City, Territory
and Architecture

RESEARCH ARTICLE

Open Access

Social sustainability in brick decoration and architectural space of Qajar houses in Dezful by Delphi method

Ahmad Sarrafzadeh[1*] , Sajjad Sotoude[1,2] and Meena Sarrafzadeh[1]

Abstract

Purpose Social sustainability is one of the influential concepts in architecture and urban planning that is formed under the influence of individual and physical factors. In such a way that its effects on the spatial architecture and decorations can be studied. The issue of social sustainability also plays an important role in the quality of life and examines the place of thinking of a society. On the other hand, the study of this issue in the historical cities is a subject that provides the basis for studying the city of Dezful as a bed with a valuable historical background. Therefore, the purpose of this study is to explain and evaluate the components of social sustainability in the historical architecture.

Methodology This research is a combination of Delphi and descriptive-analytical methods that have been identified using field studies, libraries and interviews. Also, the effective components in social sustainability are evaluated by Delphi and then the subject is explained by describing each component.

Result Findings based on the research framework show that there is a different level of social sustainability. This issue is based on the macro criteria of social participation, security and quality of life and has different components.

Conclusion The conclusion of the research shows that the effective components in the sustainability of historical houses in Dezful, plays a significant role in personal and physical relationships and create satisfaction and attachment to the architectural structure. This issue is created by strategies based on sustainability of components and preserves the identity of architecture.

Keywords Architecture spaces, Decoration, Social sustainability, Historical house, Dezful

Introduction

According to studies conducted in recent centuries, the growth of urbanization compared to rural life has increased and shows a significant trend that requires the development of the urban. Therefore, in order to improve the physical condition, it is necessary to respond to the challenges and concerns created in urban environments. These challenges are generally created based on the effective factors in people's lives and urban life and affects social sustainability relations (Noroozian Maleki et al. 2019, pp. 6). One of the important aspects in sustainable development, which is one of the main concerns of architects and urban planners; It is related to social sustainability factors that are known as social sustainability. The concept of social sustainability is associated with qualitative dimensions and is evaluated with concepts such as human needs and emotional factors in humans. There is also the issue of social sustainability in architecture; it is a kind of attitude in the architecture of spaces such as

*Correspondence:
Ahmad Sarrafzadeh
sarrafzadeh@live.com
[1] Department of Architecture, Faculty of Architecture and Urban Planning, Jundi-Shapur University of Technology, Dezful, Iran
[2] Department of Architecture, Faculty of Architecture, Islamic Azad University-Dezful Branch, Dezful, Iran

Sarrafzadeh *et al. City, Territory and Architecture*   (2023) 10:25

Page 2 of 18

housing, which is followed by the formation of cities and sustainable neighborhoods (Shieh et al. 2017). For this reason, by studying the historical context of valuable cities, we can study social sustainability among traditional communities. This issue also includes various factors that require an accurate and deep understanding of social sustainability life, customs and traditions of the people of each region, where Dezful, in the north of Khuzestan province, is as one of the stable cities with a long history of urbanization and valuable historical background. Therefore, the study of sustainability in this city has been done and the research hypothesis is that sustainability in the houses of Dezful that has been considered in some components. Based on this, it is possible to study the components of sustainability in the historical periods and determine its extent. It can also be said that there are significant differences in terms of social sustainability in different components that represent social sustainability concepts with different impact on the architecture and thoughts of society. Differences that have been formed following different levels of importance in different periods and have formed changes in the historical identity and culture of the society. In fact, it can be said that the architecture resulting from the thoughts of traditional society is a good solution for the importance of social sustainability in future architecture and is a good model for improving the components in the architecture on a large and micro scale. Therefore, the study of the residential structure of the historical context of Dezful is a purposeful study on the issue of social sustainability, while emphasizing the need to evaluate and recognize it, which is considered as the objectives of this study.

Social sustainability

Research has been done on the issue of sustainability in Iranian native architecture. Therefore, by examining the study process in the related subject, the basic fields of the current studies are obtained. Research conducted shows that there is a very close relationship between architectural patterns and lifestyle, customs and needs of people in society, which has an impact on social sustainability, cultural, psychological, environmental and so on (Philokyprou et al. 2021).

In another view, sustainability is located in three Main aspects, economic, environmental and social, and to express social sustainability, aspects of social interaction, social participation, flexibility, architectural identity and sense of security can be considered (Lami and Mecca 2021, pp. 17). Also, social sustainability is a topic related to the context, in the definition of its indicators, attention should be paid to the study area and they can

be considered with common features such as attention to human needs, focus on the future, social interactions, social cohesion and inclusion, and quality improvement (Mehan and Soflaei 2017).

Therefore, the most important aspects of sustainability can be considered in the groups of environmental, aesthetic, social sustainability and cultural identity (Alqalami 2020). Other research in this field also states that architectural patterns are a manifestation of the technical aspects of indigenous areas, cultural and social sustainability symbols of society, economy and other features of traditional architecture that strengthen social sustainability participation and preserve the values of a society (Benslimane et al. 2018); (Garcı´a-Esparza 2020).

Therefore, effective components in social sustainability include economy, security, culture and history of society, and biological quality (Dehghan and Gharibpour 2019); (Aqaltifi and Hojat 2018); (Alqalami 2020). Also, social sustainability, in addition to having direct effects on the architectural, improves bio-quality indicators and strengthens or further enhances architecture (Javan majidi et al. 2019). Social sustainability in architecture is a platform for studying the relationship between individuals and each other, which improves the quality of group life (Farzane 2020). Based on this, it can be stated that the sense of place, presence and creating a sense of belonging between the architecture and individuals increases social sustainability (Motazedian and laari. 2021); (Abdollahzadeh et al. 2020). Accordingly, aspects of social sustainability are divided into different groups and is a basis for the present study. Benefiting from these aspects is also considered as social sustainability capital and plays a significant role in creating social sustainability. Therefore, in this study, with the aim of understanding more social sustainability in the historical context of Dezful, its effective factors in the architecture are discussed.

Sustainability is aimed at identifying the environmental relations, and reduction of negative effects in social sustainability, economic, and environmental dimensions (Taherkhani et al. 2020), who have mainly paid attention to the issue of environment. Secondly, the issue of sustainability is the economy, which has been raised as a concern for social sustainability in recent decades. Social sustainability is one of the most important dimensions of general sustainability, which is involved in the architecture. Also, architecture is one of the effective sciences in the context of people's lives and deals with organizing their environment. Therefore, it is possible to create a ground for better understanding of the traditional architecture by using measures and components affecting social sustainability and studying the architecture of the

Sarrafzadeh *et al. City, Territory and Architecture*   (2023) 10:25

Page 3 of 18

past. In order to explain this issue, the architecture of the past has benefited from various elements that play a role in architectural decorations and spaces. Also, the architecture is taken from different models, each of which has interpretations of effective concepts in society and the views of individuals in society. In this way, the characteristic of paying attention to architectural patterns and the continuity of society's thoughts in the architecture can be considered as effective solutions in social sustainability, which is a language for interaction between generations. On the other hand, the architecture has different aspects that are reflected in architectural decorations and spaces (Falahat. 2006).

So that this issue can be investigated with parameters affecting social sustainability such as comfort and convenience, strength, balance, privacy, safety and security, readability, social facilities, sense of place, identity, diversity, public participation and visual richness studied (Mehan and Soflaei 2017, pp. 298).

