



ORIGINAL ARTICLE

Developing Effective Social Sustainability Indicators In Architecture

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ABSTRACT

As a guiding principle for future development, sustainability is today considered one of the outstanding issues in all areas, particularly on urban spaces and architecture. It can achieve balance through three economic, environmental and social components next to each other. In this study, the factors affecting social sustainability in architecture will be discussed in the first section; and in the second section, the components were studied from the perspective of the professional community of architects and urban developers so that their analysis can help to extract the effective indicators of social sustainability in architecture. The research methodology used is an exploratory study that is based on the analysis, description and extraction of the results obtained from questionnaires and detailed exploration of effective indicators in architecture as well as the final valuation of these indicators in order of importance from the perspective of experts. In the next step, a distinctive urban place such as city hall was designed with a reflection on the indicators discovered, and the results were also determined after evaluation the extracted components.

Keywords: social sustainability, Sustainable community, indicators of social sustainability.

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INTRODUCTION

A good community determines the constraints and obligations for all members of society to reduce social inequalities and promote equality and social justice. In such a society, there is maximum harmony between the values, norms, social order and the rest affairs. The above cases describe the feature of a good community; but, for it to be good, specific rules and regulations must be defined for the social system and the socialization of its people so that the community can be directed and governed within the framework of the laws. Communitarians assume that a good community is based on the balance between freedom and social order, and also consider the relevance between individual values and ethics and social scope.

In recent years, social sustainability has been increasingly recognized as a key component of sustainable development so that it has been included in the agenda of sustainable communities. Due to the lack of systematic studies, this research provides a comprehensive review of the current concept of sustainability, social sustainability and its theoretical framework in the first section. It was also tried to discuss the main propositions of this concept and clarify fully the dimensions of social sustainability so that the relationship between architecture and social sustainability can be examined in the second section.

RESEARCH QUESTIONS

1. How can the knowledge of components affecting social sustainability help extract the components affecting architectural design?
2. Can the significance of each indicator of social sustainability in sustainable design is determined by evaluating the leading indicators of social sustainability in architecture?
3. What are the factors influencing in the design of city halls with an approach to social sustainability?
4. Which indicators of social sustainability are of particular importance in the design of a distinctive urban center such as city hall?

RESEARCH HYPOTHESIS

According to the research questions stated, the following hypothesis is proposed. It seems that with a detailed comparative evaluation of the social sustainability indicators, the level that each indicator may affect can be achieved in accordance with the objectives and principles of social sustainability, and the relationships between these indicators can also be demonstrated.

SUSTAINABILITY

From the decade of the 1980s onwards, sustainable development has been used as a fundamental concept in the World Conservation Strategy of the United Nations and the Brundtland Report. In the report by Mrs. Brundtland (1983), sustainable development is stated as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [1].

McIntosh suggests a simple definition: “sustainability has a simple concept: living together in the middle of nature.” and says, “We need to make sure that anyone can live worthy and well.”

The basic requirement for achieving environmental sustainability is a dynamic balance between different systems of the environment. This condition, from a practical perspective, requires simultaneous access to the sustainability of ecological, social, cultural and economic systems with the following objectives:

Environmental objectives: creating a superior environmental quality, re- usability, eliminating waste and residues, using less construction materials, recycling building materials, recycling wastewater and eliminating the emissions;

Economic objectives: creating superior values, reducing ongoing costs, reducing energy consumption, providing perfect solutions, easy methods of production and prospective solutions;

Social objectives: security, adaptability, recruiting quality, eliminating energetic poverty, creating sound insulation, flexible programs, life with health, home care, permanent training [2].

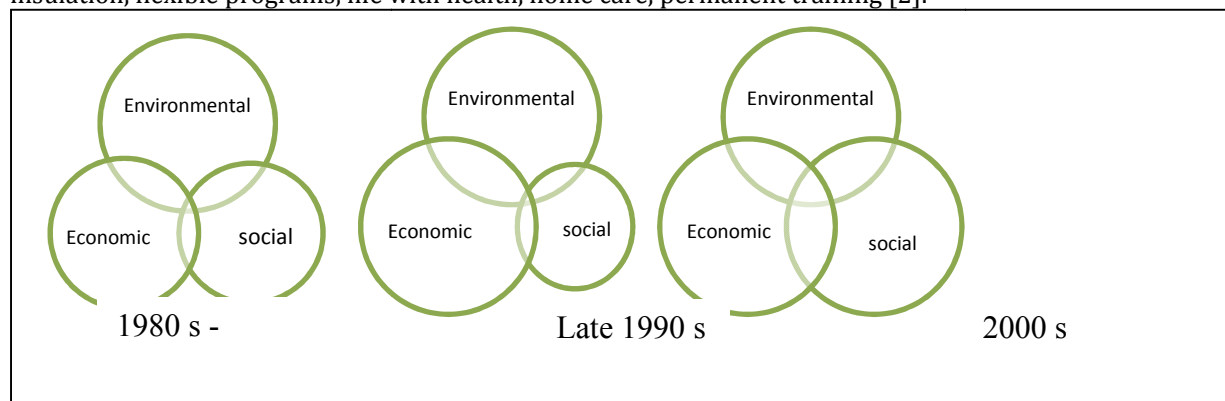


Figure 1. Different dimensions of sustainable development and the relative importance of each area [3]

SOCIAL SUSTAINABILITY AND SUSTAINABLE DEVELOPMENT

In social development, the transformation of society is not treated as a whole. More focus is placed on changing improvement of life and evaluating social transformation and currents rather than an organization and/or social institution. On the other hand, social development strategies are designed to improve the quality of human life and consider measures to meet human needs. Hence, social development strategies pay attention to the welfare needs, cultural and psychological needs, the need for adaptability and the need for growth and development, which have generally been regarded as the most important human needs in the new society, [4]

The main objective of social sustainability is to provide equal or more access to social resources for future generations compared to the current generation [5]. Social sustainability is an interface between the different dimensions of sustainable development [6]. In general, social sustainable development can be thought of as positive social changes in the community. According to the definitions given by Baines and Morgan (2004) and Sinner et al, social sustainability objectives are as follows:

- meet the basic human needs
- overcome the capabilities related to individual inability
- develop individual responsibility, including social responsibility and attention to the needs of future generations
- maintain and enhance the stock of social capital, for increasing trust and cooperation necessary to create and support civil institutions

- pay attention to the equitable distribution of development opportunities in the present and the future
- recognize the difference of diverse cultures and communities and develop social tolerance [7]

Table 1. The scope of subjects in social sustainability [7]

Dimension	The main scope of the subject
Social	Access to resources, the needs of the neighborhood/local community (for example, whether the residents of the neighborhood have the opportunity to socially express their demands?), readiness for conflict reduction, cultural promotion, education, aging and achieving old age, knowledge management for empowerment (including access to electronic information), freedom, gender equality, happiness, health, neighborhood/local community identity or civic pride, thought of the change and perception of the neighborhood, integration of newcomers (especially foreign immigrants) with residents of the neighborhood, leadership, justice and equality, sports and leisure facilities, low-ability people, population change, poverty alleviation, quality of life, crime and security, skills development, cultural diversity and pluralism, and wealth.
Socio-institutional	Capacity building, participation and empowerment, and trust of voluntary organizations and social network (also known as social)
Socio-economic	Economic security, employment, informal/ economic activities, and cooperation and partnership
Socio-environmental	Universal design, infrastructures, health and environment, housing (combination of quality and tenure), transportation, and environmental/spatial inequalities

Finally, social sustainable development is a development to

- meet the basic needs of food, shelter, occupation, income, living and activity conditions;
- be egalitarian and ensure that the benefits of development are fairly evenly distributed throughout the community;
- improve or at least not damage the physical, mental and social welfare of the community;
- promote education, creativity and development of human capacity for the whole society;
- preserve cultural and biological heritage and enhance a sense of connection with history and environment;
- be democratic and promote the participation and involvement of citizens.
- provide better living conditions and establish relationships between the design of public places within the city and the physical and social welfare and the excitement of city residents

The processes developed to achieve these goals are called soft infrastructures of society, while hard infrastructures are informal structures of society and social relationships that form the community [8].

Table 2. Definitions and opinions of experts on social sustainability [4]

Experts	Definition given for social sustainability	Study area
Paul and Stern	Development (or growth) is consistent with the pace of development in civil society.	Urban environment Focus on the economic and social dimensions
Bayart	Sustainability is designed to meet the minimum social requirements for long-term development and defines the various long-term challenges and functions in society.	Urban neighborhoods The importance of time frame and long-term conditions of social system
Chiu	Three different typologies of social sustainability from the perspective of theorists: 1) Maintain or improve the existing values and social structures; 2) Nature-based approach (social conditions necessary to ensure ecological sustainability); 3) Human-centered approach	Focus on justice and social equality
Murphy	The four main pillars of social sustainability: justice, participation, awareness for sustainability, social solidarity	
Gats and Lee	Influence of individual and collective capacities, with	Focus on the development

	four principles of equality, social justice, social balance, security and compatibility	of social organizations and strengthen the balance between them
Colantonio	Social sustainability is a combination of traditional social principles, including initial basic needs (housing and health) employment, education, equality and social justice and new concepts that are also less measured such as identity, sense of place, happiness and quality of life	Focus on traditional social principles
Bromley et al	Two main concepts of social sustainability: 1) social justice, and 2) viability and performance of community	Focus on collective institutions

SOCIAL SUSTAINABILITY DIMENSIONS

The procedures affecting social issues of the community can be examined and identified by determining the social sustainability dimensions. In other words, social sustainability dimensions can be considered as one of the most important and the most critical tool in urban planning and policy development. On the other hand, the extent, complexity and diversity of social sustainability indicators and their role in society require these indicators to be grouped and analyzed in terms of their role and performance in different groups. As for social sustainability, different perspectives and definitions have so far been offered by planners and politicians, which represent the vast dimensions of the concept. However, so far different categories and definitions have been provided in each of these three areas by researchers and experts, but those in line with the definitions and concepts of social sustainability have only been selected as criteria and sub criteria for each of these components (Table 3). It shows the most important indicators to explain social sustainability based on qualitative and quantitative indicators [4].

Table 3 .Components, criteria and subcriteria to explain social sustainability [4]

Dimension	Component	Explanatory criteria	Explanatory subcriteria
Social sustainability	Partnership	Social coherence	Sense of belonging
			Social interaction
			Responsibility
		Social participation	Participation in cultural and recreational activities
			Participation in religious activities
			Participation in local activities
	Security	Social security	Objective dimension (reduction or absence of crime)
			Subjective dimension (public perceptions)
		Social trust	Interpersonal trust
			Civic or institutional trust
	Quality of life	Subjective dimension of quality of life	Satisfaction with the quality of access to services
			Happiness in life
			Life satisfaction
		Objective dimension of quality of life	Satisfaction with the level of access to services
			Social justice

After extensive research on each of the social sustainability dimensions, the following overall diagram can be finally obtained by examining the detailed concepts of each of the social sustainability indicators and discovering the relationships between them through library studies.

