its different criteria have been formulated with the benefit of the consultation of professors and experienced people. After making the initial corrections and obtaining expert views of the people, the questionnaire has been finalized as shown in Table 2. The participants were experts and experts in Qeshm's construction and urban planning fields with related experiences and records. The number of experts participating in the research was 12 people, all of whom have more than 15 years of related work experience in this field, and eight people have doctoral education and four people have advanced graduate education. Two of the participants are women and the rest are men.

Table 2. Research questionnaire to evaluate the effective factors on the urban regeneration of Qeshm (researcher made)

| ردیف | Factor | Sub invoice |
|---|---|---|
| 1 | Economic dimensior | Paying attention to job creation and the availability of local employment in Qeshm and the quality of the jobs created |
| 2 | | Diversification of businesses and commercial services on the island along with promoting the development of small businesses |
| 3 | | Housing affordability, providing housing for different income groups |
| 4 | | Attention to the ratio of rent to income |
| 5 | | Increase in income, level of satisfaction with job income, purchasing power for daily life needs |
| 6 | Environmental dimension | energy efficiency of building materials, |
| 7 | | Environmentally friendly building materials |
| 8 | | Provision of open space and green space |
| 9 | | Separation and treatment of household waste and recycling from building materials |
| 10 | | Revival of contaminated and loose land and efficient use of land |
| 11 | | Prevention and control of pollutants |

| | | |
|---|---|---|
| 12 | | Energy efficient facilities |
| 13 | | The use of renewable energy according to the potential of the sea and the sun of the island |
| 14 | | Attention to the green space, recreational area for different groups of citizens and tourists |
| 15 | | Repair and reconstruction of repairable building structures |
| 16 | | Walking and cycling routes, work and leisure trips |
| 17 | | Paying attention to the land assigned to the parking lot |
| 18 | | Variety of modes of transportation |
| 19 | physical dimension | Access to cultural centers (cultural center, library) |
| 20 | | Access to green and recreational and sports spaces |
| 21 | | Access to health and emergency centers |
| 22 | | Access to daily shopping centers in the neighborhood |
| 23 | | Access to emergency facilities (pharmacy, fire department, etc.) |
| 24 | | Paying attention to the look and appearance of the construction o local buildings |
| 25 | | Attention to the width of roads and sidewalks |
| 26 | Social dimension | Attention to age diversity and population growth |
| 27 | | Paying attention to the combination of income, positions and educational qualifications |
| 28 | | Security of neighborhoods and public places, reduction of crime rate |
| 29 | | Paying attention to the lighting condition of the passages and sidewalks |
| 30 | | Quick response to fire or emergency |
| 31 | | Protection of the local built heritage of Qeshm |
| 32 | | Preservation of local characteristics |
| 33 | | Preservation of local culture |

**4- Findings**

**4-1 Data review**

At first, the collected data is reviewed to ensure that there is a factor analysis and its idea of the data. Among this information, the following can be mentioned:

- All frequency distributions seem acceptable and there is no strange case of data distribution among them.
- All variables are positively coded: larger values in the survey indicate more positive feelings.
- The tables show that the data have a normal distribution and dispersion.

The statistical analysis of the data shows that all the collected data have the above characteristics.

**2-4 Analytical findings**

In this section, exploratory factor analysis is done using SPSS software. In the first step, this analysis is applied to the extracted data, and then they are explained step by step.

First step: data variance:

With 33 input variables, principal component analysis (PCA) initially extracted 13 factors (or "components"). Each component has a quality score called eigenvalues. Only components with eigenvalues greater than 1.5 are likely to represent a true main factor (Table 3).

