Research Paper: Annexation of rural settlements and empowerment of vulnerable urban neighborhoods (Case study: Se Qaleh and Mohammadabad settlements of Zabol city)

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ABSTRACT

Purpose: Urbanism in the national space and reducing environmental-ecological capacities and economic-social capabilities of rural settlements near urban areas have caused the spread of sprawl and annexation of rural settlements to cities, especially in the east of Iran. Zabol is one of the oldest and most ancient cities in the east. In recent decades, the instability of rural settlements around the city and the increasing rate of migration from other villages to Zabol, stirred up the annexation of villages such as Seh Ghaleh and Mohammad Abad to Zabol City. These annexed informal settlements to Zabol have reduced the quality of rural-urban life with minimum facilities, infrastructure and services. Recent studies indicate that there are 3,467 hectares of weary texture in Zabol. Seven hundred sixty-six hectares of this amount are rural and informal annexed textures.

Methods: This study used a descriptive-analytical method to recognize and analyze the process of annexation and formation of informal settlements. Furthermore, applying a community empowerment approach, we designed guidelines for the informal texture in Seh Ghaleh and Mohammad Abad neighbourhoods of Zabol City. The statistical population of this study is the residents of Seh Ghaleh and Mohammad Abad neighbourhoods. Three hundred seventy-six households were selected by the Cochran method. The selection of sample and spatial distribution was done using the cluster method at the neighbourhood level. The reliability of the questionnaire based on Cronbach's alpha method is 0.891.

Results: The results showed that the most important factor affecting the annexation and expansion of informal settlements in Seh Ghaleh and Mohammad Abad neighbourhoods is the socio-economic factor. Also, the most critical factor as the solution to the problem of informal settlement is the promotion of citizens' participation through social-educational activities.

Conclusion: The findings show that empowering local communities by providing education, skills and creating local institutions are the foremost solutions to put an end to or modify informal settlements.

Keywords:
Empowerment, rural settlements, annexation, Seh Galeh and Mohammad Abad neighbourhoods, Zabol

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1. Introduction

According to 1996 estimates, more than 75 per cent of one billion of the world's marginalized population live in slums. If sustainable and enhanced prevention policies are not proposed, this number is expected to be tripled by 2050 (United Nationst, Habitat III, 2016). The urban population ratio will increase from 54% to 66% (United Nations, 2014). In the last ten years, however, the proportion of urban population in slums has decreased from 39% in 2000 to 32% in 2010 in developing countries (UN-Habitat, 2015: 3). The UN Millennium Development Goals Report between 2000 and 2010 estimates that a total of 227 million urban slum dwellers in developing countries have made significant progress in improving their living conditions (UN- Habitat, 2011).

Changes resulting from the formation of modern societies are associated with the rapid growth of urbanization in most geographical areas and the emergence of an urbanism pattern marginalized dwellers (Naqdi, 2010: 146). Following the industrial revolution, different types of marginalization emerged and became a common global phenomenon (Naqdi, 2002: 1). Hence, one of the most important urban destabilization phenomena, especially in developing countries or the south world, is a type of urbanization called the informal settlement, which expands according to global observations (Document on Empowerment of Informal Settlements, 2003). The issue of informal settlement and slum-dwelling has led to a wide range of different factors based on different locations (UN-Habitat, 2015: 2).

Over the last 25 years, informal settlements have become increasingly a critical issue in the United Nations Economic Commission for Europe (UNECE) (United Nations, 2015). South American cities are as well affected by this phenomenon. In these areas, 26% of the population is exposed to drought, more than any other region. Most studies and theories about these settlements have focused on their social and economic consequences (Provost Undergraduate Research Award, 2012). In South Africa, almost half of the population lives in urban areas. A quarter of these urban dwellers live in informal settlements (Misselhorn, 2008) who live in an informal land occupation (Naidoo et al., 2008) with a lack of planning standards (Angignu & Huchzermeyer, 2009). According to some evaluations, over 38 million housing units are slums in South Asia. Informal settlements and slums have grown in all major cities across Asia to meet the need of poor citizens. For instance, 52,000 people (14% of the total urban population) in India, 50% of the total population of Karachi (7.6 million people in Katchi-Abadis), 80% of Kabul residents in Afghanistan, and more than 2 million Dhaka migrants in Bangladesh with more than 2100 slums live in informal settlements (World Bank, 2013).

The increasing growth and uncontrolled expansion of informal and marginal settlements brought this matter to international organizations' attention. This is shown particularly in all the statements and documents prepared by the UNCHS Commission in 1976, Habitat I in 1977, Agenda 21 in 1992, Rio Summit in 1995, Habitat II in 1996, Florence World Conference in 1997, Alliance City. A large number of case studies at the Human Resources Conference in Vancouver in 1976 called for a coordinated and coherent approach to problems ensuing the illegal settlements (Lirebo, 2006: 276). In 1999 Habitat and the United Nations Development Program (MDGs), in 2000, the World Bank took action, and in 2001, World Housing Day was announced with the slogan "Cities Without Slums". The European Parliament reported on housing and regional policy by Adrian Alfonso in 2007, Suditu and Vâlceanu in 2013 and the latest European 2020 strategy (Fig Working Week, 2015: 6), which mainly studied the solutions for this phenomenon with an emphasis on creating the necessary capacity to empower them.

In recent decades, different strategies have been experienced in informal settlements. From the 1970s onwards, attitudes toward informal settlements have been a response to the acute housing shortage, and planners began to identify informal settlements. Therefore, recognizing the positive and negative characteristics of these settlements led to a change in urban policies. In general, the rise of growing settlements in the 1980s was a worrying response to the growing trend of global poverty (Ley, 2009).

In the early 1970s, this issue was mostly ignored. In the late 1970s and 1980s, the approach was forced elimination and evacuation, especially in countries with a centralized political system and countries with weak governance and local governance. Between 1999-and 2002, the approach of self-improvement and the initial formation of a place for occupational security in informal settlements were considered in the planning (Dadashpour and Alizadeh, 2010: 36). Improving suburbans (addressing issues related to property security and economic development in these neighbourhoods) has led to involvement of the suburban residents, not only in the

planning and improvement processes of these neighbourhoods but also an awareness in the decision-making and design processes that identify priorities for action and support for implementation. The "empowerment approach" was gradually extended from the mid-1980s to the result of the Habitat 22 agenda in 1996 for regulating mobilization and community organization (Tehran Center for Studies and Planning, 2015: 20).

On the other hand, the United Nations Human Settlements Program was commissioned in 2002 to coordinate the International Committee of the Red Cross endeavours to achieve the Millennium Development Goals. In 2000, the Millennium Development Goals (MDGs), a set of goals agreed upon by the international community, focused on prioritizing and improving the living conditions of slum dwellers. Despite the substantial improvements between 2000-2004, the number continues to rise globally (United Nations, Habitat III, 2016).