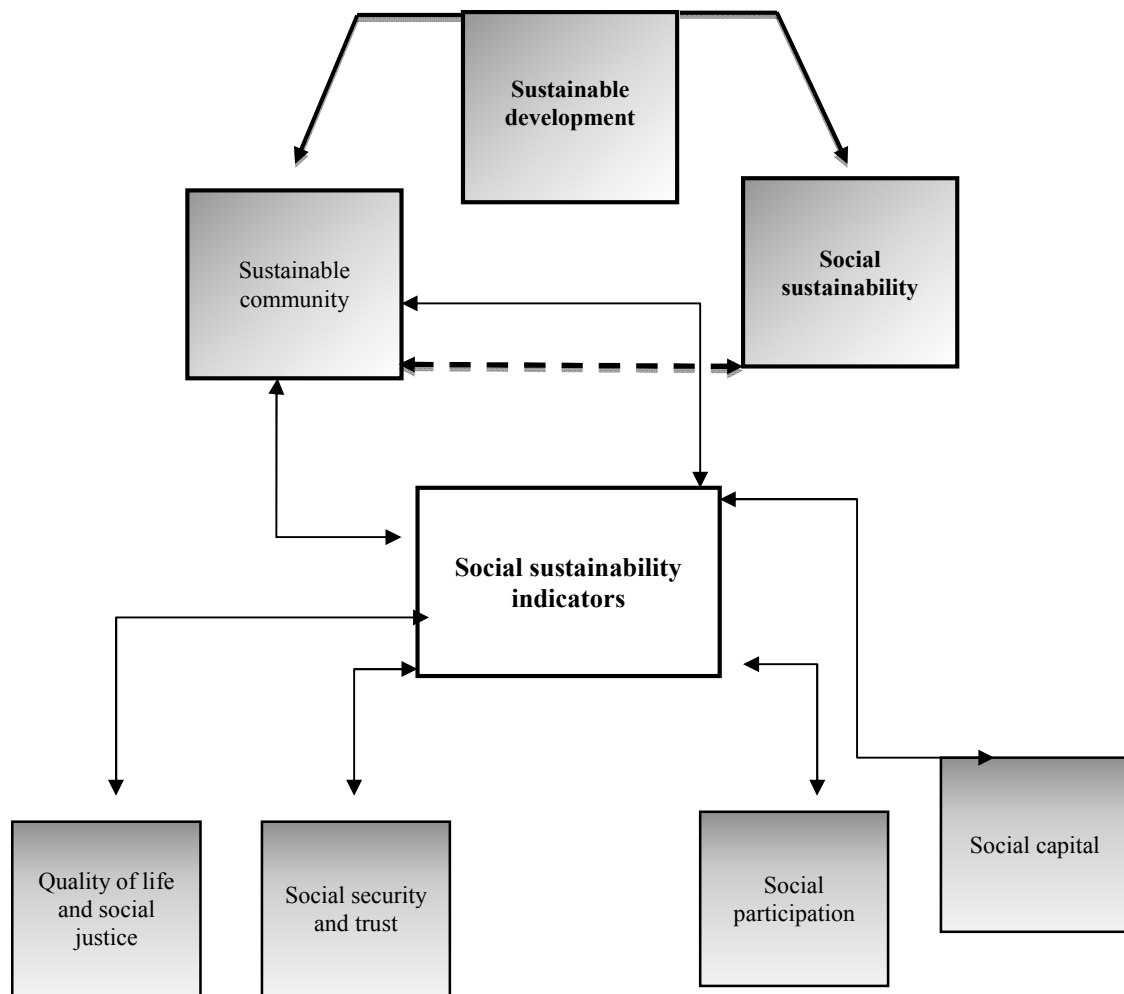


Figure 2. The relationships between social sustainability dimensions

Given the diagram above, the importance and role of social capital in social sustainability is quite clear. Hence, this indicator is evaluated in detail.

SOCIAL CAPITAL

Social capital is a set of norms present in the social systems that promotes the cooperation level of the community members and decreases the level of transaction and communication costs; that is to say, social capital is defined as the ability of individuals to work together toward common goals in groups and organizations [9].

Social capital can be regarded as the result of the following phenomena in a social system: mutual trust, reciprocal social interaction, social groups, social participation, social and collective identity, the sense of having a common image of the future, teamwork and social cohesion.

Social capital can be understood at two macro and micro levels: the general status with organization in the social, political, cultural fields and external communication networks are discussed at the macro level; and two types of social capital within the organization are noted at the micro level.

Accordingly, the theoretical foundations, critical quantifiable measures and its variables are defined in the Table 4 [10].

Table 4 .operational definition of social capital dimensions [10]

Theoretical concept	Dimensions and features	Theoretical components	Key criteria and variables
	Performance	Activity and space	The extent of physical changes in the

Social capital		management The right to change and modify Possibility of building a neighborhood by the residents	neighborhood compared to the past Existence of memorable spaces in the neighborhood, and the level of knowledge possessed by residents The level of tendency to suggest for living in the neighborhood to others
	Social belonging	Sense of place attachment	The level of a sense of belonging to the neighborhood as the environment of home The level of tendency to have more residence in the neighborhood Priority to interest in the place after the living environment (home) Nostalgia for the space of neighborhood after leaving it
	Social commitment	Informal socialization (visits) Amount of commuting with neighbors Level of feeling the need to communicate with the people of the neighborhood and the neighbors The power and influence of social networks (types of relationships formed between people) Willingness to work, cooperation and mutual empathy between individuals	Amount of changes made in the values and culture governing the neighborhood Helping fellow man and neighbor Level of conversation with neighbors to address and solve the neighborhood's problems Level of the cordial relations between the neighbors and the neighborhood
	Social trust	Sense of public trust and confidence Institutional trust (measuring people's trust in city management)	Level of trust and confidence to the citizens residing in the neighborhood Evaluation of the activities and programs of the municipality to solve the neighborhood's problems Level of security and peace of mind in the environment, especially at night
	Civic participation	Formal participation through active responsible cooperation Informal participation (attendance at religious services) Spirit of volunteerism Active participation in local community activities Active involvement in society	Level of willingness to participate for the implementation of development projects and services in the neighborhood Participation in religious ceremonies and social activities Participation in municipal council elections The desire to become a candidate for city council Providing a proposal on the possibility of participation or reasons for the lack of participation

In recent years, the discussion of social capital in Iran has also attracted the attention of many researchers and theorists, which has been followed by many theoretical and experimental works. Several general rules can be extracted from these works and the results published. First, social capital is generally low in Iran. Second, intragroup social capital in Iran is more active than intergroup social capital, and of course is also eroding and being reduced more than ever [11, 12].

SOCIAL SUSTAINABILITY IN ARCHITECTURE

Social sustainability is the main focus of the present and future generations, aimed to meet the needs, improve the quality of life, and use all the capabilities and competence in self-improvement, and has the criteria such as equal access to resources (social justice), ability to live well, health and social welfare, security, raising of awareness and education, participation, and promotion of public relations. The feedback in architecture is to create a responsive architecture that is consistent with the excellent basic

needs and behavior patterns of human to improve the corresponding spatial qualities for all segments of society, especially the low-income and disabled people - an architecture that reflects the culture, beliefs and behavior patterns. In addition, the support of social and cultural life can create a sense of belonging, make a harmonic living environment and flexible spaces by improving public spaces to engage the people of the city, increasing cultural values and creating structures of identity.