Table 3. Eigenvalues and extracted loads obtained for questionnaire questions

| Sub-components of corporate governance | Initial eigenvalues | | | The sum of squared extraction loads | | | The sum of the squared loads rotated | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Percentage of variance | The cumulative percentage | Total | Percentage of variance | The cumulative percentage | Total | Percentage of variance | The cumulative percentage |
| 1 | 3.944 | 11.952 | 11.952 | 3.944 | 11.952 | 11.952 | 2.680 | 8.121 | 8.121 |
| 2 | 3.265 | 9.895 | 21.847 | 3.265 | 9.895 | 21.847 | 2.658 | 8.055 | 16.175 |
| 3 | 3.035 | 9.197 | 31.044 | 3.035 | 9.197 | 31.044 | 2.336 | 7.080 | 23.255 |
| 4 | 2.596 | 7.867 | 38.911 | 2.596 | 7.867 | 38.911 | 2.194 | 6.647 | 29.902 |
| 5 | 2.441 | 7.398 | 46.309 | 2.441 | 7.398 | 46.309 | 2.157 | 6.535 | 36.437 |
| 6 | 2.027 | 6.142 | 52.451 | 2.027 | 6.142 | 52.451 | 2.112 | 6.399 | 42.837 |
| 7 | 1.934 | 5.860 | 58.311 | 1.934 | 5.860 | 58.311 | 2.091 | 6.336 | 49.173 |
| 8 | 1.727 | 5.234 | 63.544 | 1.727 | 5.234 | 63.544 | 2.059 | 6.239 | 55.412 |
| 9 | 1.518 | 4.600 | 68.145 | 1.518 | 4.600 | 68.145 | 2.042 | 6.188 | 61.600 |
| 10 | 1.473 | 4.464 | 72.609 | 1.473 | 4.464 | 72.609 | 2.041 | 6.184 | 67.784 |
| 11 | 1.363 | 4.131 | 76.740 | 1.363 | 4.131 | 76.740 | 2.019 | 6.119 | 73.903 |
| 12 | 1.199 | 3.633 | 80.373 | 1.199 | 3.633 | 80.373 | 1.845 | 5.591 | 79.494 |
| 13 | 1.107 | 3.356 | 83.728 | 1.107 | 3.356 | 83.728 | 1.397 | 4.234 | 83.728 |
| 14 | .950 | 2.878 | 86.606 | | | | | | |
| 15 | .862 | 2.613 | 89.219 | | | | | | |
| 16 | .811 | 2.456 | 91.676 | | | | | | |
| 17 | .670 | 2.030 | 93.705 | | | | | | |
| 18 | .638 | 1.934 | 95.639 | | | | | | |
| 19 | .628 | 1.904 | 97.543 | | | | | | |
| 20 | .456 | 1.381 | 98.924 | | | | | | |
| 21 | .355 | 1.076 | 100.000 | | | | | | |
| 22 | 3.811E-16 | 1.155E-15 | 100.000 | | | | | | |
| 23 | 3.459E-16 | 1.048E-15 | 100.000 | | | | | | |
| 24 | 1.639E-16 | 4.966E-16 | 100.000 | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 25 | 1.106E-16 | 3.351E-16 | 100.000 | | | | | | |
| 26 | -3.872E-19 | -1.173E-18 | 100.000 | | | | | | |
| 27 | -3.720E-17 | -1.127E-16 | 100.000 | | | | | | |
| 28 | -1.292E-16 | -3.915E-16 | 100.000 | | | | | | |
| 29 | -2.182E-16 | -6.611E-16 | 100.000 | | | | | | |
| 30 | -3.707E-16 | -1.123E-15 | 100.000 | | | | | | |
| 31 | -4.658E-16 | -1.412E-15 | 100.000 | | | | | | |
| 32 | -6.018E-16 | -1.824E-15 | 100.000 | | | | | | |
| 33 | -7.649E-16 | -2.318E-15 | 100.000 | | | | | | |

In factor analysis, a general rule is to select components whose eigenvalue is at least 1. Using this simple rule in Table 3 answers the first question of our research: it seems that the 13 components examined in this research measure 13 basic factors. The reason for this is that only the first 13 components have an eigenvalue greater than 1. Other components that have low quality scores (eigenvalues smaller than 1) are not suitable representatives for the real characteristics of the 33 questions of the questionnaire of factors affecting urban regeneration in Qeshm.