One of the effective dimensions in social sustainability is quality of life, which in a way reflects the situation and conditions of people living in a settlement or urban area. This macro component includes various indicators such as social sustainability capital, satisfaction and social sustainability justice, which are addressed in each of the related sections. Also, biological improvement in the architecture is created by benefiting from the concepts of satisfaction, peace and comfort of human beings. On the other hand, the physical structure of the architectural with the benefit of effective strategies in the development of sustainable environments, is a ground for increasing quality (Chams and Garcia Blandonb 2019). Based on this, it is possible to influence the selection process and the type of biological attitude by considering the technology and physical structure as well as the principles of distribution and appearance elements. In the other dimension, the concept of security is considered and includes mental health and trust between people. In this regard, various structures have influenced the component of security and sustainable development, which include the concepts of human resource performance, supportive organization culture and transparency in a vision or perspective (Qi and Lingfeng 2019). Security also means peace of mind of individuals, organizational and national levels, which are rooted in the social sustainability activities of individuals in a society. So that improving social sustainability behaviors and attitudes in the form of active leadership, appropriate culture, flexible and transparent structure to create environmental sustainability. On the other hand, there is a component of social sustainability participation that has been considered from the past to

the present. Therefore, the importance of the participation of individuals in the community and constructive and investing groups can be considered. Also, adapting the concepts and culture of society with the architecture in creating social sustainability participation, increases the concept of social sustainability solidarity and causes interactions and belonging of individuals (Mete and Xue 2020). These factors are considered as major components of social sustainability and play a significant role in the architecture.

Brick decorations play a role in architecture as one of the components of the architecture and express related concepts. These decorations, which are taken from different thoughts and views of people in the community, are influenced by social sustainability factors and their symbolism in homes. For this reason, it can be considered as a process to transfer the indigenous concepts of a society. This transfer of concepts is created between different human groups and includes the experiences of the past. In other words, the patterns used in the decorations can be considered as the language of architecture, which creates the context of communication between people in different periods with this physical element. On the other hand, attention to architectural spaces and their relations with each other are derived from cultural concepts and the needs of traditional society, which while eliminating the function of each space, has hidden concepts and related to social sustainability factors.

Studies of the urban context of Dezful

Dezful is one of the cities with a valuable historical background, which is located in the north of Khuzestan province and adjacent to Dez river (Naeima 1997).This city was formed in order to protect the Sassanid bridge and as the center of government of the rulers as a safe place for its residents against the invaders (Sarrafzadeh et al. 2022). Also, its historical context has been formed with the centrality of the Qala region, and it has followed the development of the environment around the central core, which includes valuable buildings from the historical era. These valuable works include the Sassanid bridge (old bridge), the Old Bazar, historical residential context, etc., which are formed in cultural and social structures appropriate to the society (Ahmadi et al. 2016, pp. 104). Also, the brick decorations used in the historical context of this city show social and economic issues. So that the decorations in the detailed group are considered for wealthy people with better financial status and the simple decorations group for people with lower income (Sarrafzadeh et al. 2022). This is while different social groups have benefited from decorations at various financial levels. In

Sarrafzadeh *et al. City, Territory and Architecture*   (2023) 10:25

Page 4 of 18

another aspect, decorations represent the social and cultural thoughts of the society and express the importance of religious and belief patterns, connection with nature and animals, the importance of geometry and order in architecture and structural techniques, which are considered as a common language between architecture and humans. (Sarrafzadeh et al. 2023). Therefore, the economic and social aspects affecting the sustainability of this city can be studied as an issue affecting its native architecture.
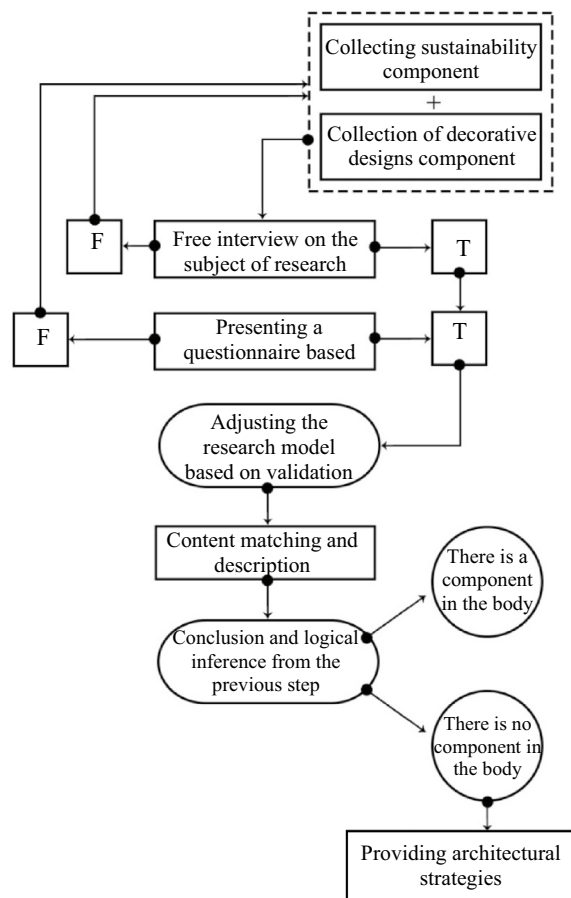
Fig. 1 Diagram of research steps

Methods

The present study was conducted with a combination of Delphi scientific and descriptive-analytical method (Fig. 1). In a way that the sustainability components are evaluated by Delphi method first and then each component is studied by descriptive method. Since in this research, the architecture (architectural spaces and decorations) is considered and the importance of each of the components in them is investigated. Data analysis is performed based on the described descriptions, and finally, a conclusion is made with logical inference. The effective components in the sustainability of the architecture have been done with the help of Delphi method and in 3 step, which is done by presenting a questionnaire to the experts. This method is also a structured process for collecting and classifying the knowledge of experts (Shieh et al. 2017) that is used in relation of the presented topic.

The experts have been selected from among the architecture professors of Dezful universities (Table 1) who are active in this field, which is equivalent to 30 people.

In the first step, the Delphi process is done by presenting the issue of sustainability in the architecture openly and in the form of interviews, in which the effective foundations in the research literature and the factors affecting social sustainability are determined.

In such a way, the issue of social sustainability is presented to the interviewees in the primary aspects of the study and its impact is investigated in the context of the study. Each of the interviewees presented their opinions in this regard and the next steps are taken.

At this stage, the main issues affecting social sustainability are discussed among the interviewees. So that the aspects affecting the social sustainability of Dezful houses are considered and the components of each subject are expressed in relation to the study context.

The main aspects of social sustainability participation, security, and quality of life are discussed.

In the second step, a limited questionnaire (Table 2) is prepared based on the issues raised by experts and the background studies by researchers. At this stage, the initial research framework is set based on the topics discussed. The experts then receive a questionnaire that summarizes the points of the previous step and provides explanations about the effective components in social sustainability. Finally, the effective components in social

Table 1 Characteristics of the interviewers in social sustainability assessment

Level of Education	The number of women	The number of men	Number of interviewers
Masters and Ph.D	9	21	30
They were selected from among the professors of Jundishapur University of Technology, Dezful, Islamic Azad University, Dezful Branch, and Payam Noor University, Dezful			University community

Table 2 Questions raised by experts

N	Question
1	What is the degree of attachment in the architectural body of Dezful houses?
2	To what extent do the architecture of Dezful houses play a role in social sustainability interactions and are they considered as a common language between generations?
3	What is the relationship between the thoughts of the traditional society and the decorative pattern and architectural space?
4	To what extent has there been a sense of ownership and sacrifice for the protection of architecture in traditional society?
5	How effective is the benefit of architecture in the historical body of Dezful in creating people's peace of mind?
6	How will the created understanding of architecture in the society have an effect on the trust among the people of the society?
7	How much impact of architecture can be considered as values or social sustainability capital of a society?
8	How satisfied are you with the decorative and architectural spaces of Dezful houses?
9	What is the extent of benefiting from architectural motifs and spaces in the historical body of Dezful houses and its relationship with the concept of social sustainability justice?

Table 3 Social sustainability and the components affecting *Xowun* decorations

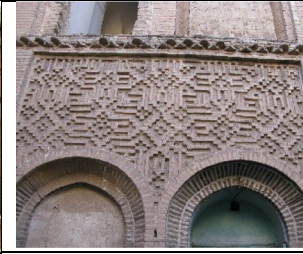| Dimension	Main criteria	Secondary criteria	Explanations
Social Sustainability	Social participation	Sense of belonging	Qualitative analysis of the sense of belonging and attachment of people to architecture body
		Social interactions	Architecture body as a common language paving the way to transfering the concepts from past to future
		Culture and tradition	The relationship between architecture body and religious-cultural thoughts of the society
		Social structure	Sense of ownership and dedication to the created signs of architecture body
	Security	Mental health	Mental security and comfort of individuals in the unity and integrity of architecture body
		Trust	Existence of common signs among people in relation to the thoughts shown in architecture and building trust between them
	Quality of life	Social capital	Analysis of the quality of implementing various architecture body in line with social capitals
		Satisfaction	Satisfaction by architecture body in terms of the relation between role and social beliefs
		Social justice	Justice in creating aesthetics based on the amount of decoration coverage and spaces function in different parts of the house

sustainability are determined and lead to the formation of effective components in research (Table 3).