What is known today as social sustainability in architecture, in fact, is derived from the socio-cultural approaches in architecture. The effects of behaviors, beliefs and culture of the community in architecture are primarily important in this attitude. In general, architecture with an approach to social sustainability focuses on the design of spaces that are compatible with the culture, behaviors and methods of human life for the maximum time possible and is considered to be suitable for human life for prolonged times. Hence, social sustainability is related to basic human needs such as happiness, security, freedom, dignity and compassion. Sustainable architecture is a socially responsive architecture that must provide direction to the design by studying human needs and behaviors in a way that the relationship between man and the built environment is established (in other words, space is living and sustainable) for a long time. This requires an understanding of the spatial qualities that are defined by human needs and arise from the reflection of the needs in the design of space.

In addition, social sustainability makes stable and improve the quality of the events that flow within the architectural framework. Thus, the need to define and predict desirable events arises for the sustainability of the flow of events in space and for the improvement of their quality. Also, the factors creating a sense of place, a sense of belonging and identity building factors in space become a key role player to make sustainable and persistent the environment and currents within it [2].

SOCIAL SUSTAINABILITY CRITERIA IN ARCHITECTURE

According to the principles of social sustainability and its indicators and criteria in the community, the sustainability of the community development indicators in architecture is expressed with a review of studies in other areas, as follows:

- **Social interaction:** Social interaction in architecture is one of the issues that should be considered more than ever by architects to develop social sustainability. The human need for social interaction at different levels is not hidden from anyone, and the design of physical space for this interaction is borne by architectural designers. Socialization feature of architecture space can reduce or increase the level of social interaction among people in space, and therefore causes an increase in social capital and thus the development of social sustainability [13].
- **Architectural identity:** Despite differences in land, which have affected its shape, architecture has inherently dynamic and progressive features that are called identity. Design of spaces with the identity rooted in the culture and history of the society is the unique architectural feature of each territory. The sense of social identity can be increased by creating spaces with architectural identity as well as protecting historic sites, buildings, parks and museums, and on the contrary, can be reduced in the imported architectural design, which is not rooted in the unique culture and history of a country.
- **Social security:** Another indicator for developing social sustainability in architecture is to create a sense of security in space. Some points to include in the architectural design are the design of an architecture space that can enhance the sense of controllability in users, design of safe urban façades and design of defensible space. Therefore, special attention to the discussion of security in architecture seems necessary to develop social sustainability [13].
- **Flexibility:** Flexibility is dependent on socio-psychological and economic performance; and the physical spatial organization of the building must be in harmony with the natural and cultural environment, man-made environment, economic and political environment and the livelihood of the community. Flexibility can emerge as three types of diversity, adaptability and variability. Diversity means having a multi-functional space where it is possible to change the function of the space proportional to requirements. Adaptability means functional and functional-spatial flexibility, in which mobility is possible between sectors and spaces, proportional to change in time and season. The most important features of a flexible architecture are usability for a longer time, compliance with the experience and intervention of the user, benefits of technical innovations, economic and ecological endurance, and re-use of all or part of the building structure and components [14].
- **Social participation:** This component suggests participation and interactions in social roles and activities. Participation in customary activities can increase a person's connection to the values and norms of society in this way that the customary values and norms are internalized during the activities; and thus the internal adaptive features are reinforced, which contribute to the socialization of people [15]. In this regard, Montgomery attributes the success of a public space to the diversity of activity type, which should be varied in the space as possible [16]. It should be noted that there are also other

indicators (such as welfare and social order) that are of secondary importance compared to the provided indicators. In addition, social indicators are generally overlapping together so that an increase or decrease in one indicator can affect the other. For example, the increased level of social interaction in the community increases the social capital, which in turn can add the social security. Another point to note is that the sustainability indicators should be interpreted according to their unique space and time, and a general solution cannot be provided to improve them at any time and place. Second, these solutions must have flexibility because the latter is inherently necessary for the concept of sustainability. Participatory design process may be a good choice to design for social sustainability. After a careful evaluation of each of the above criteria, the relationships between these indicators can be expressed as the following diagram.