Second step: scree chart

The scree plot refers to the eigenvalues (quality scores) and as can be seen here, the first 13 components have eigenvalues greater than 1. These "effective factors" are used in modeling and forming statistical models. After that, i.e. the 14th component and subsequent components, the corresponding eigenvalues drop dramatically. Therefore, based on the scree plot, the sharp drop between components 1 to 13 and components 14 to 33 strongly suggests that the first 13 factors are the main context of our questions (Figure 1).

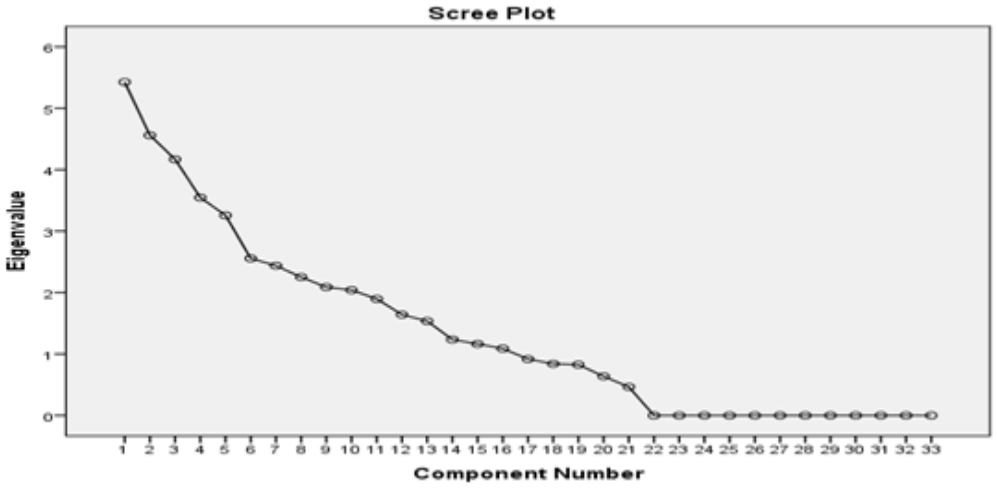


Figure 1. Scare diagram of the data obtained from the present research

Third step: Cumulative analysis

According to what has been stated so far in connection with the data obtained from the questionnaire, the question that arises is that to what extent our 13 basic factors account for the variance of the 33 input variables? The answer to this question is related to the square value of r or r2. The value of r2 in factor analysis is known as the degree of sharing of factors. The share of the factors is presented in the correlation table between the factors (Table 4).

Table 4. The share of factors and correlation between them

| | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 | Factor 6 | Factor 7 | Factor 8 | Factor 9 | Factor 10 | Factor 11 | Factor 12 | Factor 13 | Factor 14 | Factor 15 | Factor 16 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| | 0.709 | 0.621 | 0.635 | 0.843 | 0.872 | 0.854 | 0.968 | 0.917 | 0.47 | 0.986 | 0.613 | 0.477 | 0.545 | 0.925 | 0.939 | 0.709 | |
| | Factor 17 | Factor 18 | Factor 19 | Factor 20 | Factor 21 | Factor 22 | Factor 23 | Factor 24 | Factor 25 | Factor 26 | Factor 27 | Factor 28 | Factor 29 | Factor 30 | Factor 31 | Factor 32 | Factor 33 |
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | 0.943 | 0.984 | 0.486 | 0.668 | 0.978 | 0.993 | 0.925 | 0.939 | 0.943 | 0.984 | 0.978 | 0.993 | 0.986 | 0.843 | 0.872 | 0.854 | 0.968 |

Therefore, if q1 is predicted by its 13 components with multiple regression, the value of r2 will be equal to 0.709. In this way, the relationship of these components with the value of q1 is determined. Variables that have less relationships, for example, their r2 value is less than 0.5, do not have much effect in measuring the basic factors in factor analysis with SPSS. In this way, such variables or, more correctly, such components can be removed from the analysis. Usually, instead of removing these variables, the entire analysis is repeated by removing factors one by one, and then the results are checked. Maybe the presence of one factor is removed and removing another factor improves the model.