Studies show that the strategies and policies adopted to solve this problem have usually been entirely initiated by the government in a top-down approach, without the effective intervention of residents and often demolition and renovation. Eventually these solutions evolved into strategies with more stakeholder and resident participation. Nonetheless, the specific level of socio-economic development of these countries, the local and regional characteristics of their problems, and the specific governing structure of each of them have shifted the path to participatory approaches (Zanouz and Mokhber, 2010: 119).

The role of citizen participation in communities has received more significance since the 1960s. Currently, the best-accepted practice for housing interventions in developing countries is to improve the situation suburban through a participatory means (Tehran Urban Research and Planning Center, 2015: 22). In Iran, researchers of the method-oriented approach suggested the programs to organize informal settlements after implementing theoretical frameworks about program-oriented organization and empowerment. These planners emphasize providing the necessary structures and institutions in the economic, physical, and social fields for organizing and grading informal settlements in Iran (Seif-o-Dini, 2004: 45). It should be noted that informal settlement confrontation policies have changed from destructive to environmental improvement and empowerment methods.

Since 1954, marginalization and informal housing in Iran started with implementing programs and plans for modernization and economic development of cities (Atshin Sadaf, 2015). Notably, from the early 1960s and the growth and expansion of informal housing in Iran, theoretical research and studies have been carried out about the nature, causes and factors of development, and the consequences and strategies dealing with this issue. The first organized study after the formation of the Ministry of Housing Development in 1964 was conducted under the supervision of its social management department, which was mostly about describing the lives of residents of suburban areas (Haj Yousefi, 2002: 22). In the early fifties, a cooperation of the Program and Budget Organization and social research institutes of the University of Tehran studied these settlements in several large towns of the country (Irandoost and Sarafi, 2007: 203).

Empowerment and studies related to informal settlement effectively influenced the attitude toward urban planning and urban development. Resettlement is one solution for informal settlements in Iran. According to studies conducted across the country, 70,000 households require resettlement. These people live in high-risk settlements. The housing needed for this scheme are including Construction of social housing in accordance with urban, neighbourhood, physical identity in target areas using the support of the government and the municipality (National strategic plan for rehabilitation, improvement and renovation of urban texture weariness, 2014), as well as houses built by housing donors (Urban Regeneration Corporation of Iran, 2017: 4075). Another common approach for organizing formal settlements in the suburbs is the gradual housing model in which the households themselves organize their housing (Ibid: 4075). Land reorganization is also one of the programs that try to re-balance rural or rural-urban lands which are irregularly divided and separated (Houshangnejad and Zabihi, 2010). Renovation by self-owned projects is another approach to rehabilitation and reconstruction of residential units in the target renovation areas between 1988 and 1992 in Iran. This also includes a part of the Mehr Housing Project. According to studies conducted by the holding company of urban development and revitalization organization of Iran about informal settlements in 60 cities, 18% of the residents of these areas do not have property problems. They can have the standard models and methods of supportive housing in these areas. Utilizing the capabilities and capacity of the association of Housing Donors on the land ownership model is another model implemented to organize informal settlements (Urban Regeneration Corporation of Iran, 2017: 4075).

The biggest urban problems and issues are weariness of middle and historical texture, marginalization

and disorganization of villages annexed to cities, and migration of villagers to cities due to lack of jobs and successive droughts. In the country, 141 thousand hectares of worn and marginal urban texture that include 2700 urban neighbourhoods were identified in 543 cities in which approximately 30% of the urban population live (19 million people). 77,000 households inhabit high-risk areas around high-pressure electricity towers and on steep slopes (Urban Regeneration Corporation of Iran, 2018: 5262). The suburban population living in Sistan and Baluchestan Province is 441625 people. This amount is almost 44% of Zahedan, 45% of Zabol, 50% of Chabahar, 45% of Konarak, and 23% of Iranshahr population (Urban Regeneration Corporation of Iran, 2017: 4627/3). There are 3,467 hectares of weary texture in the north of Sistan and Baluchestan Province. Seven hundred sixty-six hectares of this amount are just in Zabol, which includes 61% of the population of Zabol in 39 neighbourhoods (ibid., 1395: 3333). In the current situation, the residents of Seh Qaleh and Mohammad Abad settlements are prone to socio-economic, physical and environmental abnormalities and urgently need to improve environmental conditions. Given the current trends and the lack of integrated policy, the growth of informal settlement and destabilization of cities is subject to great concern, which requires national determination and novel solutions. The solutions should be tried with principled planning and an entirely rational approach to empower these areas and take actions to prevent its expansion by applying legal mechanisms. Having stated the problem, the present study seeks to answer the critical question of what are the most important factors influencing the emergence of informal settlement in the suburbs of Zabol and two neighbourhoods of Seh Qaleh and Mohammad Abad. Also, the desirable solutions are to increase the quality of life, urban management, prevention of the annexation of rural settlements, and the formation of marginalization in the country's eastern cities.

3. Methodology

In terms of aims, this research is developmental-applied, and in terms of data collection is analytical-descriptive research. The statistical population includes two groups of citizens and residents of Seh Qaleh and Mohammad Abad neighbourhoods, as well as a combination of experts and executive officials. In this study, the population was 17900 people, the total people in Seh Qaleh (7537 people) and Mohammad Abad (10900 people). Using the Cochran method, the statistical population was equal to 376 households. Applying a cluster method, 225 samples for Mohammad Abad (60% of the population) and 151samples for Seh Qaleh neighbourhood (40%) were selected. The analysis for the household samples was determined at the 95% confidence level and probability accuracy of 0.05. The descriptive data was organized through questionnaire, interview and observation. The validity of the questionnaires was done by consulting with urban experts such as municipal officials, the staff of Housing Foundation and university professors. Cronbach's alpha determined the reliability of the questionnaire. Cronbach's alpha coefficient was obtained and calculated in SPSS software. First, we used demographic, social, economic, physical and environmental factors to analyze the annexation and formation of informal settlements. Then the effective components and indicators were identified and analyzed in different dimensions at the neighbourhood level.

The environmental and ecological characteristics of Sistan Plain is homogeneous, but at the same time, it is heterogeneous in terms of geology (Zomordian, and Pour Kermani, 1988: 104). The city lands have a gentle slope from east to west, and the average height is about 480 meters above sea level (Comprehensive Plan of Zabol City, 2017). One of the prominent features of this region is 120-day winds and droughts due to less intake of the Helmand River, which has endangered the social and economic life of the region.