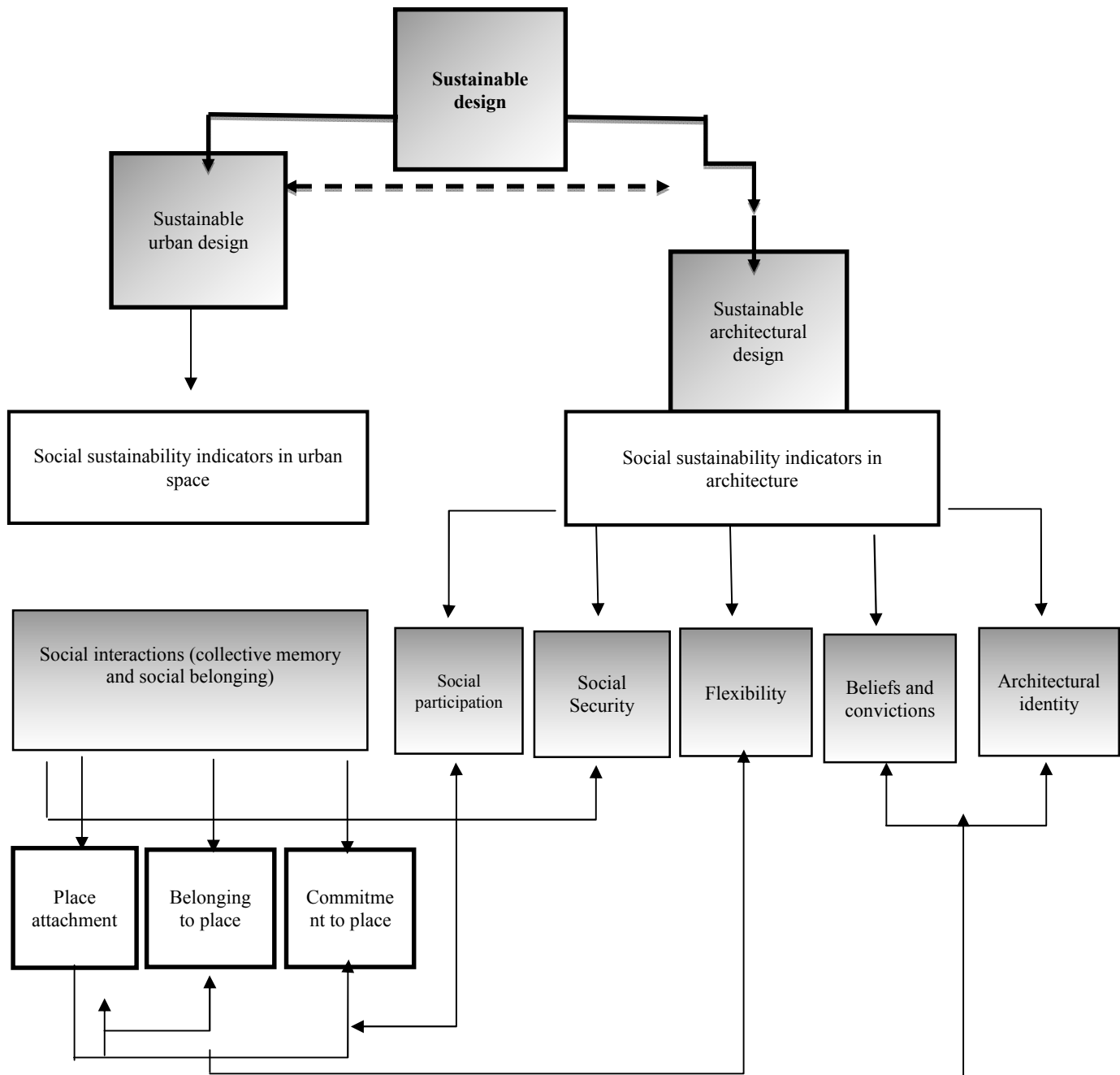


Figure 3- Social sustainability in architecture and the relationships between them

ANALYSIS OF STUDIES

Considering that the research is performed on the most important components of social sustainability in architecture, design components of a city hall as a distinctive urban place can be discussed with an approach to social sustainability.

Table 5. Design components of the city hall as a distinctive urban place in social sustainability

Design components of city hall	Type	Description
Place attachment	Physical	Use guides with playing color, light and texture Create a legible and attractive facade Use appropriate symbols and signs Create visual appeal according to its function Urban façade along or in combination with the body of building
	Activity-based	Create incentives for continued citizen participation in programs Provide cultural activities related to the history and culture of Shiraz city Citizen satisfaction with various celebrations Increase social interactions by providing incentives for attendance
Belonging to place	Physical	Select geometry, shape and arrangement with respect to citizen satisfaction The proximity of the building to valuable historical or cultural buildings Define the hierarchy of access, based on the type of activity
	Activity-based	Enhance the collective memory of citizens and visitors Establish temporary art exhibitions related to city hall programs Increase motivation for the presence of citizens in city hall through participatory activities Persuade people to join open city activities
Commitment to place	Physical	Create a space for the sense of intimacy among citizens in the environment Predict suitable and flexible spaces to welcome citizens Create some diversity in the physical- environmental design
	Activity-based	Try to facilitate social interactions Try to increase people's participation in cultural-environmental activities
Participation and security	Physical	Make the space more inviting: Make the space more inviting through appropriate design Entrance and the main facade, and attention to the hierarchy Access and general appropriateness of spaces Use the symbol and sign for inviting citizens to participate in programs
		Security: Include a flexible space in the design of façades to increase the sense of trust Type of geometry and organized spatial relationships of the entire complex, in order to build trust between citizens, attention to visual views

		Utility: Appropriate scale with behavioral and sensory effects in the interior and exterior space, respect for human scale in the exterior body design, type of lighting
	Activity-based	Readability of interior and exterior body for better communication and citizen participation
Beliefs and convictions	Physical	Type of shape and geometry in accordance with the culture and history of Shiraz people Hierarchy of access appropriate to Iranian culture Attention to the beliefs and convictions of Shiraz people in order to induce a better sense of place Create visual and physical appeal appropriate to the culture and people of Shiraz Attention to Iranian identity in the overall physical design of the complex
	Activity-based	Attention to the flexibility and diversity of activities and functions Pay attention to Iranian culture and architecture in detail, with regard to the related cultural activities, and induce a sense of place proportional to the appropriate behavior model

As is shown in Table 5, the intended environmental qualities in the design of a city hall can be extracted by considering the above effective components in the context of social sustainability, and therefore an appropriate physical program can be developed with an approach to social sustainability

BODY OF RESEARCH

Since the important aspects of social sustainability in architecture are clarified through library studies, analysis and interpretation, which was discussed in detail in the first section, a questionnaire was developed in the next step to discover and evaluate precisely the indicators stated, in order of importance from the perspective of experts in the field.

CONTENT OF THE QUESTIONNAIRE

The final questionnaire consists of 17 closed questions, whose accuracy and priority were determined to achieve the above objective from the perspective of community experts (university professors in the fields of architecture, urban planning and sociology).

Questions were developed in three general two-, five- and six-choice types. We suggested the two-choice questions to clarify the validity to deal with issue, five-choice questions to precisely measure each indicator, and six-choice questions to examine the impact of each of the indicators and indeed prioritize them in order of importance. The questionnaire was distributed among 120 people and was completed and returned by 80 individuals.

RESULTS

Before analyzing the findings, we evaluated the reliability of the questionnaire to examine the accuracy and inadequacy levels of the questions and demonstrate the strengths and weaknesses of the questionnaire. In this study, the evaluation was done with the help of the software SPSS v.16; and after calculating the acceptability coefficient, it became clear that 9 out of the 26 questions were unclear to respondents because of ambiguity, were not an appropriate for the purposes of the questionnaire and/or were boring. Thus, the nine questions were excluded. Since the minimum level of acceptability is 0.7, the number 0.719 is acceptable.

Results of the Questionnaire

As stated before, the questions were organized into three sections. In the first section, the following results were obtained from the calculations in Excel.