The fourth step: matrix of components

Thus far, we conclude that the 33 study variables likely measure 13 underlying factors. Pearson's correlation component matrix shows the relationship between observations and components. These correlations are called "Factor Load" and through it one can find out exactly what feature each component or factor has measured (Table 5).

Table 5. Showing the factor loadings and determining the relationship between the factor and the variables of the factor analysis

| | **matrix of components** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 1 | 0.034 | - 0.128 | 0.172 | - 0.168 | 0.532 | 0.201 | - 0.035 | - 0.151 | 0.357 | - 0.198 | - 0.255 | 0.138 | 0.188 |
| 2 | 0.081 | - 0.215 | 0.191 | 0.219 | - 0.319 | 0.092 | 0.236 | - 0.202 | 0.019 | - 0.413 | 0.323 | 0.039 | 0.019 |
| 2 | 0.32 | -0.1 | - 0.315 | 0.297 | - 0.345 | - 0.001 | - 0.077 | - 0.047 | - 0.371 | - 0.173 | 0.054 | - 0.124 | 0.151 |
| 4 | 0.657 | 0.16 | - 0.424 | 0.211 | 0.029 | 0.045 | -0.1 | 0.149 | -0.2 | 0.216 | - 0.192 | - 0.046 | 0.013 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 0.517 | 0.109 | - 0.128 | - 0.535 | 0.151 | 0.129 | 0.399 | 0.137 | - 0.178 | - 0.087 | -0.11 | 0.063 | - 0.131 |
| 6 | 0.489 | - 0.541 | - 0.017 | 0.277 | 0.251 | 0.132 | 0.273 | -0.05 | 0.039 | - 0.155 | 0.211 | 0.022 | - 0.132 |
| 7 | 0.159 | 0.391 | 0.504 | 0.364 | 0.093 | - 0.155 | 0.357 | - 0.208 | 0.068 | 0.147 | - 0.078 | -0.41 | 0.01 |
| 8 | 0.298 | 0.691 | 0.265 | - 0.002 | 0.044 | 0.062 | 0.073 | -0.2 | -0.02 | 0.177 | 0.19 | 0.377 | - 0.135 |
| 9 | 0.151 | 0.259 | - 0.006 | 0.083 | - 0.197 | 0.193 | - 0.236 | - 0.043 | 0.168 | -0.06 | 0.188 | 0.391 | 0.142 |
| 10 | 0.216 | 0.026 | 0.444 | -0.1 | 0.283 | 0.337 | - 0.586 | - 0.145 | - 0.338 | - 0.097 | 0.102 | - 0.191 | - 0.043 |
| 11 | 0.028 | - 0.085 | 0.146 | - 0.011 | 0.428 | 0.221 | - 0.108 | - 0.128 | 0.378 | - 0.137 | - 0.349 | 0.075 | 0.189 |
| 12 | 0.091 | - 0.215 | 0.269 | 0.301 | - 0.214 | 0.158 | 0.196 | - 0.072 | - 0.094 | - 0.192 | 0.254 | 0.163 | 0.095 |
| 13 | 0.155 | 0.015 | - 0.204 | 0.148 | - 0.258 | - 0.121 | - 0.031 | - 0.258 | - 0.303 | - 0.022 | -0.01 | 0.058 | 0.461 |
| 14 | 0.547 | 0.31 | - 0.221 | 0.193 | - 0.243 | 0.064 | - 0.268 | 0.136 | 0.499 | -0.15 | 0.048 | - 0.131 | - 0.011 |
| 15 | 0.364 | - 0.056 | 0.211 | - 0.698 | - 0.191 | - 0.207 | 0.005 | 0.076 | 0.13 | 0.008 | 0.289 | - 0.213 | 0.204 |
| 16 | 0.339 | - 0.628 | 0.133 | 0.04 | 0.029 | - 0.182 | -0.16 | - 0.128 | 0.131 | 0.549 | 0.08 | 0.117 | - 0.025 |