Based on historical documents, Sistan had a long history of urbanization. Archaeological artifacts that remained from Shahr-e Sukhteh show that urbanization in this land dates back to 3000 BC (Bazi, 2006: 11). During the reign of Nasser al-Din Shah, to strengthen the eastern borders with Afghanistan, a security base was formed near the village of Hossein Abad called Nasser Abad Castle, which was renamed, Nosrat Abad. The first residential point of the city gradually expands more distinctly to the eastern and southern areas. "Hossein Abad" is as the primary core of the city. The military fortress of Nosratabad was formed; afterwards, the inner parts consisted of a bazaar, a street, residential houses and a citadel (the home of the ruler of Sistan). The total area of this citadel is 62.55 hectares, and the area of the center is 17.8 hectares. Over time, a street was built between the two points where the British Consulate was founded. These two points were connected, and it changed the patterns of the city (Pars Arayeh Consulting Engineers Company, 2010: 120). After establishing a military fort and citadel in the north of Hossein Abad village, a large village emerged from these two points, which was named Zabol in 1929. The approximate area of Zabol City in 1933 was 156.1 hectares. In 1938, the council of ministers regulated the Sistan Land Sale, which was accompanied by political

and regional conflicts, evacuation of villages, famine and drought, and migration. At the same time, Zabol region was selected as a city with the enactment of the new law of national divisions (Pars Arayeh Consulting Engineers Company, 2010: 120-121). The first streets were formed in 1946. The main road of the city is created at this time and the city expanded. And the bazaar of the city expands linearly (Bezi, 2006: 15). Urbanization trend expedited in the mid-1340s, and the city continues to grow radially and mainly around the bazaar. As a middle texture, this texture is generally linked to the old texture of the city. In this part, the passenger network system followed the village passenger pattern of the old texture. The rural origin of new residents and obstacles related to lands (pure lands) have prevented the formation of a smooth and efficient texture (Pars Arayeh Consulting Engineers Company, 2010: 122). The development of the city was to the north and west until 1967 (1345 SH), and from 1345 to 1355, the growth of the city continued irregularly, the amount of which was equal to 180.05 hectares, and the city ended up to an area equivalent to 583.96 hectares. From 1977 (1355 SH) until today, the growth of the city has intensified. Irregular constructions brought about rapid transformation in the urban space. The growth area of the city between 1977 and 2002 (1355 to 1380 SH) was about 1500 hectares. The city area added up to about 2085 hectares (Ibid: 122).

In terms of economic condition, neighbourhood informal activities have been continued at the neighbourhood level due to the unfavourable situation of the Zabul region and the existence of a long and common border with Pakistan and Afghanistan. The service sector is the dominant economic sector of the city. The production of construction materials is the most important industry in the region. 68% of the active manufacturer in Zabol and 82% of its employees are engaged in nonmetallic mineral products and then food production. The share of working age population , the share of the economic enterprises employment rate in Zabol has been reduced from 92.3% in 1997 to 77.1% in 2011 (Comprehensive Plan of Zabol City, 2017: 81). Also, the unemployment rate of 23% in Zabol in 2011 signifies the inefficiency of the existing economic structures of the labor market and the country during the economic recession and sanctions. The the social system of Zabul has a relatively strong tribal structure. Poor income and the desire to live and get support from relatives and using specific dialect are the main reasons for residents of the studied neighbourhoods to live in this place. The study areas are Seh Qaleh, with an area of 36.88 hectares and Mohammad Abad with 90.51 hectares located in Zabol and Sistan and Baluchestan Province. Figure 1, shows the location of the study areas.

Table 1. Effective components and indicators in the formation of informal settlement from the perspective of experts

Components	Indicator	References
Education	Participation level neighbourhood residents in various neighbourhood issues - expertise and skills in specialized, technical and professional fields - education and skills acquisition - holding family education classes and raising awareness - instruction in the field of environmental health - education in the field of waste segregation and reduction of per capita waste - training to reduce environmental pollution	Arefi (2018), UN Habitat, PSUP (2015), World Bank (2016), Ribadeau (2013) Rafieian et al. (2014), Dehghani and Haghpanah (2009) Ismail pour (2010)
Security	Neighbourhood lightness - providing light in the neighbourhood - the presence of homeless people in the neighbourhood - gathering and organizing areas for addicts - neighbourhood security - establishment of a police station in the neighbourhood	Abbott (2000), Piran (2002)
Cultural	Creating and establishing a library for the neighbourhood - increasing skills training - creating a neighbourhood public office to communicate with officials - communication between local residents and city officials	Popal & Turkstra (2010), Hill & Chung (2002) Abbasi (2013), Khuzani (2011), Piran (2001)
Economical	Public transportation for families - access to cultural and tourism centers - access to pilgrimage and tourism centers to markets - actions of urban management service institutions - establishment of a neighbourhood municipality to meet the needs	Veisi (2017), Irandoost et al. (2014) Roshanai (2014), Hatami Nejad and Oghli (2009), Kalhor Nia (2003)
Services	The active role of women in the management of neighbourhood - establishment of a production cooperative for women - the presence of officials and their timely response	Calderon, at.al (2015), Hall (1998) Khakpour (2015), Sajjadi and Souri (2012) Safarzaei (2011)

Source: authors, 2018

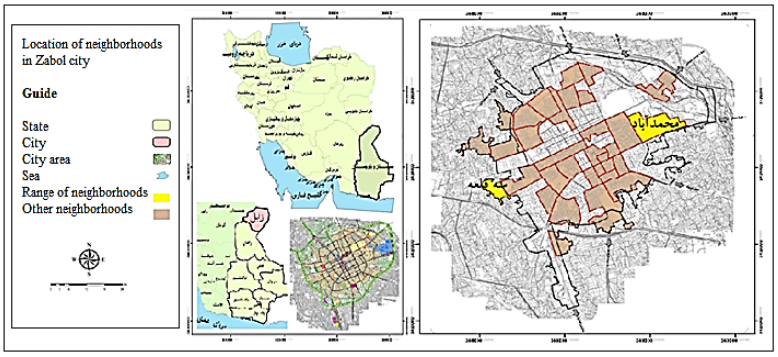

Figure 1. Location of Seh Qaleh and Mohammad Abad neighbourhoods in Zabol

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Regarding identifying and determining problematic and unconventional urban (informal) textures in Zabol, this category of textures can be divided into two general categories of textures within and outside the city limit. The latter can be referred to the villages located in the city territory. The former can be referred to informal areas based on the definitions and indicators of the Urban Development and Improvement Organization. This is the destination of low-income immigrants, which led to the uncontrolled expansion of the city, and a marginal texture with their physical shape distinguishable from other textures. Seh Qaleh and Mohammad Abad are instances of this texture. These neighbourhoods are currently located in the official area of Zabol City, and their endowment of services are of the current concern. These neighbourhoods have provided about 95% of infrastructure services like other neighbourhoods. Figure (2) shows the boundaries of neighbourhoods and informal settlements in Zabol, and Figure (3) illustrates the typology of the texture and the location of neighbourhoods.