Also, in order to match the data, each of the components in the architecture of Dezful houses are examined and their amount is determined. Then, the ways of creating sustainability in higher components are extracted and strategies are proposed to improve other components that have less sustainability. These strategies are created

under the influence of physical needs and effective components in social sustainability.

The research bed is located in the north of Khuzestan province (Dezful) which has a valuable historical context. Also, the studies conducted on the subject of research are among all the houses registered in the national monuments (Table 4).

Table 4 The case study of the decorations and spaces of Dezful houses. Source MCTH

Golchin house	Sohrabi house	Shayegan house	Chinisaz house
Nilsaz house	Mojahed house	Daeei house	Kohi nejad house
The list of houses studied in the context of research			
Tizno, Abasgholi, Mostofi, Ashraf Kochack, Kargar Hodi, Bagheban, Safavi, Omidi, Bozi Bozorg, Boum Arab, Nafisi, Hosainvand, Zargarzadeh, Kashani, Khoshkalam, Rahimi, Pakarzadeh 1 , 2, Naderi, Ziaei, Kazem Khabaz, Mishkesh, Ashiri, Chaneh Germez, Delvar, Naseri, Mard Soltani, Yek Khalilo, Shushtari, Ashari, Saadat Bakhsh, Moazen Masjedi, Tehrani, Touni, Daraei, Seyed Sadr, Mohseni, Ramezan Chaeideh, Bibaz, Mirza Ebrahimi, Derikvandi, Ghalambour, Hasanvand, Dianati, Adasi, Moezi, Roudbandi, Safar Nan Khour, Bahramvand, Kazem Lami, Filbanzadeh, Mirzaei, Hajivand, Alidad Ghasemi, Masoumi			

Findings

The findings show the quality of each of the criteria of social sustainability in architectural decorations and spaces. Based on this, different dimensions of social sustainability have been analyzed and include social sustainability participation (sense of belonging, social sustainability interactions, culture and tradition and social sustainability structure), security (mental health, trust) and quality of life (social sustainability capital, satisfaction and social sustainability justice). Is. Based on evidence and research texts, social sustainability can be considered as having different levels.

The small amount of each component is calculated based on the distribution of different species in architectural and decorative spaces, which includes 57.15% of "social sustainability participation" with agreeable and completely agreeable opinions, 64.3% of "security" with agreeable and completely agreeable opinions, 71.43 the percentage of "quality of life" agrees and strongly agrees with the opinion. Also, the remaining 100 percent of each macro component includes abstaining, opposing, and completely opposing opinions. The mentioned percentages and values are according to the answers of the architectural experts, which were expressed during the steps of Fig. 1.
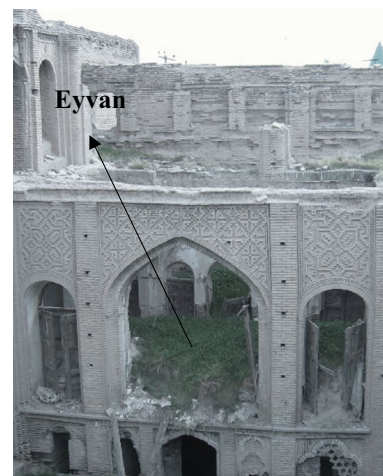
Fig. 2 The Ghalambor house. Source: MCTH

Sense of belonging in architecture

Sense of belonging in architecture is one of the criteria of social sustainability. In this criterion, the attachment of individuals to architecture is the focus point and leads to the continuity of their presence. Attachment comes with messages exchanged between the architectural features

Sarrafzadeh *et al. City, Territory and Architecture*   (2023) 10:25

Page 7 of 18

and human, and can be signs of social sustainability and cultural factors in the society (Jaalama et al. 2021, pp. 8–9).

The relationship between decorative patterns and home spaces with the component of belonging is such that it creates an attachment between the architecture and people. The existence of architectural spaces in homes is such that it has variety and in different situations, meets the needs of users.

For example, spaces such as porches in historical houses of Suzangar, etc. have had different functions in different climatic conditions. In a way that it has been used in winter as a living space and in summer as a space for sharing (access) to other spaces (Fig. 2). On the other hand, this issue is influential in the motifs of different groups and the use of each of them is a manifestation of attachment to them and creating a two-way relationship with the thoughts of society. For example, in "religious" motifs, the general public's tendency towards these motifs has caused people to use divine and religious names and create decorations in this group. The motifs associated with animals and plants also indicate people's attention to these living beings and have formed their decorative patterns based on the geometry found in nature. Patterns influenced by construction techniques are also taken from the execution method. Based on this, we can see the constructive attachment and traditional architects in creating such a model, which have gradually been welcomed by the general public. Finally, "geometric" and "compositional geometries" are patterns related to numbers and mathematics that show an attachment to order and principles (Fig. 3). According to the statistics announced by experts, the degree of attachment to the architecture is high and is equal to 64.3% (Fig. 4). Based on the numerical quantities and descriptions raised around this criterion, it can be stated that people's attachment to the decorative and spatial body in the architecture of Dezful houses is created due to responding to the needs of users in terms of functionality and belief.

Social sustainability interactions in architecture

The architectural features play a key role in creating proper spaces for social sustainability interactions and
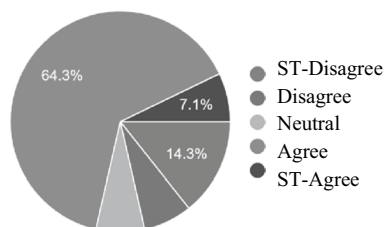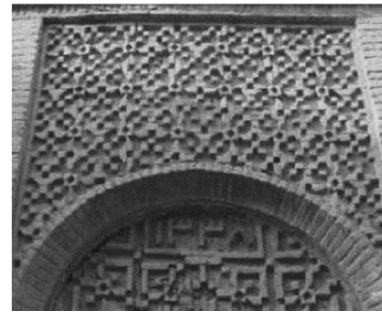

Fig. 4 The Sozangar house

paves the way to create a suitable behavioral quality (Xin et al. 2020). Social sustainability interaction is one of the most valuable criteria in architecture, which has been affected by physical elements and has been also a common language among people. Hence, considering the architecture and the relevant concepts of social sustainability interaction can be a good solution to communicate between the traditional and contemporary society. Accordingly, the brick Xowun decorations and architecture spaces can pave the way to transfer the past values affected by social sustainability. The relationship of the patterns used in motifs with the component of social sustainability interactions is such that it creates a common language between the generations. This issue has played a role in conveying the ideas of traditional society and has formed various decorative groups, each of which represents a part of the ideas of the past.

In the model of the "belief and religion" group, we can see the names of Allah, Muhammad, Ali, etc., which shows the community's attention to religion and its importance in their thoughts (Fig. 5). This issue has a significant connection with the religion of the people of the society; it is a quality of the role of religion in the architecture. Patterns from nature can also be seen in motifs related to plants and animals. This shows the importance of living things and the naturalism of the people
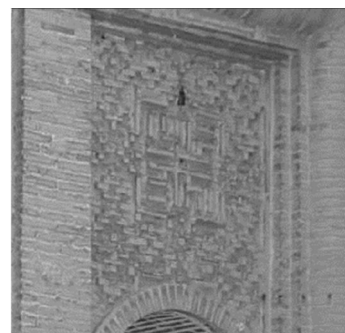

Fig. 3 Sense of belonging graph

Fig. 5 The Bozi Bozorg house Source: MCTH

of the deceased society, who have appeared in the form of brick roles. Also, Xowun in this section has been able to be considered valuable and educational for the next generations in the direction of naturalism. On the other hand, the patterns influenced by the construction technique express a quality in relation to the way the designs are executed and present the Xwoun art in the form of execution techniques. This is in a way that the execution techniques are presented in architectural language and concepts such as how the patterns are placed, the degree of complexity of the execution, how the bricks are placed, and so on. On the other hand, geometric patterns and combined geometries represent the use of mathematics in architecture and by combining them, it shows a step beyond simple geometric frameworks. This issue has a wide range and a different look at the use of patterns and has created new examples by combining geometric patterns by default. In this regard, we can refer to the "role of the cup" which is a combination of two patterns of triangle and rectangle, which are placed next to each other to create a pattern similar to a cup (a kind of glass).