| 17 | 0.002 | - 0.089 | 0.552 | 0.17 | - 0.188 | 0.358 | 0.1 | 0.647 | - 0.033 | 0.137 | - 0.075 | 0.058 | 0.151 |
| 18 | 0.45 | - 0.187 | - 0.162 | 0.083 | 0.36 | 0.125 | 0.124 | - 0.049 | 0.017 | - 0.108 | - 0.128 | - 0.059 | 0.143 |
| 19 | 0.11 | 0.15 | - 0.001 | -0.01 | 0.211 | - 0.074 | 0.177 | - 0.165 | - 0.091 | 0.073 | - 0.052 | 0.161 | 0.695 |
| 20 | - 0.343 | 0.195 | - 0.431 | 0.085 | 0.486 | 0.233 | 0.078 | 0.182 | 0.047 | 0.194 | 0.474 | - 0.145 | 0.118 |
| 21 | 0.136 | 0.084 | 0.189 | 0.199 | 0.412 | - 0.689 | - 0.159 | 0.362 | -0.09 | - 0.241 | 0.086 | 0.137 | 0.002 |
| 22 | 0.547 | 0.31 | - 0.221 | 0.193 | - 0.243 | 0.064 | - 0.268 | 0.136 | 0.499 | -0.15 | 0.048 | - 0.131 | - 0.011 |
| 24 | 0.339 | - 0.628 | 0.133 | 0.04 | 0.029 | - 0.182 | -0.16 | - 0.128 | 0.131 | 0.549 | 0.08 | 0.117 | - 0.025 |
| 25 | 0.002 | - 0.089 | 0.552 | 0.17 | - 0.188 | 0.358 | 0.1 | 0.647 | - 0.033 | 0.137 | - 0.075 | 0.058 | 0.151 |
| 26 | - 0.343 | 0.195 | - 0.431 | 0.085 | 0.486 | 0.233 | 0.078 | 0.182 | 0.047 | 0.194 | 0.474 | - 0.145 | 0.118 |
| 27 | 0.136 | 0.084 | 0.189 | 0.199 | 0.412 | - 0.689 | - 0.159 | 0.362 | -0.09 | - 0.241 | 0.086 | 0.137 | 0.002 |
| 28 | 0.216 | 0.026 | 0.444 | -0.1 | 0.283 | 0.337 | - 0.586 | - 0.145 | - 0.338 | - 0.097 | 0.102 | - 0.191 | - 0.043 |
| 29 | 0.657 | 0.16 | - 0.424 | 0.211 | 0.029 | 0.045 | -0.1 | 0.149 | -0.2 | 0.216 | - 0.192 | - 0.046 | 0.013 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 0.517 | 0.109 | - 0.128 | - 0.535 | 0.151 | 0.129 | 0.399 | 0.137 | - 0.178 | - 0.087 | -0.11 | 0.063 | - 0.131 |
| 31 | 0.489 | - 0.541 | - 0.017 | 0.277 | 0.251 | 0.132 | 0.273 | -0.05 | 0.039 | - 0.155 | 0.211 | 0.022 | - 0.132 |
| 32 | 0.159 | 0.391 | 0.504 | 0.364 | 0.093 | - 0.155 | 0.357 | - 0.208 | 0.068 | 0.147 | - 0.078 | -0.41 | 0.01 |
| 33 | 0.298 | 0.691 | 0.265 | - 0.002 | 0.044 | 0.062 | 0.073 | -0.2 | -0.02 | 0.177 | 0.19 | 0.377 | - 0.135 |

Ideally, each input variable measures exactly one factor. But as seen in the above table, the variables measure different factors. In this case, rotation is done. Factor loads are distributed on the factors based on some mathematical rules that are calculated with SPSS software. With this work, factors and factor loadings are redefined and calculated. There are various rotation methods, but the most common one is varimax rotation, which is called "variable maximization" for short. This method tries to distribute factor loadings in such a way that each group of variables measures exactly one factor, which is the ideal scenario for understanding factors.