Seh Qaleh as a rural settlement is one of the villages around the city (Figure 3), which is located within the city of Zabol. During the expansion, this part of the city is the destination of low-income due to the uncontrolled expansion of the city, which is a type of rural texture that can be distinguished from other textures. Neighbourhoods and villages in and around the cities are considered as one of the suitable places for the formation of informal settlements. Demographic information shows that the population of Seh Qaleh neighbourhood in 2017 was 7537 people. 3995 and 3542 were men and women, respectively. The population density in this neighbourhood in 2017 was equal to 204.3 people per hectare, while in 2010 was equal to 29.28 people per hectare. In 2017, the highest percentage of the population belonged to the adults group with 33%, and in 2010, the children group with 38.6%. Demographic data shows that the population of Mohammad Abad neighbourhood in 2017 was 10900 people. 5400 and 5500 were men and women, respectively. The population density in this neighbourhood in 2017 was equal to 120.4 people per hectare, while in 2010 was equal to 25.3 people per hectare. In 2017, the highest percentage of the population belonged to the adults group with 32.1%, and in 2010, the children group with 38.5%. Due to the rural context of these neighbourhoods and the lack of proper supervision over construction, most of the old textures and dwellings have very low quality and just intended to prepare a shelter for residents. Therefore, a wide range of houses can be seen built with different materials.

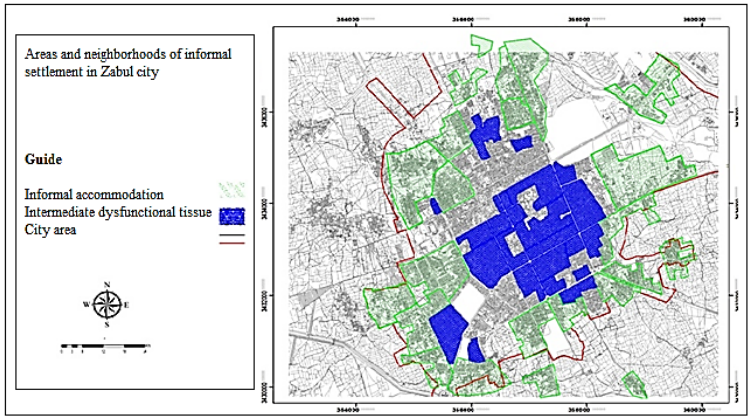

Figure 2. Shows the boundaries of neighbourhoods and informal settlements in Zabol

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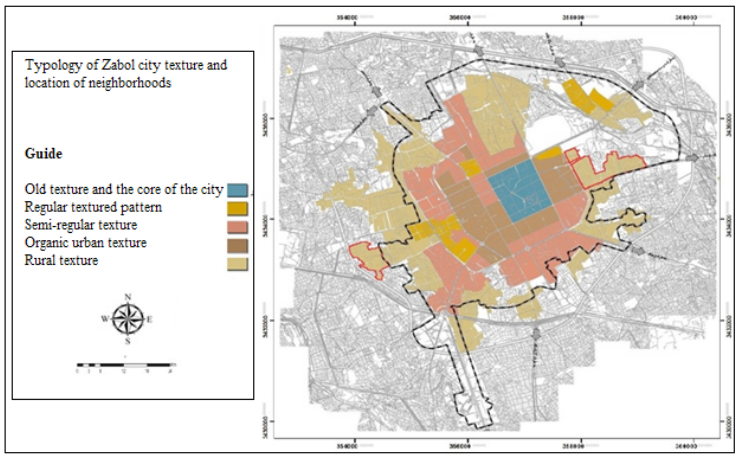

Figure 3. Illustrates the typology of the texture and the location of informal neighbourhoods

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In terms of physical divisions, Seh Qaleh neighbourhood located in district one, and also it is located in the area one of the detailed plan. The total area of Seh Qaleh neighbourhood was 36.88 hectares, of which 8.85 percent cover roads, 22.12 percent for residential areas, 2.49 percent for green spaces. Religious affairs occupy 0.12 hectares, 0.36, and 2.92 hectares are for educational, and regional services. The rest of the area is allocated to municipal services. Most of the area in Seh Qaleh neighbourhood is dedicated to residential use. Seven thousand five hundred thirty-seven people live in the neighbourhood, the per capita of housing is equal to 29.34 square meters per person.

Mohammad Abad neighbourhood is located in the second district and the third area of the detailed plan. The total area of Mohammad Abad neighbourhood is 90.50 hectares. The dedicated spaces are 21.92 hectares for roads, 61.2 hectares for residential areas, 1.53 hectares for green space, 0.22 hectares for religious use, 0.8 hectares for educational service, 0.362 hectares to cultural usage, 0.37 hectares to medical use, 0.66 hectares to mixed usage, and 2.13 hectares to higher education. In Mohammad Abad neighbourhood, 61.2 hectares out of 90.50 hectares of the neighbourhood is occupied by residential spaces. The per capita rate of residential area is equal to 56.14 square meters per person. Figure (4) shows the use of land in the neighbourhoods of Seh Qaleh and Mohammad Abad.

Table 2. Areas and services required for Seh Qaleh and Mohammad Abad neighbourhoods in the comprehensive plan of Zabol City

Seh Qaleh Neighbourhood (Population: 7537)				Mohammad Abad Neighbourhood (Population: 10900)			
Usage	**Area (square meters)**	**Ratio (hectares)**	**Per capita**	**Usage**	**Area (square meters)**	**Ratio (hectares)**	**Per capita**
Residential	221205	22.12	29.34	Residential	612000	61.2	56.14
Green space	24971	2.49	3.31	Green space	15349	1.53	1.40
Religious affairs	1220	0.12	0.16	Religious affairs	2248	0.22	0.20
Educational services	3653	2.92	0.48	Educational services	8000	0.8	0.73
Regional Services	29240	0.36	3.87	Roads	219209	21.9	20.11
Roads	88533	8.85	11.74	Cultural affairs	3628	0.36	0.33
Total	368822	36.88	48.93	Medical services	3770	0.37	0.34
				Business areas	6666	0.66	0.61
				Higher Education	21340	2.13	1.95
				Total	685880	36.88	83

Source: (Zabol Municipality, 2018 and field study)