On the other hand, we can point to the quality of architectural spaces in creating social sustainability interactions between people. In this way, historical houses have created spaces for people to interact in various situations and responses for example, the space of the sit outside the house is for the comfort of the people outside the house to wait for the landlord or sometimes for the landlord to sit and communicate with the people in the street and neighborhood (Fig. 6). Also, the spaces of the hall (large room) for entertaining guests and people interacting with each other or a room with a closet are considered for
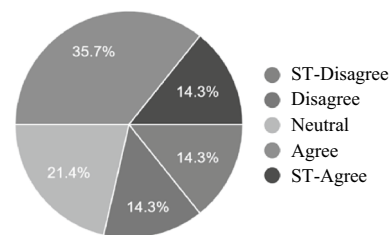

Fig. 6 The Sohrabi house

Fig. 7 Social sustainability interactions graph

collective rest. This issue is a manifestation of the relationship between people at different levels of private and public, which in different situations strengthens social sustainability interactions in architectural spaces. Also, according to experts, the impact of designs as a common language between different generations in society is high and equivalent to 35.7%, which is in a two-way relationship between the architecture and humans (Fig. 7).

Based on the numerical quantities and descriptions presented, it can be said that the social sustainability interactions of people are influenced by architectural spaces by creating a place for the formation of social sustainability relationships (Fig. 8). Also, people's social sustainability interactions are used in decorations, and their use in different decorative groups can be considered as a common language between humans and architecture for social sustainability interactions and transfer of concepts.

Culture and traditional in architecture

Other factors affecting social sustainability participation are culture and tradition. In this criterion, attentiveness to the importance of architecture and their relations with the social sustainability culture has been analyzed, and relevant structures have been presented (Fig. 2, 4 and 3). Culture and tradition are a complicated collection of knowledge, beliefs, art, and customs, which are based on the values and thinking structures of the society (Norton
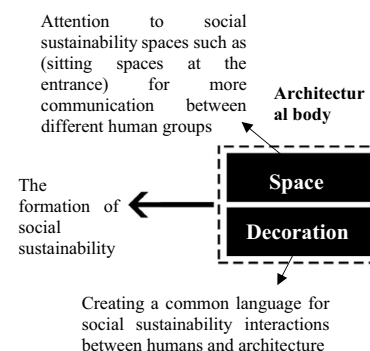

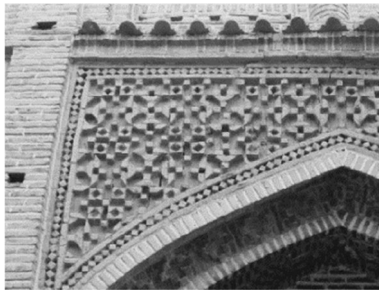**Fig. 8** The relationship between space and decoration and its impact on social sustainability

Sarrafzadeh *et al. City, Territory and Architecture*   (2023) 10:25

Page 9 of 18

Fig. 9 The Ghalambor house

Fig. 11 Culture and traditional graph

2000, pp. 4–6). These factors pave the way to distinguishing the group from others and create a special structure for every society. Hence, it could be mentioned that the physical specifications in architecture have been created based on cultural and traditional formations. In the criterion of culture and tradition, the relationship between the patterns and thoughts of society is discussed. This should be in a way that people can see the quality of behavior and beliefs of society in the architecture. Therefore, the social sustainability and behavioral cognition of society can be examined based on the study of decorations and relationships of architectural spaces. Therefore, "religious" motifs can be considered as one of the most important groups of this criterion in social sustainability. The presence of these motifs also indicates the strong connections between religion and the architecture. On the other hand, there are animal motifs, one of the most popular patterns of which is the "cow's eye" (Fig. 9). In using this role, it can be said that the society has believed that the desired role has been used to protect and prevent natural disasters. Therefore, it is possible to see how different beliefs and patterns are related to the composition of "cow's eye". Also, in the use of plant motifs, one can observe the freshness and vitality taken from nature, which is a ground for the vitality of the people of the society and their life. Also, the patterns "influenced by the construction technique" express the thoughts of the
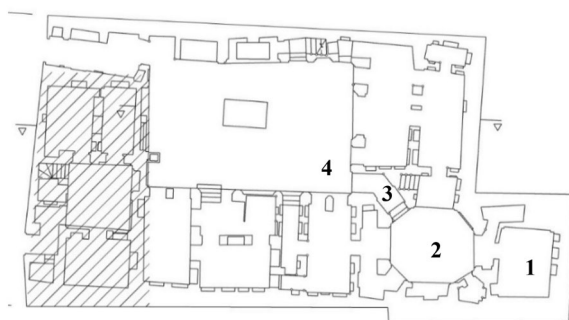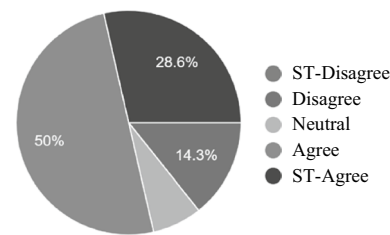

Fig. 10 Access steps in the Ghalambor house

traditional architect, which express the executive characteristics of the designs. In these designs, the executive quality of each role is created according to the characteristics and under the influence of the architect's mind, and they have formed patterns such as simple flowers, flowers in the corners, etc. On the other hand, geometric patterns and hybrid geometries exist in the minds of different societies and are derived from predefined shapes. These designs sometimes combine to form new shapes that are inspired by creativity and innovation. The combination of arranged patterns with other patterns used frames and arranges the whole decoration and in combination with the non-geometric group, forms a unique variety.

On the other hand, architectural spaces can be seen in the evolution of culture and tradition of society. In such a way that architectural spaces with specific relationships are formed in order to adhere to culture. For example, the hierarchy of access to architectural spaces can be seen in different groups of users. In this case, the presence of the guest and access to the spaces (such as the hall, etc.) in the passage of different stages (Fig. 10). Therefore, people have access to defined spaces and do not observe other private spaces of the house, and adhere to the principles of belief. Also, according to the statistics obtained from experts, it can be stated that the relationship between culture and traditions and the beliefs of society is high and equal to 50% (Fig. 11). Based on the numerical quantities and descriptions presented, it can be said that culture and architecture have had effects on the decorative and spatial body through communication with each other. So that the decorations under the influence of religious and non-religious culture and traditions ruling the society have formed different patterns and the architectural spaces under the influence of these ideas have led to functions in accordance with the cultural beliefs of the society. This issue in the spatial body causes people to adhere to the thoughts and ideas that govern the society and is a communication form that affects architecture.

Dedication in the architecture
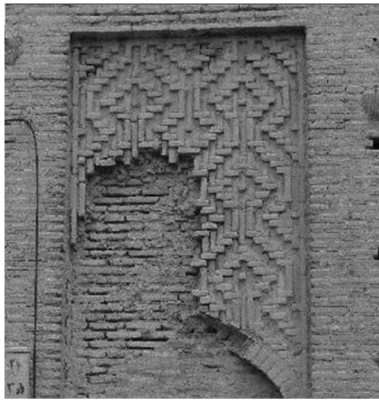Dedication in the architectural features is one of the valuable levels in sense of place. In this step, the person

Fig. 12 Destroyed *Xowunchini* in the Mojahed house. Source:MCTH

Fig. 13 Modern architecture behind the historical context in the Ziaei house. Source:MCTH
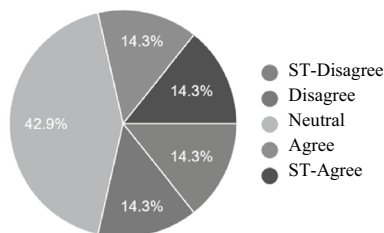

Fig. 14 Dedication graph

neglects personal interest and makes the effort to protect the architectural interests (Shahcheraghi and Bandarabadi 2016, pp. 274–275); (Righetti and Impett 2017). The reaction to the architectural features can be caused by the sense of ownership and can be also a factor for dedication in the individuals. On the other hand, decorations as physical elements and architecture spaces play a key role in this criterion of sustainability. However, because of insufficient protection of these works, some of them have been unfortunately neglected (Fig. 12). Accordingly, it could be mentioned that attentiveness to this criterion

Fig. 15 The integration and similarity of houses in the historical context of Dezful

is less important due to the decreased sense of dedication and ownership to the traditional architecture features. This issue is based on the observations in the historical context and lack of protection of national works and shows the importance of this criterion in Dezful houses.