The fifth step: matrix of rotated components

Now, in order to investigate the issue of which variables measure which factors, in the current step, the matrix of rotated components must be calculated. This matrix is shown in Table 6.

| | matrix of components | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Agents | | | | | | | | | | | | |
| Factor | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 1 | .078 | -.067 | .016 | .021 | -.007 | .023 | -.032 | .012 | .028 | -.038 | .106 | .825 | -.032 |
| 2 | -.165 | .004 | -.128 | .094 | .019 | .720 | .036 | -.167 | -.091 | .005 | -.039 | -.097 | .036 |
| 3 | .106 | .299 | -.029 | -.142 | -.205 | .266 | -.086 | -.122 | -.034 | -.079 | .108 | -.423 | .425 |
| 4 | .525 | .537 | .222 | -.253 | .018 | -.156 | .023 | .031 | .053 | -.012 | .082 | -.207 | .295 |
| 5 | .869 | -.024 | -.101 | .273 | .128 | .001 | -.055 | -.056 | -.043 | -.017 | -.034 | .047 | -.048 |
| 6 | .344 | .096 | .388 | -.106 | -.164 | .705 | .036 | .080 | .090 | -.025 | .036 | .136 | -.069 |
| 7 | -.039 | .026 | -.039 | -.018 | .158 | .052 | .961 | -.055 | .066 | .070 | .020 | .017 | .023 |
| 8 | .137 | .080 | -.065 | .006 | .905 | -.049 | .233 | -.005 | .035 | -.021 | .090 | -.041 | .006 |
| 9 | -.176 | .318 | -.059 | .006 | .473 | .095 | -.256 | -.016 | -.062 | .081 | .033 | .054 | .147 |
| 10 | -.002 | -.012 | .029 | .060 | .086 | .008 | .019 | -.038 | .027 | .056 | .977 | .111 | -.027 |
| 11 | -.007 | .063 | .027 | -.102 | -.049 | -.042 | .030 | -.032 | -.019 | .018 | .101 | .762 | -.002 |
| 12 | -.122 | -.071 | .021 | -.040 | .099 | .600 | .027 | -.103 | -.042 | .224 | .017 | -.079 | .125 |
| 13 | -.044 | .061 | .001 | -.022 | -.007 | .081 | -.037 | -.123 | -.054 | -.137 | -.010 | -.194 | .676 |
| 14 | .008 | .944 | -.045 | .101 | .119 | .039 | .029 | -.040 | .007 | -.024 | -.033 | .024 | -.044 |
| 15 | .164 | .058 | .101 | .938 | .005 | -.030 | -.017 | -.104 | .010 | .004 | .065 | -.044 | .013 |
| 16 | -.039 | -.019 | .951 | .103 | -.062 | .080 | -.041 | -.114 | .009 | .013 | .025 | .026 | .005 |
| 17 | -.026 | -.021 | .010 | .004 | -.001 | .077 | .063 | -.057 | -.004 | .980 | .055 | -.005 | -.073 |
| 18 | .428 | .182 | .160 | -.089 | -.162 | .210 | .065 | .087 | .061 | -.079 | .080 | .317 | .192 |
| 19 | .075 | -.122 | -.006 | .107 | .156 | -.042 | .122 | .134 | .077 | .021 | -.095 | .291 | .691 |
| 20 | -.027 | -.035 | -.106 | -.103 | -.008 | -.085 | -.054 | .968 | -.014 | -.060 | -.039 | .005 | -.024 |
| 21 | -.014 | .012 | .015 | .008 | .016 | -.020 | .065 | -.013 | .993 | -.004 | .026 | .013 | -.001 |
| 22 | .008 | .944 | -.045 | .101 | .119 | .039 | .029 | -.040 | .007 | -.024 | -.033 | .024 | -.044 |
| 23 | .164 | .058 | .101 | .938 | .005 | -.030 | -.017 | -.104 | .010 | .004 | .065 | -.044 | .013 |
| 24 | -.039 | -.019 | .951 | .103 | -.062 | .080 | -.041 | -.114 | .009 | .013 | .025 | .026 | .005 |
| 25 | -.026 | -.021 | .010 | .004 | -.001 | .077 | .063 | -.057 | -.004 | .980 | .055 | -.005 | -.073 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26 | -.027 | -.035 | -.106 | -.103 | -.008 | -.085 | -.054 | .968 | -.014 | -.060 | -.039 | .005 | -.024 |
| 27 | -.014 | .012 | .015 | .008 | .016 | -.020 | .065 | -.013 | .993 | -.004 | .026 | .013 | -.001 |
| 28 | -.002 | -.012 | .029 | .060 | .086 | .008 | .019 | -.038 | .027 | .056 | .977 | .111 | -.027 |
| 29 | .525 | .537 | .222 | -.253 | .018 | -.156 | .023 | .031 | .053 | -.012 | .082 | -.207 | .295 |
| 30 | .869 | -.024 | -.101 | .273 | .128 | .001 | -.055 | -.056 | -.043 | -.017 | -.034 | .047 | -.048 |
| 31 | .344 | .096 | .388 | -.106 | -.164 | .705 | .036 | .080 | .090 | -.025 | .036 | .136 | -.069 |
| 32 | -.039 | .026 | -.039 | -.018 | .158 | .052 | .961 | -.055 | .066 | .070 | .020 | .017 | .023 |
| 33 | .137 | .080 | -.065 | .006 | .905 | -.049 | .233 | -.005 | .035 | -.021 | .090 | -.041 | .006 |