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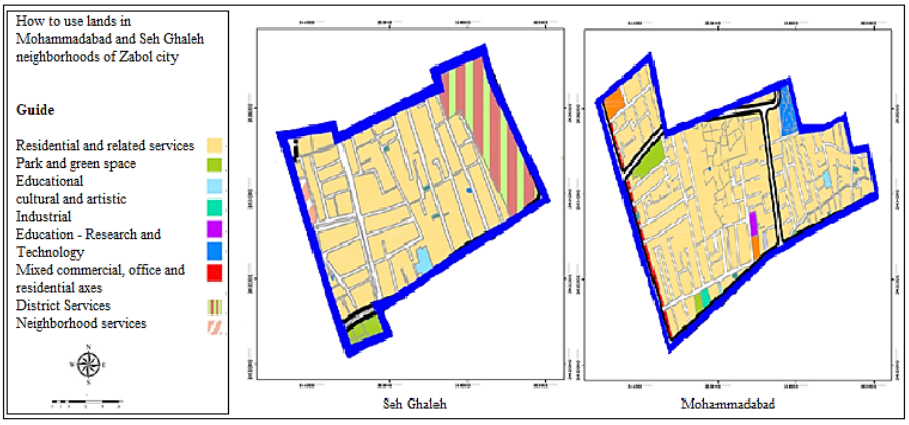

Figure 4. shows the land use in Seh Qaleh and Mohammad Abad neighbourhoods

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4. Findings

The results of the characteristics of the statistical population on demographic characteristics indicate that 75% and 67.9% of the respondents in Seh Qaleh and Mohammad Abad neighbourhoods are men, and 21.4% and 29.5%, of them, are women. More than 90% of the respondents were married. Also, 95.9% and 97.4% lived in Seh Qaleh and Mohammad Abad neighbourhoods with their families. Also, the highest percentage of the population in neighbourhoodSeh Qaleh is 5-9 years old, and Mohammad Abad is 15-19 years old. The lowest percentage of the population in the neighbourhoods is in the age group of 15-19 years old and 0-4 years old, respectively. The number of people living in households shows that the highest percentage belongs to families with four to seven members in the neighbourhood of Seh Qaleh neighbourhood (55.6%) and families with four to seven members (35.3%) in the Mohammad Abad neighbourhood. Also, 6.1 and 28.5% of the households living in Seh Qaleh and Mohammad Abad neighbourhoods have more than eight members. 11.6% and 10.4% of the households in Seh Qaleh and Mohammad Abad neighbourhoods have female heads of household, while the remaining heads of households are men.

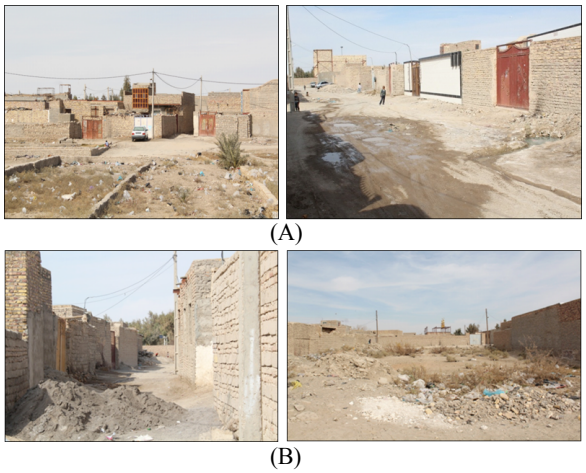
Regarding the social characteristics, the results obtained from the survey show that most of them are literate in diploma and under diploma levels (64.3% of households in Seh Qaleh neighbourhood and 66.3% in Mohammad Abad neighbourhood). Also, based on religion, 84.2% of the respondents in Seh Qaleh neighbourhood were Shia, and 71.5% of the respondents in Mohammad Abad neighbourhood were Sunni. 82.1% and 85% of respondents were born in Seh Ghaleh and Mohammad Abad neighbourhoods. The minimum length of stay of households living in Seh Qaleh neighbourhood was 16.8% (0 to 10 years) and the maximum length of stay was 35.7% (over 30 years). This amount was 7.8% (0 to 10 years) and 42.5% (over 30 years) for Mohammad Abad neighbourhood. Furthermore, 42.9% of the respondents in Seh Qaleh neighbourhood and 49.7% of the respondents in Mohammad Abad neighbourhood selected "living near the relatives and the immediate family" as their reason for living in these neighbourhoods (49.7% in Seh Qaleh and 50% in Mohammad Abad).

The economic characteristics show that 69.4% of the residents of Seh Ghaleh in residential units consisted of one house, but 39.9% of the residents of Mohammad Abad neighbourhood live in units with two households. Also, 38.6% and 8.8% of heads of households were employed in Seh Ghaleh and Mohammad Abad neighbourhoods, respectively. The majority of them are self-employed (18.4% in Seh Ghaleh neighbourhood and 16.1% in Mohammad Abad neighbourhood). Many unemployed people in the neighbourhoods are without any income (61.7% in Seh Ghaleh and 68.4% in Mohammad Abad), who are engaged in informal economic activities. Some also receive pensions from public institutions, and a small group are self-employed women. In terms of job position, many of these people in Seh Ghaleh (49%) are working within the neighborhood and some of the people in Mohammad Abad neighbourhood (39.4%) are working outside the city. The income of households classified in four groups. Data analysis showed that 45.9% of the residents in Seh Ghaleh neighbourhood and 46.1% of households in Mohammad Abad neighbourhood have a monthly income of fewer than 500 thousand Tomans (One dollar exchange rate was 22900 Tomans in 2020, so the income of these households is equal to 22 dollars) and 28.1% and 36.8% of the residents of Seh Ghaleh and Mohammad Abad neighbourhoods have a monthly income of between 500 and 1 million Tomans, respec-

tively or $ 22 to $ 44. Regarding the primary source of income, 58.2% of residents in Seh Ghaleh neighbourhood and 49.7% of residents in Mohammad Abad neighbourhood, obtain payment from a job, 7.7% in Se Qala neighbourhood and 9.8% in Mohammad Abad receive income from renting a house. 16.8% of people in Seh Ghaleh neighbourhood, 11.4% in Mohammad Abad neighbourhood make a living from pensions and donor organizations. According to the results, 3.13% of households in Seh Ghaleh neighbourhood and 25.9% of the households in Mohammad Abad mentioned house related activities as the primary source of income. Also, 3.7% of the households in Seh Ghaleh neighbourhood and 8.3% in Mohammad Abad give a part of their property for renting to provide income.