An objective example of this can be seen in contemporary structures next to historical sites with different architecture (Fig. 13).

So that the lack of sustainability of this component in architecture due to creating confusion in different architectural values, changes in construction materials and architectural type, changes in color, etc. creates the background for these changes, an example of which can be seen in Fig. 13. On the other hand, the lack of maintenance and restoration of decorative patterns and architectural spaces by upstream organizations is another reason for the lack of proper maintenance and destruction of valuable historical monuments. Also, based on the opinion of experts regarding the sacrifice of people in the community for the protection and maintenance of architecture, the average rate has been set (Fig. 14), which is equal to 42.9%. Based on the numerical quantities and descriptions presented, it can be said that dedication to architecture has reached low levels and there is a need to consider rules to prevent modern constructions in the historical context. Therefore, the application of these rules by the upstream organizations has a significant need to avoid confusion.

Mental security in architecture

Security is one of the most effective criteria in social sustainability, which includes the two domains of mental health, and mutual trust based on the research framework. In this section, the desired issue is the psychological dimension of security, which can be created by architectural spaces and decorations (Barros et al. 2019, pp. 263–265) that it's amount can be measured based on the unity and homogeneity of decorative motifs and quality spaces (Fig. 15). The historical context of Dezful has created a harmonic view by creating unity and homogeneity in the Urban. Dezful houses have been built with harmonic decorations and a certain style, and have

shown various motifs. The motifs have created eye-catching beauty in the architectural features, and have shown mental comfort and visual quality. Accordingly, it could be mentioned that the mental health has been considered as a factor creating social sustainability.

On the other hand, comfort and mental security in architectural spaces is in a way that creates satisfaction from them and in two groups, comfort arises from meeting functional needs and social sustainability security. For example, for functional comfort, we can mention the adjacent rooms, which, when needed, expand the architectural space with the help of flexibility and cause peace of mind. On the other hand, the existence of a dense texture in the neighborhoods of Dezful and the knowledge of people in the community about each other, will lead to social sustainability security.

Using this criterion in the architectural features shows that mental health and mental comfort is a significant issue in traditional society (Nili et al. 2013, pp. 72). Accordingly, decreasing stress and creating mental comfort are underlying issues in historical houses.

Based on this, decorative patterns with various designs have been considered to create peace of mind. Religious and doctrinal motifs cause spiritual peace and deity to more people. Also, patterns with natural patterns (plant and animal motifs) are associated with peace of mind and tranquility due to people's connection with nature. Patterns with the pattern of "influenced by construction technique" are a manifestation of architectural structures and show sustainability in the execution of decorations, which causes a sense of security. Also, geometric patterns are formed in a logical and stable way due to their recognizable patterns and geometric order, which is a quality of peace of mind in society. On the other hand, this component is reflected in architectural spaces and causes mental comfort, which according to experts, its amount is high and equal to 50% (Fig. 16). Based on the numerical quantities and descriptions presented, it can be stated that mental security in the architecture of historical context is based on the harmony and integration of
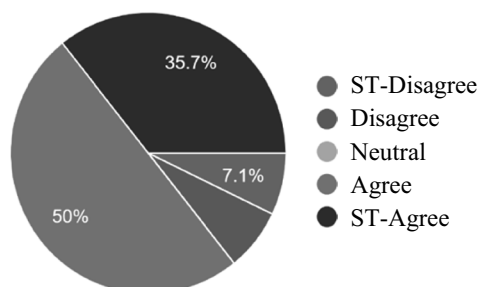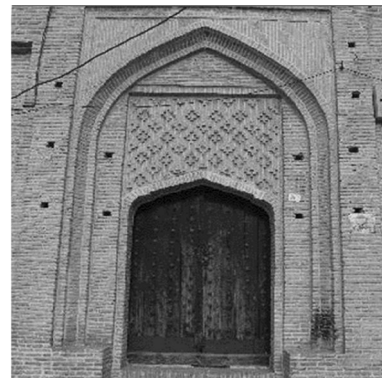

Fig. 17 Entrance of the Tizno house

architectural elements with each other in it, responding to different functions in architecture and creating mental security resulting from it, order and pattern. Madoon was formed for the formation of decorations and the connection of architectural decorations with religious and non-religious beliefs related to thoughts. Therefore, mental security can be considered as a result of the mentioned cases.

Social trust in architecture
Social trust can be created based on the attitudes created toward each other (Amirkafi and Fathi 2011, pp. 12). Hence, the creation of trust is based on mutual understanding, and positive and negative feedbacks can be created by residents of a neighborhood. Social trust can also be considered as a criterion used in architecture and it exists in *Xowun* decorations and architecture spaces. The decorations include various types and patterns, which have been created because of financing by families (Fig. 17). Every house has different motifs from others, which can be introduced to the people out of the house with the indicator entrances. However, the entrance
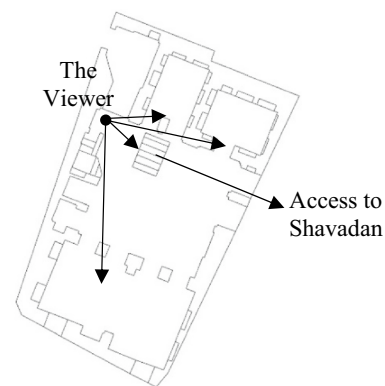

Fig. 16 Mental security graph

Fig. 18 Architecture plan in the Ashraf-kochak house

decorations in the houses of rich people have abundant complications and details. On the other hand, the entrance to the houses of poor people are simple. Therefore, it could be mentioned that the people of a house can be identified based on the *Xowun* decorations of their houses and the motifs used in the entrances.

The patterns used in the house are based on different roles that reflect people's views and intellectual tendencies. For example, in the house of Qalambar, the presence of the "cow eye" pattern, the "flower" pattern, shows the naturalism and the tendency of the people of this house to natural environments. Therefore, knowing the thoughts created by people is a ground for trust among them. In other motifs such as religious and doctrinal patterns, influenced by construction techniques, combined geometries can create appropriate knowledge. On the other hand, social trust in architectural spaces is formed through the connections between people and the readability of spaces, which is formed in creating social sustainability interactions. This is in a way that the neighbors of a neighborhood know each other well and have a better understanding of each other through access to architectural spaces and its legibility (Fig. 18). The knowledge created in the historical houses of Dezful has sometimes been such that the neighbors have access to each other through the space of Shavadan (a kind of underground space with a favorable temperature) and the social trust between them has been formed to a considerable extent. Therefore, the effective role of architectural spaces in creating trust between people can be understood. Also, knowledge of such rules and structures provides the basis for trust between people (Latifi et al. 2018, pp. 163–165), which according to experts, this component in the architecture of Dezful houses is low and equal to 42.9% (Fig. 19). Based on the numerical quantities and descriptions presented, it can be stated that social sustainability is formed under the influence of the knowledge of people in a common life and their neighborhood with each other, that the ideas hidden in the decorations and spatial patterns are the basis of knowledge to some extent for the people of a neighborhood.
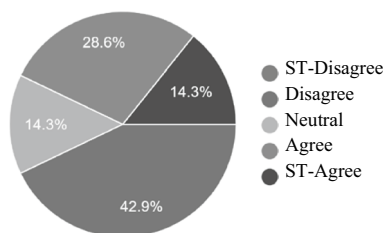