First, the general attitude towards the study (with the analysis of social sustainability indicators, the impact of each indicator can be determined), which was stated in the research hypothesis, was also questioned. 82.75 percent responded positively and 95 percent believed that these indicators have different values. Given these initial results, the need for the research questions, which arises after the support for the hypotheses, became clear more than ever, and the acceptability of the study was also confirmed.

In the second section, the questions for each indicator of social sustainability in architecture, which were extracted from the studies on social security and trust, social participation, quality of life, social interactions, flexibility, popular beliefs and identity, were examined separately, and then were also compared together, which the results are shown in Table 6, and the final evaluation is given fully in Diagram 1.

Table 6 - Separate analysis for each indicator of social sustainability

Social sustainability indicators	Percentage of particular importance					Result
	Totally agree	Agree	No opinion	Disagree	Totally disagree	The most effective indicator with the majority of opinions
Social security and trust	15	6.25	42.5	26.25	10	ς
Social participation	2.5	28.75	26.25	36.25	6.25	ς
Quality of life	33.75	37.5	18.75	7.5	2.5	ς
Social interactions	21.25	63.75	11.25	3.75	0	T
Flexibility	8.75	28.75	32.5	27.5	2.5	ς
Popular beliefs and identity	16.25	27.5	35	11.25	10	ς

As is indicated in the Table 6, a comparison of sustainability indicators found that from the perspective of experts, the indicator of social interactions has the greatest impact (85%), and then with a little distance, the quality of life is the most effective indicator (71.25%). Since there is a small distance between the two indicators stated, it is obviously necessary to evaluate them in detail so that we can confidently choose the most effective indicator of social sustainability and explain the more accurate valuing of the indicators in order of importance, to achieve a sustainable design. After this point was considered during the development of questions, this evaluation was included in the questionnaire, the results of which are shown in **Figure 4**.

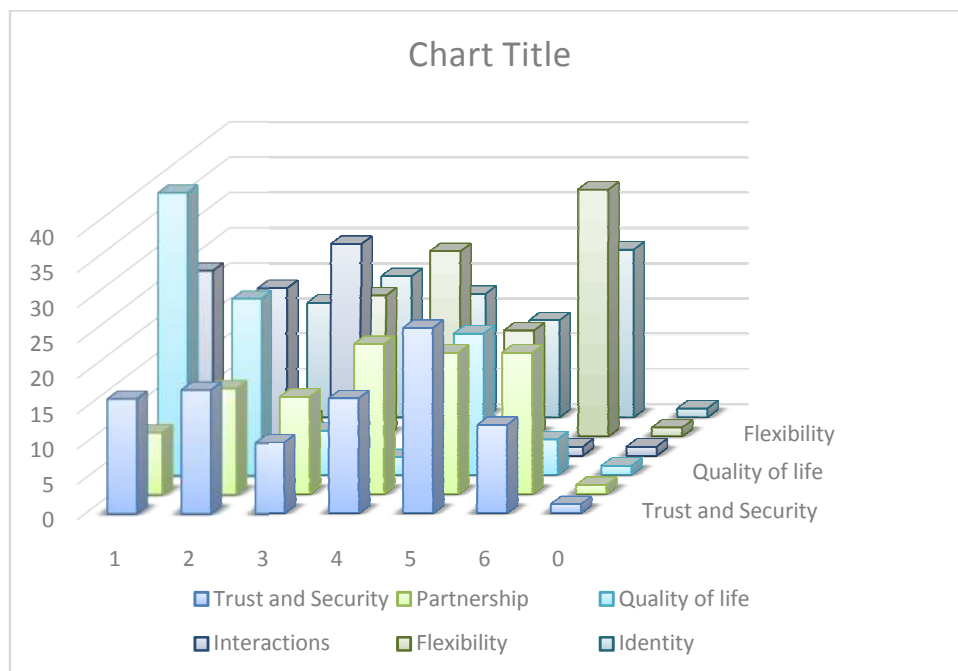


Figure 4- Detailed evaluation of social sustainability indicators in architecture

After a careful one-to-one comparison of the three-dimensional diagrams, it can be said that the indicators of life quality (41.11%), social interactions (26.25%), popular beliefs and identity (23.15%), social participation (21.25 %), social security and trust (26.25%) and flexibility (35.11 %) are ranked in the first order to the sixth-order, respectively. Considering the results obtained from Figure 4, the following diagram can be drawn.

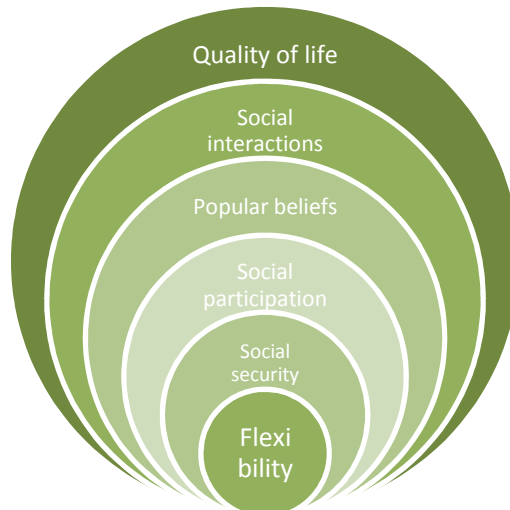


Figure 5. Diagram of sequential importance for social sustainability indicators in architecture

The third part of the questions is aimed at stabilizing the evaluation performed with important issues such as social sustainability objectives and principles and finding the relationship between social sustainability indicators and social capital. Finally, we will try to discover the most effective indicator in the design of a distinctive urban place such as city hall.