The physical characteristics indicate the disorder and disorganization in accessibility and communication, the formation of a different texture, physical weariness, lack of order in the composition and separation and high population density. Seh Qaleh neighbourhood is 368.821.721 square meters and Mohammad Abad neighbourhood is 905.890.83 square meters. 41.8% of the residential units in Seh Qaleh neighbourhood limited to between 100 and 200 square meters ., but in Mohammad Abad they are limited to 200 to 300 square meters (60.1%) in Mohammad Abad neighborhood. About 30% to 40% of the total land area is allocated to the central yard in this construction pattern. 5 to 15 years was the highest age of constructions in both neighbourhoods (54.6% in Seh Ghaleh neighbourhood and 44% in Mohammad Abad neighbourhood). 30-year-old residential units are the seond groups. In Sistan, two or even several households in a residential unit is common and typical. The indicator shows that most buildings in the two neighbourhoods have 2 to 4 rooms, which is 60.2% of them for the Seh Ghaleh neighbourhood and 63.4% for the Mohammad Abad neighbourhood, which confirms a lack of housing units to the number of existing households. Also, based on the density index, most of the buildings in these neighbourhoods have one flat (88.8% in Seh Ghaleh neighbourhood and 88.6% in Mohammad Abad neighbourhood), which have primarily residential functions. Cheap materials such as cement, block and cement facade are more used in the units. Most of the view of residential units (80.6%) in Seh Ghaleh neighbourhood and (75.6%) in Mohammad Abad neighbourhood have a brick and iron design. The status of land ownership also indicates that a high percentage of residential units have been transacted with preliminary agreements in Se Qala neighbourhood (38.8%), but the more land transaction is with official documents (42.5%) in Mohammad Abad neighbourhood. Physical weariness and worn textures of residential units are well visible in these neighbourhoods. Therefore, many households in Seh Ghaleh neighbourhood (60.7%) have repaired their residential unit in recent years. This amount is 42.5% for Mohammad Abad residents. Both neighbourhoods have access to piped water, electricity, telephone network and sewage.

Solid waste in informal neighbourhoods is disposed manually due to poor urban management. And the dilapidated spaces adjacent to the residential areas have become a waste dump where can generate many diseases. Moreover, to collect surface water in these neighbourhoods, the alleys do not have suitable technical amenities such as canals. Only 40.8% of households in Seh Ghaleh neighbourhood have good access to the sewerage network, and wells are the means for sewage disposal in both neighbourhoods (51% of residential units in the Seh Ghaleh neighbourhood and 93.3% in Mohammad Abad). Figure (5).



(A)

(B)

Figure 5. The view of the environmental appearance and physical condition in the neighbourhoods of Mohammad Abad (a) and Seh Ghaleh (b)

Regarding the social indicators of target texture in rural areas, the new neighbourhoods show that the age group of 5 to 9 years (52.6%) in Seh Ghaleh, and the youth in Mohammad Abad neighbourhood (39.9%) are the majority, which requires more attention to develop housing welfare and youth employment. The low rate of children under five years old in Seh Qaleh (21.9%) and Mohammad Abad (6.7%) verifies that various health policies in these neighbourhoods have been quite successful. On the other hand, 55.6% of households have 4 to 7 members in the Seh Qaleh neighbourhood. The rate is 35.3% for Mohammad Abad neighbourhood, which indicates the rural socio-cultural nature of these areas. It is worth mentioning that the population density in Mohammad Abad neighbourhood the number of more than eight family members is significant (28.5%). Among the social indicator, the education index also shows that the high number of people with diploma degree and lower than it, 64.3% in Seh Ghaleh and 66.3% in Mohammad Abad neighbourhood in direct connection with the low financial ability of the residents to support the education of their children at higher levels and also the lack of appropriate educational space in higher education levels.

Given ethnic and social segregation, the intra relations of these neighbourhoods are based on ethnic commonalities of social groups (Baluch and Fars, religion and kinship ties. Also, satisfaction and sense of belonging to the place measurements indicate that there is a direct relationship between the degree of belonging, length of stay and even the choice of housing. The rural nature of the texture and the existence of homogeneous tribes have made residents more inclined to live in the area. So that the longest stay in Seh Ghaleh and Mohammad Abad neighbourhoods are 7.35% and 42.5%, respectively, for more than 30 years. The desire to live with relatives is in consistence with a high degree of belonging to the place and the desire to live in the area. In this regard, living in single or double household units directly relates to the degree of belonging to the place and the preference to live with relatives and family.

The analysis of economic indicators of resettled households as indicators affecting housing and as a dimension of the housing characteristics is paramount. It is directly related to access to welfare facilities and infrastructure. The results show a high rate of semi-skilled and unskilled labor, which can cause the intimacy of rural and urban textures and is related to the factor of education. 30.6% of population in Seh Ghaleh neighbourhood and 57.5% in Mohammad Abad neighbourhood are unemployed, which indicates the rural nature of neighbourhoods, and low incomes and engagement in informal jobs. The average income of households in these places is less than 500,000 Tomans. Due to the position of informal texture in the city structure, most of the residents are low-income people. Therefore, increasing the income gap leads to increased incentives to be working in the informal sector. Unemployed labour force, unfavourable environmental and economic conditions of the city, and proximity to the border are factors affecting residents' income and economic situation, and proximity to the border affects residents' income and economic situation. Being close to the border area, the residents of Mohammad Abad (income between 500 to one million Tomans 36.8%) have a more favourable economic situation.

In analyzing the physical indicators of informal texture, the residents' economic situation and the low price of some materials has made brick and cement facades more useful than other ones in the neighbourhoods, which plays a major role in physical deterioration the texture aging. Due to the increase in population in neighbourhoods and its relationship with housing, providing housing is one of the essential measures in achieving welfare and perhaps the most significant investment of any household, which is directly related to income and employment. Also, according to the proportion of sufficient space for each person, the residential amenity is directly related to the household population and social relations and income. Most residential units in Seh Ghaleh have an area between 100 to 200 square meters and a share of 200 to 300 square meters in both neighbourhoods, which comes from the composition and structure of the family and the relationship among family members. The number of single-floor buildings (88.8% in the Seh Ghaleh neighbourhood and 88.6% in Mohammad Abad) also implies the importance of comfort and accessibility indicators. The existence of a central yard and the importance of privacy, comfort and peace for the family are the reasons for the predominance of single floor units in these neighbourhoods. Due to the erosion of the texture, most of the buildings and residential units in these neighbourhoods do not have a good view. Improving the residential situation in these neighbourhoods is directly related to social and economic factors. Willing to repair (70.7% in Seh Qaleh neighbourhood and 42.5% in Mohammad Abad neighbourhood) suggests a reluctance to leave the place (85.2% in Seh Qaleh and 87% in Mohammad Abad neighbourhood), belonging to the place and improvement of the housing situation. The lack of stable incomes to accelerate the improvement and renovation of housing units is a bottleneck in the development of the housing units. Also, the surveys conducted through a questionnaire investigating the land ownership status in the study area indicate that ownership is directly related

to household income. The ownership status in the neighbourhood of Se Qala (37.8% of the local preliminary agreements) suggests that based on the social structure (kinship, trust, etc.), a limited number of people formally trade and the means to provide housing is concerning interactions and relationships. This emphasizes that having a house and property rights are necessary for more stability of households and their social status. Due to its spatial and functional location, religious usage (0.12 hectares in Se Qala and 0.22 hectares in Mohammad Abad) is able to become a focal point for unity and increase solidarity and social interactions within the texture. Also, empty lands are prominent features of the informal textures of the studied areas. This caused and created certain social anomalies in the neighbourhoods, which are affected by the type of land use and demographic characteristics.