Fig. 20 Entrance of the Golchin house

Social sustainability capital in architecture

Social sustainability capital is another indicator of sustainability, which is analyzed by the quality of the form, and the resulting values in the society. Therefore, the importance of transferring the values and evaluation of architecture can be a reason to study this issue, and can be used to preserve that in the historical architecture (Garcia Esparza and Altaba Tena. 2020, pp 911). According to the values and structures in architecture, the presence of social sustainability capitals cannot be ignored and this shows the quality of these elements. All decorative patterns used in the architecture are part of the culture and beliefs of society, and therefore its patterns can be considered as social sustainability capital. Religious and doctrinal patterns are a display of the religious orientation of individuals that in the use of divine names can be seen the emphasis and attention of society on specific religious individuals (Fig. 20). That is why it is considered a value for the future that remains as a social sustainability capital. Also, in the designs with plant and
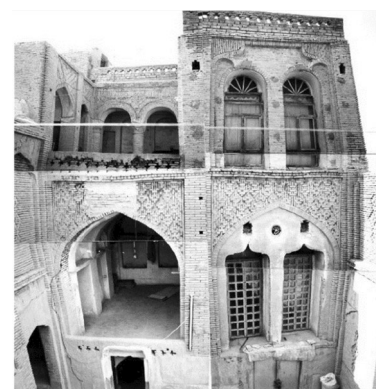

Fig. 19 Trust graph

Fig. 21 The shayegan house with thierd floor for different private. Source: MCTH
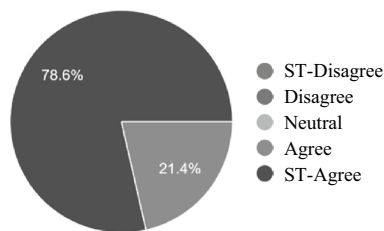
Fig. 22 Social sustainability capital graph

animal patterns, it is possible to observe nature and its entry into the architecture. This is also a capital for the future to increase physical quality by combining nature and architecture.

In designs with patterns influenced by construction techniques, design solutions in decorations can be considered as knowledge from the past and as a guide for future generations. Also, in designs with geometric patterns and combined geometries, these continuous capitals and geometric structures are used as stable patterns influenced by the laws of society. On the other hand, the presence of architectural spaces has been formed with an approach in accordance with the culture of the society and has observed certain criteria. In such a way that the presence of people in the house is regulated with different categories and in accordance with the function of architecture. For example, different people can access different spaces of the house in different groups and different situations. This is done by placing private spaces on the floors or at the end of the house (Fig. 21). Also, the use of inner and outer courtyards that have been formed in connection with the beliefs of the community to provide free and unrestricted access for people in different situations. Therefore, experts express the value of *Xowun* decorations and the adaptation of architectural spaces with the culture of society as a social sustainability capital and with a very high amount, equivalent to 78.6% (Fig. 22). Based on numerical quantities and descriptions, it can be stated that design patterns in spaces and architectural decorations are considered as social sustainability examples and cultural assets of the society. These patterns, whether in the spatial structure or in the decorations, carry out the transfer of the concept in a way that leaves consequences for the generations after them and is considered a manifestation of the social sustainability behaviors of the historical society.

Satisfaction from architecture

Satisfaction can be created because of the quality of architectural space and can improve people's lives. This criterion in architectural features creates a special attitude for the residents by the utilization of the elements and decorations, and with satisfaction as a result. Sense
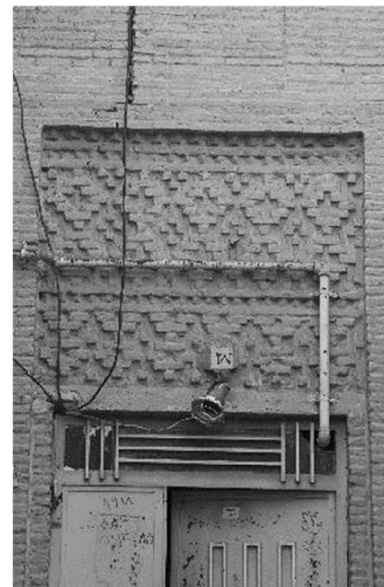

Fig. 23 Entrance of the Yek-Khalilo house

of satisfaction by the architectural features in people can be created when the architectural elements respond to different human dimensions, and this can be continued until the time that the person is attached to space by satisfaction (Nuttavuthisit et al. 2015). One of the most important issues in creating satisfaction by the architecture is the observation of social sustainability thoughts and the similarities in line with their beliefs (Fakere et al. 2017, pp. 139).

For this reason, the thoughts of society can be considered consistent with satisfaction and related to it. Also, the relationship between different models and society causes their interest and attachment. In a way, being interested and believing in different groups of designs in people causes this satisfaction. In religious and doctrinal motifs, we can refer to the subject of religion and devotion of individuals to infallible Imams and Imams, which

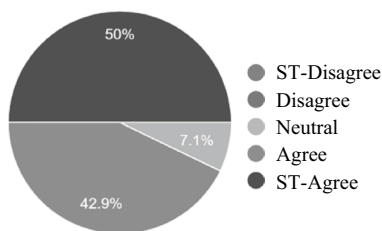**Fig. 24** Plants in the Daei house. Source: MCTH

Fig. 25 Social capital graph

Fig. 27 Architecture plan of the Masoumi house with diifrent space function Source: MCTH

Fig. 26 Exterior wall of the Chini-Saz house
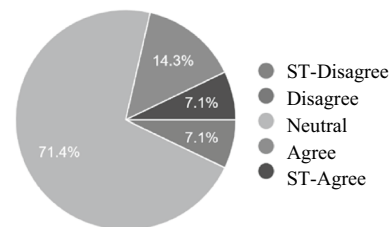
Fig. 28 Social sustainability justice graph

have been formed on the bodies of houses in order to appreciate them.

It has been created by plant and animal motifs due to the freshness and flow of people's lives and has provided the ground for their satisfaction (Fig. 23). Also, the designs influenced by the construction technique, by describing how the designs are placed in each of them, are from considerable interest to different people, especially the performers; because in this group, it expresses a kind of transferred science and the basic elements of pattern designs. Finally, geometric patterns and combined geometries, by expressing the concepts of logic and mathematics, create the ground for satisfaction and orderliness in people. On the other hand, adapting architectural spaces to the social sustainability views of society can be another issue for satisfaction. So that the application of social sustainability thinking and the architecture increases the quality of social sustainability beliefs and community commitment to them, which leads to satisfaction. For example, people's satisfaction with privacy, proper visual communication with nature, meeting social sustainability and cultural needs also form the basis of user satisfaction and increase the quality of this component (Fig. 24). Meanwhile, according to experts, the level of satisfaction with the designs is very high and
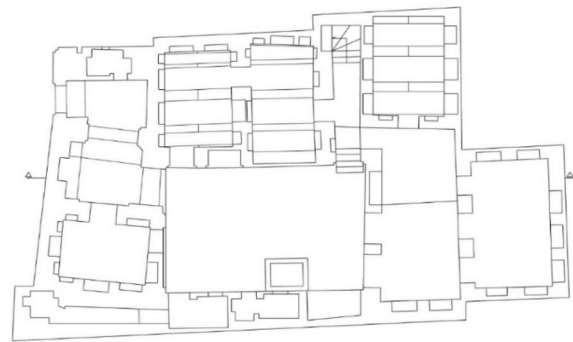
is equivalent to 50% (Fig. 25). Based on the numerical quantities and descriptions presented, it can be said that satisfaction with decorations is considered to match people's thoughts with beliefs and it's in the aspect of subjective satisfaction. On the other hand, the responsiveness of architecture and the fulfillment of functional needs in architecture creates the basis for satisfaction with the performance of the space.