A factor (or component) represents all the common items between the main variables. The rotation component matrix obtained in this research shows which variables are measured by our first component. Here, the higher the absolute value of the correlation coefficients, it indicates which of the 13 extracted hidden factors are related to which questionnaire item. Here, correlation values higher than 0.5 are considered as the criterion value. Therefore, it can be concluded that the 5 questions related to items 4, 5, 18 and 30 are measured by the load or the first factor component. The questions expressed in these five questions of the questionnaire somehow represent the "development of the island's infrastructure". Regarding the second factor, it can be seen that it measures questions 4, 14, 22 and 29 and indicates "special attention

to tourism". In the same way, the other extracted factors are each related to a number of obvious variables (questionnaire questions). In Table 7, you can briefly see the extracted factors.

The sixth step: adding factors' scores to the data

It is quite common to add actual component or factor scores to questionnaire data. This action is often used as predictor in regression analysis or stimulus in cluster analysis. Therefore, at this stage, after determining the factors and their related variables, the collected data was described this time based on 13 extracted factors in order to determine the role of each of them in corporate governance and the success of projects. . For example, for the first factor, the average scores and data collected for questions 4, 5, 18, and 30 are calculated, and the same is done for the following factors (Table 7).

Table 7. Descriptive parameters for the data related to the extracted 16 factors

| Agent number | Extracted agent | Number | Minimum | Maximum | Average | standard deviation |
|---|---|---|---|---|---|---|
| 1 | Infrastructure development | 11 | 2.51 | 4.86 | 3.685 | 0.523 |
| 2 | Special attention to tourism | 11 | 2.36 | 4.68 | 3.52 | 0.416 |
| 3 | Attention to aesthetic and visual aspects | 11 | 2.45 | 4.76 | 3.605 | 0.564 |
| 4 | Building safety and benefiting from modern structural science | 11 | 2.15 | 4.39 | 3.27 | 0.386 |
| 5 | Attention to the native culture and folklore of the island | 11 | 2.08 | 4.64 | 3.36 | 0.092 |
| 6 | Paying attention to the discussion of energy and facilities | 11 | 2.31 | 4.95 | 3.63 | 0.491 |
| 7 | Restoration of historical monuments | 11 | 2.49 | 4.39 | 3.44 | 0.082 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | Suitable spaces for youth sports | 11 | 2.16 | 4.56 | 3.36 | 0.419 |
| 9 | Treatment spaces with expert staff | 11 | 2.31 | 4.81 | 3.56 | 0.082 |
| 10 | Reduction of heavy traffic and traffic | 11 | 2.38 | 4.91 | 3.645 | 0.082 |
| 11 | Improving the security of residents | 11 | 2.46 | 4.84 | 3.65 | 0.0453 |
| 12 | Paying attention to employment and expertise in | 11 | 2.42 | 4.75 | 3.585 | 0.562 |
| | the fields of reducing pollution | | | | | |
| 13 | Efficient educational and cultural centers | 11 | 2.51 | 4.67 | 3.59 | 0.487 |