Based on the environmental indicators of informal texture, inadequate access and networks, and the lack of proper urban infrastructure, self-constructed and non-standard construction patterns have put neighborhoods in the form of unconventional settlements. Disregarding the landscape and observance of technical construction principles caused a lot of environmental pollution in these neighbourhoods. The factors affecting the formation of informal settlements in Seh Ghaleh and Mohammad Abad neighbourhoods are shown in Table 3.

To answer the research question of achieving solutions for informal housing and the desirability of these two rural settlements and then integrate new urban neighbourhoods of Seh Ghaleh and Mohammad Abad using the empowerment approach through 25 variables. Therefore, a correlation matrix was formed to select the appropriate variables for factor analysis. Table (4) shows the eigenvalue and the corresponding variance of the factors; the initial eigenvalues for each factor are estimated as the sum of the explained variances. This matrix shows the result of factor analysis in reducing the items to the final factors and the contribution of each factor in providing appropriate solutions to the informal settlement. Afterwards, variables with numerical values less than 0.5 were removed from the calculation process.

Table 3. Factors affecting the formation and expansion of informal neighbourhoods of Seh Ghaleh and Mohammad abad

Demographic factors	Decrease in population density (existence of vacant lands)
	Increase in household size
	Increasing the number of females as self-employed or heads of households
	Increasing the number of children in need of education
Social factors	Reducing education rate
	Existence of unskilled labour and workers
	Insecurity and social crimes
	Ethnicity and affiliation
	Decrease the social rank of the place
Economic factors	Insignificant household income
	Existence of low-income people (not consistence with the culture and environment of the city)
	Lack of investment by real and legal entities
	High informal and unstable employment
	An inappropriate pattern of housing supply and housing construction
Physical factors	Inadequate organization of land use and neighbourhood
	Informal ownership of residential lands and properties (preliminary agreements, official documents, license, etc.)
	Lack of qualified construction
	Existence of building density and required uses
	Lack of necessary facilities in residential units
	Inappropriate urban structure and lack of proper access to urban services (educational, health, sports, etc.)
	Lack of proper road network and inadequate sewage and surface water disposal (incomplete water and sewage network and the presence of loose water on the roads)
	Existence of livestock places for keeping livestock and poultry in an unsanitary and informal way in the residential unit

Table 4. Extracted factors, eigenvalues and variance explained

Eigenvalues of extracted factors after rotation			Eigenvalues of extracted factors without rotation			Eigenvalues			Factors
Cumulative percentage variance	Percentage of variance explained	Eigenvalue	Cumulative percentage variance	Percentage of variance explained	Eigenvalue	Cumulative percentage variance	Percentage of variance explained	Eigenvalue	
25.97	25.69	6.68	28.51	25.51	7.41	51.28	51.28	7.41	1
41.90	16.21	4.21	47.80	19.29	5	47.80	19.29	5	2
55.91	14	3.64	60.51	12.71	3.30	60.51	12.71	3.30	3
68.12	12.21	3.17	68.91	8.36	2.18	68.91	8.39	2.18	4
73.90	5.86	1.52	73.99	5.08	1.32	73.99	5	1.32	5

JSRD

After rotation, the analysis of the extracted factors shows that five factors can explain the variances. Factors are examined by the Varimax approach in Table (4). The first to fifth factors together consist of 73.90% of the variance. Figure (6) shows the eigenvalue in each factor.

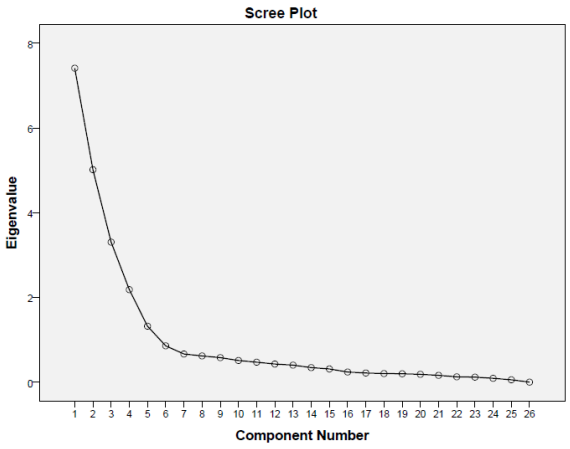


Figure 6. Gradient of the variables

JSRD

The most important factors as the solution to the problem of the informal settlement are shown in Table (5). Also, the items related to each factor along with their importance from the perspective of the local community (mean and standard deviation), and the factor loadings pertaining to each item are reported in Table (6).

According to Table (6), acquiring skills and education with an average of 4.1 is a high priority and is known as the most important item in the first factor. The establishment of a police station and the presence of homeless people in the neighbourhood with an average of 3.9 and 3.8, respectively, are the most important items of the social-security factor. Communication means between residents and officials with an average of 4. The need to obtain skills and training with an average of 3.9 is the most prioritized item in the socio-cultural factor. In the socio-economic factor, the active role of women in managing neighbourhood affairs is, on average, 3.8. Moreover, the access to cultural and tourism centers is an average of 4. Corresponding with public transportation to meet the needs of the households with an average of 3.9 are the most important items of the socio-service factor.

Table 5. Factors to solve the informal settlement problem

Row	Factors
1	Socio-educational
2	Socio-security
3	Socio-cultural
4	Socio-economic
5	Socio-service

JSRD

According to the interview and the local community survey, it is necessary to improve the situation of the residents of these neighbourhoods from a social and economic point of view. Studies and projects have been conducted for the social development of these neighbourhoods. We suggested some strategies for two neighbourhoods, as shown in Table 7.

5. Discussion

The phenomenon of the annexation of rural settlements to cities and the formation of informal settlements in large cities are different from informal settlements in smaller cities such as Zabol due to the type of livelihood, culture and lifestyle and the use of urban services. In Zabol, because of environmental, ecological, social and economic conditions and other reasons such as the construction of a border wall, lack of agricultural water, 18 years of drought and not proper spatial arrangement and deteriorating process of rural settlements, the migration of villagers to city's outer neighbourhoods and the formation of dysfunctional urban neighbourhoods are increasing.