Social sustainability justice in architecture

Social sustainability justice can be assessed to create a proper quality of architectural features in different spaces. This criterion has been generally investigated in three dimensions of distribution amount, method, and identification (Popke et al. 2016, pp. 72–74). The significant issue in creating social sustainability justice is paying attention to the decoration coverage in different parts of the house and distribution of architectural spaces, which can be considered as a kind of social sustainability justice in terms of classification and different amounts of decorations in different parts (Figs. 20 and 21); (Fig. 26). Accordingly, the *Xowun* decorations can be classified based on the position and the amount of coverage in different parts of the house. The decorated parts include the exterior wall, interior wall, and entrance with different amounts of coverage. According to the observations and analysis of the samples, it could be mentioned that
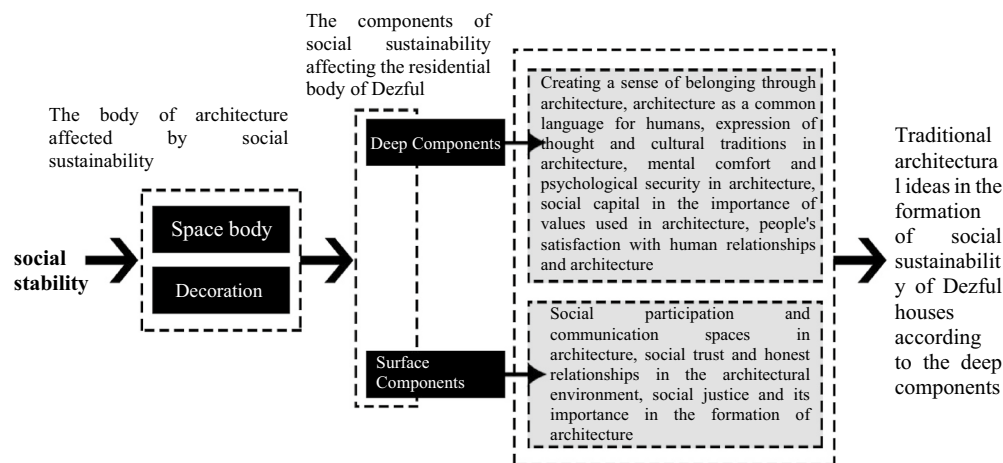
Fig. 29 The formation of deep and superficial thoughts of traditional Dezful architecture with regard to social sustainability in architecture

the entrance of the houses has been created as an indicator element in architecture. Also, the interior wall can be another important element in the building, which is created using a considerable number of *Xowun* decorations. On the other hand, the exterior wall includes a limited number of *Xowun* decorations because of visual aesthetics. Therefore, the decorative body of houses in Dezful has been distributed by different measures of *Xowun* decorations and based on social sustainability justice.

On the other hand, attention to different decorative groups, including religious motifs, related to plants and animals, influenced by construction techniques, geometry, indicates the diversity of different human groups that have been proposed based on social sustainability justice to meet the needs of the group, to provide different. On the other hand, the concept of social sustainability justice in architectural spaces is formed by their proper distribution in different parts of the house and causes the needs of users. Meanwhile, service, public and special spaces are tailored to the needs of users and based on social sustainability justice (Fig. 27). Accordingly, experts believe that social sustainability justice in the architecture of Dezful is considered as an average of 71.4% (Fig. 28). Based on the numerical quantities and descriptions presented, it can be said that social sustainability justice has been formed in the body of architecture through fair distribution. So that it has been created for people with different positions in the decorations due to the distribution in different internal and external walls of the house. Also, the distribution of spaces has been considered in terms of the function of the space (service, public and special) at different levels and for guests and hosts (Fig. 29).

Based on the research model and the studied components, 66.6% of the sustainability components are the most important in Dezful houses and 33.3% of the components are less important. So that the summation of each of its components represents a strategy in the social sustainability of Dezful houses. In the component of people's attachment to the house, the response of decorations and architecture to people's beliefs can be considered as an effective factor on its sustainability. In the component of social sustainability interactions in decorations, the creation of a common language between humans and architecture can be considered as a factor of social sustainability, and considering a space for people to interact with each other is effective on its sustainability. In the component of culture and tradition in architecture, it is possible to point out the adherence to decorations and spaces that are appropriate to them, which is a form of communication that affects the relationship between architecture and culture. Also, in the component of sacrifice for architecture, the existence of criteria and their application in construction and design frameworks are significant issues that must be considered. This issue is formed by restoring and renovating historical buildings and paying attention to construction patterns that are effective on social sustainability in architectural spaces and decorations. In the component of mental security, the relationship between the mental dimensions and the physical body of architecture has been formed with integration and coordination in order to respond to the physical and religious needs of people. In the component of social trust, it is possible to consider people's recognition of each other through economic levels and hidden views in their chosen thoughts in the decorations and architectural body. In the component of social sustainability capital, the existence of social sustainability and cultural examples in the decorations and architectural spaces

can be considered as consequences for the transfer of the social sustainability concept. Based on this, the next generations get to know the social sustainability capitals of their ancestors and a cultural trend is formed between them. In the component of satisfaction, it is possible to consider the social sustainability affected by it through the adaptation of people's thoughts and functional needs. Also, the component of social sustainability justice in the distribution of spaces in terms of function and the degree of use of decorations for different human groups is considered another factor of social sustainability.

Conclusion

As stated in the present study; Sustainability is one of the concerns of architects and urban planners. Also, according to studies conducted in this regard, it can be stated that social sustainability in the spatial and decorative body of Dezful houses has different components, each of which has created different levels of sustainability. These most influential components include belonging, social sustainability interactions, culture and tradition, mental health, social capital, and satisfaction.

Therefore, it can be said that the components of impact in the architecture of Dezful include the mentioned items. On the other hand, the components that have the least effect on the social sustainability, Includes social participation, trust and social justice. Based on this, most of the components of use in social sustainability of the architecture of Dezful houses can be seen in the historical context of this city. Based on this, strategies for creating sustainability in architecture can be considered according to the issues raised, which include:

-Creating diversity and responding to the functional needs of the space, along with adapting the patterns of designs to people's thoughts, creates the ground for belonging among them.

-Creating spaces for the interaction of people in society at different levels (public, semi-public and private) and the use of decorative patterns as a common language to convey the concepts that underlie more relationships and create social sustainability interactions between them.

-Paying attention to spatial relationships in adhering to the culture of society and the quality of decorative patterns based on the beliefs of individuals, is an important issue that expresses the identity of society. S-trengthening social sustainability relations in the neighborhood and getting to know each other in the spatial architecture causes mental security. Also, flexibility in architectural spaces meets the needs in emergencies, which plays a role in creating peace of mind. Therefore, by considering these two groups, the importance of the mental health component in architectural spaces can be expressed. On the other hand, paying attention to patterns appropriate to the nature of existence, geometric order in creating regularity or logic, emphasizing the religion and beliefs of individuals and patterns derived from the knowledge of predecessors have given people more knowledge of their identity, which leads to peace of mind and better understanding.

-Considering common spaces between neighbors, especially in architectural spaces and the intellectual closeness of people through the patterns used in decorations, provides the ground for people to trust each other.

-Benefit from decorations and architectural spaces that are in compliance with cultural and religious standards, art and technical expertise of construction; It is considered as a field for maintaining social sustainability capital that plays an important role in social sustainability.

-The commitment and satisfaction of the people of the society from the spatial and decorative body in creating mental comfort and meeting the needs, creates the ground for satisfaction. Evidence of this is the degree of people's attachment to the spatial and decorative body that has been formed in adaptation to the needs. Therefore, attention to various functional and psychological dimensions can be considered as important pillars of architectural design that causes people's satisfaction

-Proper distribution of architectural spaces based on the function, amount and type of decoration in different parts of the house, is a manifestation of the importance of social sustainability justice that can be located with proper control and design in the desired architectural spaces and decorations.

Finally, it can be said that the historical architecture of Dezful has created a kind of attitude and perspective of a traditional society that expresses a quality of social sustainability. This quality is rooted in architectural spaces and decorative designs and has led to their sustainability. So that the most functional dimensions of architecture are observed in architectural spaces and the most psychological dimensions are observed in architectural decorations. Also, the component of diversity as a common concept between decorations and architectural spaces has played a prominent role, which has been followed by the concepts of attachment and satisfaction.