As the above table shows, the first component or factor related to the extracted indicators of Qeshm urban regeneration is "infrastructure development" and after that the eleventh component is "improving the security of residents" is one of the main factors affecting Qeshm urban regeneration based on the analysis are a done factor. These factors are also shown in Figure 2. Also, the statistical analysis of the factor load data obtained for the questionnaire questions indicates that among the four main dimensions of urban regeneration, the economic dimension has the highest load with an average of 0.14, followed by the social, environmental and physical dimensions with an average load. Factors are 0.13, 0.12 and 0.11.

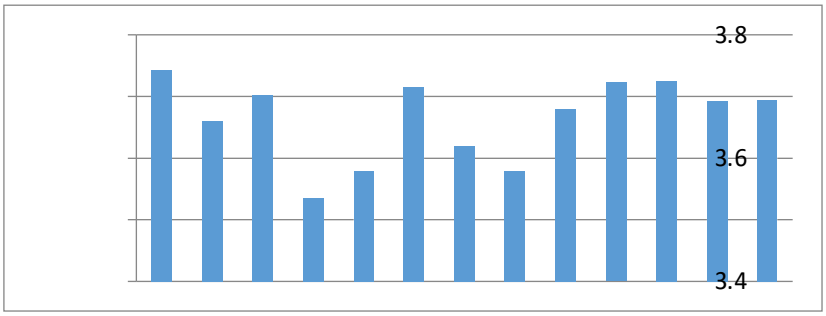


Figure 2. Column chart of the factor loadings of the extracted indicators for the urban regeneration of Qeshm

**conclusion and discussion:**

The industrial revolution and the resulting technological advances accelerated demographic changes and increased the population. This increase in population mostly focused on the urban centers and caused social and environmental balance to be disrupted. According to the United Nations Fund report, the world's urban population is expected to increase to five billion people by 2030. The development of urbanization has left significant effects on the old and worn-out tissues, and the settlement of a large population, who are mostly immigrants, brings the destruction and wear and tear of the aforementioned tissues.

In recent world literature, the term "urban regeneration" is used as a general term that includes other concepts such as improvement, renovation, reconstruction, empowerment, and revitalization. Urban regeneration is a process that leads to the creation of a new urban space by maintaining the main spatial characteristics (physical and functional). In this action, a new urban space is created, which, along with the basic similarities with the old urban space, shows substantive and semantic differences with the old space. In other words, urban regeneration is a comprehensive and integrated attitude and measures to solve the urban problems of the

region, which will ultimately lead to an economic, physical, social and environmental sustainable development. The purpose of implementing urban regeneration policies and urban revitalization programs is to improve the quality of life in settlements through securing and strengthening buildings, developing and improving urban infrastructure, providing needed urban services, educating residents, creating opportunities The job is to strengthen local management institutions and neighborhood service offices of non-governmental organizations, modeling and promoting quality rules and guidelines for construction.

Therefore, the present study was conducted with the aim of providing suggestions in the form of urban regeneration indicators in Qeshm. The results obtained from the study showed that among the various main indicators in urban regeneration, economic and social indicators have the most importance in formulating the framework of urban regeneration. Also, in the factor analysis section, based on the extracted factors and measurements related to each of the factors in the obvious variables of the research, it was shown that the development of infrastructure and the security of residents are the main factors in the development of urban regeneration indicators in Qeshm. . These results are consistent with other results obtained from similar studies in other cities.

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