Table 6. Classification of the test questions and naming the factors

Components	Correlation coefficient	Subcomponents (factors)	Mean	Standard Deviation
Socio-educational	0.834	The degree of participation of residents in issues	3.8	1.3
	0.689	Specialized and getting skills in technical and professional subjects	3.3	1.1
	0.860	Acquiring skills and education	4.1	1.3
	0.667	Holding family training classes and raising awareness	3.5	1.2
	0.778	Education in the field of environmental health	3.2	1.3
	0.885	Awareness in the field of waste segregation and reduction of per capita waste	3.2	1
	0.811	Training to reduce environmental pollution	3.9	1.3
Socio-security	0.784	Amount of neighbourhood lightness	3.7	1.2
	0.652	Providing light in the neighbourhood	3.7	1.1
	0.883	Presence of homeless people in the neighbourhood	3.8	1.2
	0.816	Gathering and organizing areas for addicts	2.6	0.8
	0.841	Amount of neighbourhood security	3.4	1.4
	0.874	Establishment of a police station	3.9	1
Socio-cultural	0.734	Desire for creating a library	3	1
	0.815	Need for increasing skills training	3.9	1.1
	0.811	Creating a neighbourhood public office to communicate with officials	3.8	1.2
	0.820	Communication means between residents and officials	4	1.3
Socio-economic	0.889	Active role of women in managing neighbourhood affairs	3.9	1
	0.778	Establishment of a production cooperative for women	2.7	1
	0.708	Presence of officials and their timely response	2.8	1
Socio-service	0.877	Corresponding with public transportation to meet the needs of the households	3.9	1.2
	0.880	Access to cultural and tourism centers	4	1.3
	0.685	Income dependency to cultural and tourism centers	3.2	1.3
	0.731	Actions of urban management service institutions	3.3	1.3
	0.702	Establishment of a neighbourhood municipality to meet the needs	2.7	1.1

Table 7. Objectives and strategies for empowerment and organization of Seh Qaleh and Mohammad Abad neighbourhoods

Domain	Purpose	Strategies
Socio-educational	Upgrading the education quality	Acquiring skills and education - Holding family training classes and raising awareness - Getting specializations and skills in technical and professional fields - Education in the field of environmental health - Awareness in the field of waste segregation and reduction of per capita waste - Organizing meetings with officials to plan and increase interaction with residents - Holding classes and workshops for city managers, executive entities, universities
Socio-security	Promote public safety and reduce crime and social offences	Public education on security and participation - Establishment of care centers for homeless and addicted people - Eliminating unsafe spaces in hot spots of criminals - Establishment of a police station
Socio-cultural	Improving the lifestyle and cultural centers	Provide training - Create a cultural center - Create a neighbourhood public office to communicate with officials - Strengthen the communication between residents and officials
Socio-service	Promoting the texture and services	Development of public transportation to facilitate people's access to municipal services - establishment of a neighbourhood municipality as a link between residents and city managers - Recognition of low-income groups and providing low-cost services to facilitate access to cultural and tourism centers
Socio-economic	Job creation and poverty reduction	Training and education of people without skills to strengthen specialized skills and lead to the labor market - Establishment of organizations, associations and cooperatives based on skills training of women and housewives - Creating small and local production workshops
Infrastructure	Development of infrastructure networks	Strengthen municipal wastewater disposal operations - Development of electricity network, telecommunications and water and sewage disposal network (repairing old asbestos pipes) - Improvement of roads (asphalt, geometric design of streets, pavement of unpaved roads) - Development and creation of green space
Environmental	Improving the urban environment	Elimination of visual and environmental pollution - Disposal of surface water - Solid waste collection - Use more workers to clean neighbourhoods - Placing of trash cans
Physical	Optimal use of available empty spaces	Optimal use of empty spaces to improve the required uses - Meeting needs and shortcomings at the neighbourhood scale - Providing educational, health, sports and recreational services, and increasing business units - Strengthening the communication network - Increasing the permeability - Improving the space and urban landscape (Making the roads and sidewalks appealing and improving the quality of the environment) - Strengthen the physical structure of the neighbourhood and interaction with landowners

JSRD

In recent years, various studies have been conducted on the reasons for creating informal settlements and ways to adjust and overcome this problem. World Bank project (2016) entitled "integration of slums for the benefit of the poor of Bangladesh" showed that project management, training, capacity building, and development of the urban community in various dimensions are the key points of empowerment initiatives. Brown, Lotango (2015) states that improving physical necessities and providing basic services to improve living conditions and reduce the vulnerabilities of citizens in informal settlements requires more social and economic programs. In the studies of Edge Mensa (2014) in Kumasi, the growth of informal residence has been a combination of social, economic, cultural, institutional, and physical factors. Safarzaei (2011) also prioritizes employment-related strategies based on social and economic attributes, physical and spatial status of neighbourhoods, housing and participation of residents due to economic problems to empower suburban neighbourhoods of Zabol. Also, Sharifinia et al. (2011), in a study using the factor analysis method, prioritized social and economic indicators in organizing and empowering the Gholam Tapeh neighbourhood of Azadshahr city, which is consistence with the present study. Also, the study by Hatami Nejad and Oghli (2009) also shows that informal settlements are significantly different from their main part of the city in terms of economic, social, and physical indicators. After comparing these studies to this recent study, we can argue that the informal settlements in Zabol are not favourable for economic and social indicators. One of the most important components of empowerment is strengthening these settlements' social and economic basis.

According to the results of this study, low-income residents, and lack of trust in local management and service providers are among the reasons for reduced participation in the urban neighbourhoods of Seh Ghaleh (82.7%) and Mohammad Abad (36.3%). The dominance of unemployed (30.6% in Seh Ghaleh neighbourhood and 57.5% in Mohammad Abad) and unsustainable employment lead to very low income and affect all initiatives in the socio-economic system of households. Also, the

weakness of public decisions and the power of bureaucracy, lack of social organizations for the youth and especially women in the neighbourhood (21.4% in Se Qala neighbourhood and 29.5% in Mohammad Abad neighbourhood) are among the reasons for frail participation. Therefore, it can be concluded that informal settlement is very closely related to socio-economic categories in these neighbourhoods. Accordingly, production cooperatives and active social organizations should be emphasized to empower the vulnerable people in the neighbourhoods. Training is the basis of the economic empowerment system, which helps collect micro-capital and utilise investment capabilities of other public and private sectors. This can be achieved by creating development centers to improve the livelihood of new urban households.

Therefore, the neighbourhoods should provide projects and programs that are aligned with the neighbourhoods' needs, which results in increased participation of local people and their control over their livelihood. This requires the cohesion and integration of residents in a community and the strengthening of the requirements for neighbourhood identity. Therefore, local institutions, NGOs and CBOs are crucial in this process. Empowerment in these neighbourhoods can be obtained with a new approach of creating a social organization in the neighbourhood to collect proposals and solutions in the project, involve neighbourhood residents, intervene and monitor the implementation of projects.

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Conflict of Interest

The authors declared no conflicts of interest.

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