Author contributions
SA arranged the analysis, a part of the result, a part of the conclusions, and a part of the research literature. SO arranged a part of the research literature, a part of the result, and the introduction. SA arranged the methodology and a part of the conclusions. However, all sections of the article are based on the opinions of the authors, which are approved by them.

Declarations

Competing interests
The authors declare that they have no competing interests.

References
Abdollahzadeh M, Rahnam M, Shokouhi M, Mousavi M (2020) Assessment of social sustainability indicators in cities of west Azerbaijan province. Human Geogr Res Quarterly 52(4):1257–1273. https://doi.org/10.22059/JHGR.2019.276093.1007878

Ahmadi M, Saraei MH, Moradi Y (2016) The study of imagine citizens the city of Dezful with emphasis on signs and social factors governing the city. Sociol Cultural Stud 1(7):97–124

Alqalami T (2020) Dynamic transparency in design: the revival of environmental sustainability in design elements of Iraqi buildings. Heliyon 6:1–11. https://doi.org/10.1016/j.heliyon.2020.e05565

Amirkafi M, Fathi S (2011) Investigating factors affecting attachment to neighborhood, case study: kerman city. J Iranian Soc Stud 5:1–26

Aqaltifi A, Hojat E (2018) Investigating the impact of the house concept on its physical transformations in the contemporary era in Tehran. J Fine Arts Archit Urban Plan 23(4):41–54

Barros P, Fat LMT, Garcia Slovic AD, Thomopoulos N, Herick De Sa T, Morais P Mindell, J S, (2019) Social consequences and mental health outcomes of living in high-rise residential buildings and the influence of planning, urban design and architectural decisions: a systematic review. Cities 93:263–272. https://doi.org/10.1016/j.cities.2019.05.015

Benslimane N, Biara R (2018) The urban sustainable structure of the vernacular city and its modern transformation: a case study of the popular architecture in the Saharian region. Energy Procedia 157:1241–1252

Chams N, Garcia Blandon J (2019) On the importance of sustainable human resource management for the adoption of sustainable development goals. Resour Conserv Recycl 141:109–122. https://doi.org/10.1016/j.resconrec.2018.10.006

Dehghan D, Gharibpour A (2019) Adaptability in reusing historic homes, journal of architecture and urban. Planning 29(85):1–12

Fakere AA, Arayela O, Folorunso O (2017) Nexus between the participation of residents in house design and residential satisfaction in Akure Nigeria. Front Archit Res 207:137–148. https://doi.org/10.1016/j.landurbplan.2020.103996

Falahat MS (2006) The concept of the sense of place and it's constituent factors. Honar-Ha-Ye-Ziba Memari-Va-Shahrsazi 26:57–66

Farzaneh J (2020) Assessing social sustainability in Iran development programs based on the framework strategic sustainable development. J Appl Stud Soc Sci Sociol 4:41–54

Fatourehchi S, Salehi S, Zarghami E (2020) Social sustainability assessment framework for managing sustainable construction in residential building. J Build Eng 32:1–15. https://doi.org/10.1016/j.jobe.2020.101761

Garcia Esparza JA, Altaba tena P, (2020) A GIS-based methodology for the appraisal of historical, architectural, and social values in historic urban cores. Front Archit Res 9:900–913. https://doi.org/10.1016/j.foar.2020.04.004

Jaalama K, Fagerholm N, Julin A, Virtanen JP, Maksimainen M, Hyyppa H (2021) Sense of presence and sense of place in perceiving a 3d geovisualization for communication in urban planning-differences introduced by prior familiarity with the place. Landscape Urban Plan 207:1–14. https://doi.org/10.1016/j.landurbplan.2020.103996

Javan Majidi J, Masoud M, Motallebi G (2019) Evaluation of the level of social sustainability in urban historical contexts. J Sustain City 4(1):19–36. https://doi.org/10.22034/JSC.2019.90902

Kim HS, Lee GE, Lee JS, Choi Y (2019) Understanding the local impact of urban park plans and park typology on housing price: a case study of the Busan metropolitan region Korea. Landscape Urban Plan 184:1–11. https://doi.org/10.1016/j.landurbplan.2018.12.007

Lami IM, Mecca B (2021) Assessing social sustainability for achieving sustainable architecture. Sustainability 13(1):1–12

Latifi G, Ghalandarian I, Sargazi S (2018) The impact of religious places on the feeling of safety among women case study Imamzadeh Yahya in Sari. Soc Develop Welfare Plan 9:135–167

Mehan A, Soflaei F (2017) Social sustainability in urban context: concepts, definitions, and principles. Archit Res Address Soc Chall 1:293–299

Mete S, Xue J (2020) Integrating environmental sustainability and social justice in housing development: two contrasting scenarios. Prog Plan 151:1–25. https://doi.org/10.1016/j.progress.2020.100504

Motazedian F, Laari A (2021) The structural model of social sustainability and spatial identity in urban peripheral settlements (case study: Konarak & Chabahar army residential complexes). J Urban Peripheral Develop 2(2):179–196

Naeima G (1997) Dezful, the city of brick. MCTH, Tehran

Nattavuthisit K, Pavitra J, Prasarnphanic P (2015) Participatory community development: evidence from Thailand. Commun Develop J 50:55–70. https://doi.org/10.1093/cdj/bsu002

Nili R, Soltanzadeh H (2013) Studying the application of healing landscapes in Persian gardens. Bagh-E Nazar 9:65–74

Noroozian Maleki S, Alaei A, Yazdanfar S A, Hosseini A B (2019) Effective criteria in measuring the social sustainability of housing, Scientific Quarterly of Architecture and Urban Planning, 30(87).

Norton W (2000) Cultural geography: themes, concepts, analyses. Oxford University Press, London

Philokyprou M, Michael A, Malaktou E (2021) A typological, environmental and socio-cultural study of semi-open spaces in the Eastern Mediterranean vernacular architecture: the case of Cyprus. Front Archit Res 10:483–501. https://doi.org/10.1016/j.foar.2021.03.001

Popke J, Curtis S, Gamble DW (2016) A social justice framing of climate change discourse and policy: adaptation resilience and vulnerability in a Jamaican agricultural landscape. Geoforum 73:70–80. https://doi.org/10.1016/j.ufug.2020.126790

Qi X, Lingfeng H (2019) Security enhancement of an anonymous roaming authentication scheme with two-factor security in smart city. Neurocomputing 347:131–138. https://doi.org/10.1016/j.neucom.2019.03.020

Righetti F, Impett E (2017) Sacrifice in close relationships: motives, emotions, and relationship outcomes. Soc Personal Psychol Compass 11:1–11. https://doi.org/10.1111/spc3.12342

Safari M, Daghighi G (2016) The symbolic aspects of water on ancient architecture. Research in science and technology conference, Berlin

Sarrafzadeh A, Didehban M, Vasigh B (2022) The art of Xowun decoration in historical context of Khuzestan. JUNDI-SHAPUR University of Technology Dezful, Dezful

Sarrafzadeh A, Didehban M, Vasigh B (2023) The classification study of Xowun patterns and their naming of Qajar houses in Dezful. City Territory Archit 7(10):1–20. https://doi.org/10.1186/s40410-022-00192-z

Shahcheraghi A, Bandarabadi A (2016) Environed in environment. Academic center fr education culture and research, Tehran

Shieh E, Daneshpour SA, Roosta M (2017) Designing a model of social sustainability place indicators using Delphi method and Shannon technique. Armanshahr 19:119–129 (In Persian)

Sulla K, Leal Filho W, Henning Sommer J, Lange S, Borgemeister C (2020) Channels of collaboration for citizen science and sustainable development goals. J Clean Product 264:1–13. https://doi.org/10.1016/j.jclepro.2020.121735

Taherkhani R, Hashempour N, Lotfi M (2020) Sustainable-resilient urban revitalization framework: residential buildings renovation in a historic district. J Clean Product. https://doi.org/10.1016/j.jclepro.2020.124952

Xin C, Sylvie VD, Luyuan L, Pieter U (2020) Taking social relation as cultural ecosystem service: a triangulation approach. Urban Forestry Urban Green 55:1–9. https://doi.org/10.1016/j.ufug.2020.126790

Publisher's Note