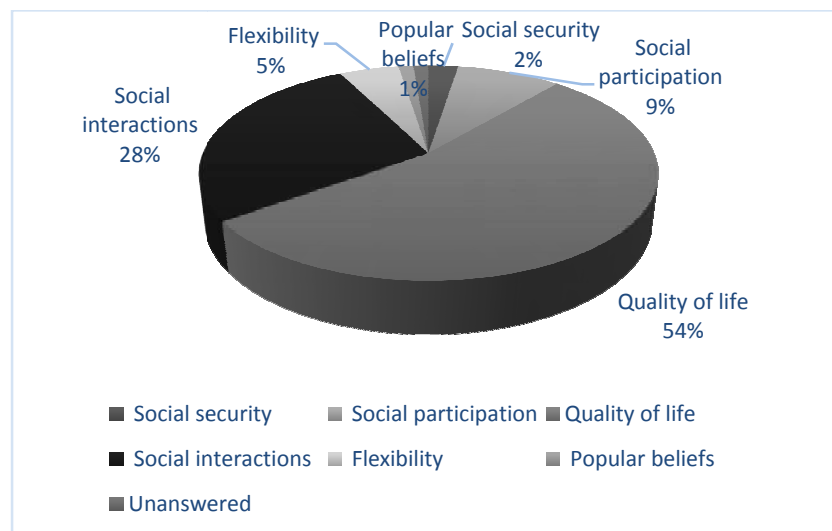


Figure 6- The most effective indicator of social sustainability with regard to the principles of sustainability

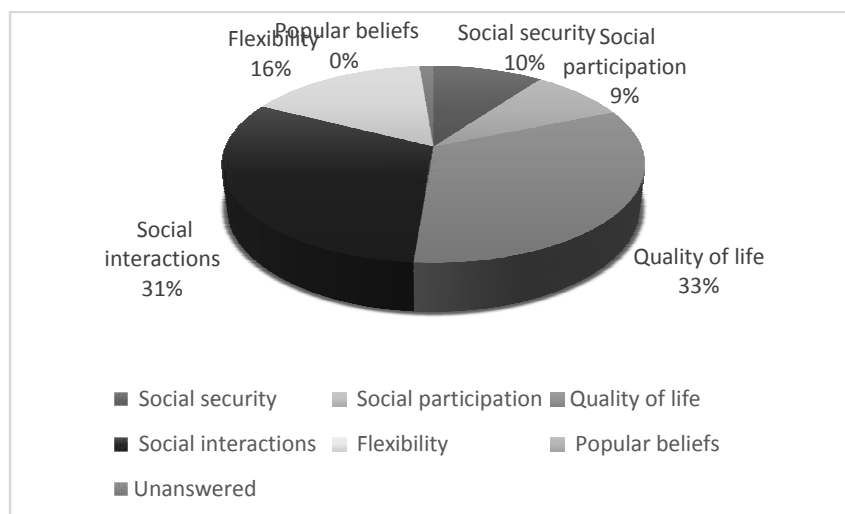


Figure 7- The most effective indicator of social sustainability with regard to the objectives of sustainability

According to Figure 6 and 7, the most effective indicator of social sustainability with regard to the main principles of sustainability (equality, viability and performance of community) and the main objective of social sustainability (i.e. meeting minimum social requirements for long-term development as well as defining various long-term challenges and functions in society), can certainly include quality of life and social justice and then social interactions.

THE RELATIONSHIP BETWEEN SOCIAL CAPITAL AND SOCIAL SUSTAINABILITY INDICATORS

According to the results of calculations based on the questionnaire, it can be said that social capital has a special impact on the indicators of life quality and social justice, social interactions, social participation, social security, respectively (Figure 9). In addition, these four indicators are directly related to social capital (Figure 8).

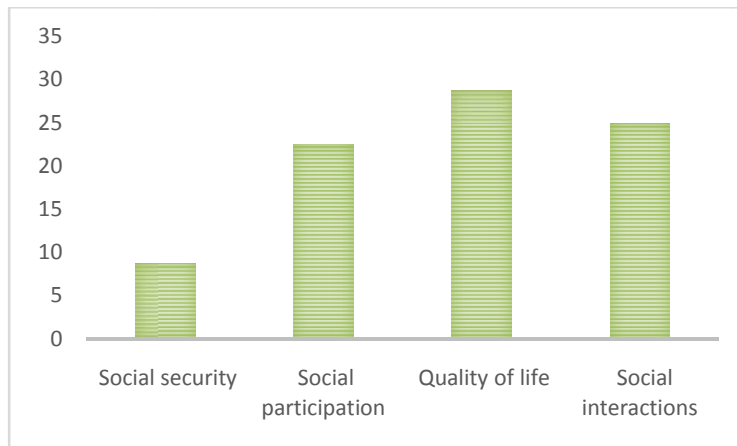


Figure 8. The effect level of each social sustainability indicator on social capital

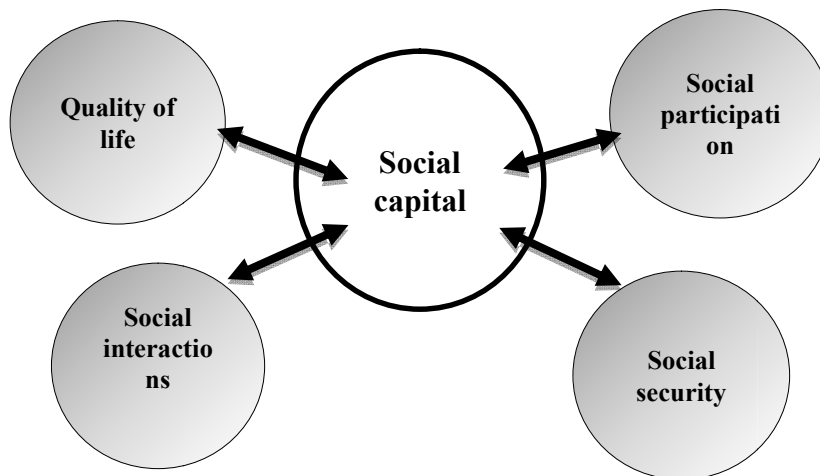


Figure 9. The relationships between social sustainability indicators in architecture

EVALUATION OF SOCIAL SUSTAINABILITY INDICATORS IN THE DESIGN OF CITY HALLS

According to the results of calculations in Excel, it can be certainly said that from the perspective of the majority of experts (70%), the indicator of social interactions is the most effective indicator of social sustainability in the design of city halls (Figure 10 and 11). In addition, considering the importance of citizen satisfaction and acceptance of environmental-physical quality in the design of city halls, it can be followed by the indicators of social interactions (25%), social security (18.75%), social participation (17.5%) and flexibility (16.25%), respectively.

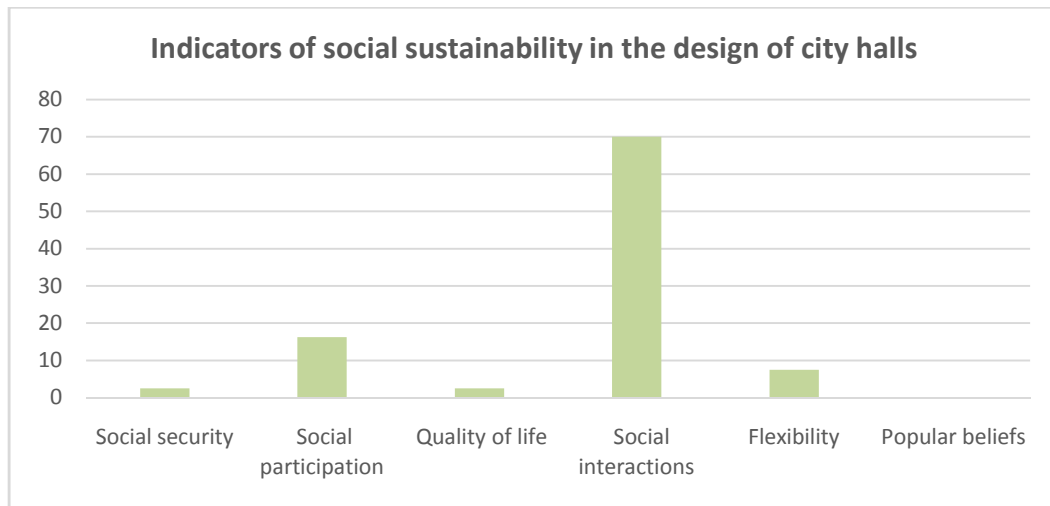


Figure 10- Social sustainability indicators in the design of city halls

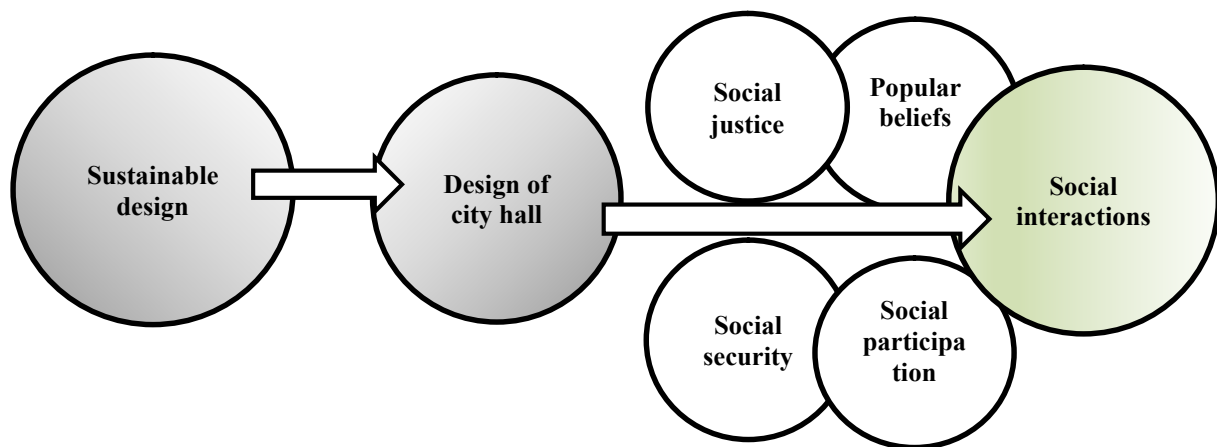


Figure 11- Social sustainability indicators in the design of city hall

RELATIONSHIPS BETWEEN SOCIAL SUSTAINABILITY INDICATORS

To determine the relationship between indicators, their correlation was analyzed by the SPSS software. Those indicators with acceptable significance are given in the following table.

Table 7. Correlation between social sustainability indicators

Table correlation of	Social participation	Social interactions	Social capital	Objectives of sustainability	Construction of city halls	Citizen satisfaction
Social participation	1	0.05	0.03	0.00	0.013	0.02
Social interactions	0.05	1			0.04	
Social capital	0.03		1	0.02		
Objectives of sustainability	0.00	0.02		1		
Construction of city halls	0.013	0.04			1	0.00
Construction of city halls	0.02				0.00	1

Table correlation of	Social capital	Quality of life	Objectives of sustainability	Principles of sustainability	Flexibility	Popular beliefs	Construction of city halls

			ty	ty			
Social capital			0.02			0.00	
Quality of life			0.05				
Principles of sustainability					0.02		0.01
Objectives of sustainability	0.02	0.05					
Flexibility				0.02			
Popular beliefs	0.00						
Construction of city halls				0.01			

Table 7 shows the particular importance of social participation, with the main objective of social sustainability (i.e. meeting the minimum social requirements for long-term development as well as defining various long-term challenges and functions in society) and social capital. It should be noted that there is a weak positive correlation between participation and social interactions, while a strong relationship is found between social capital and popular beliefs (Figure 13).

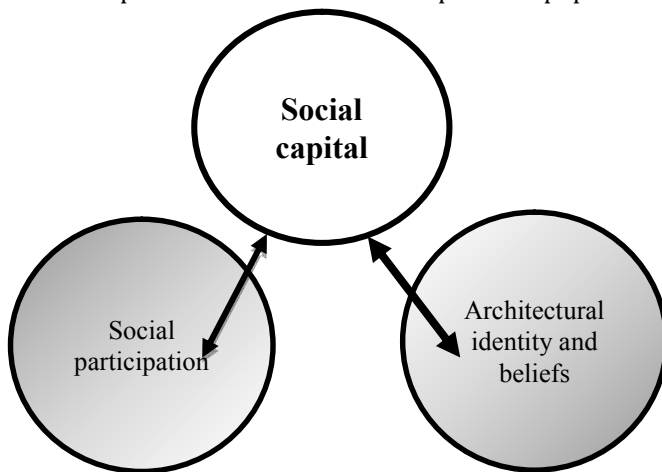


Figure 13. The relationship between social participation and social capital

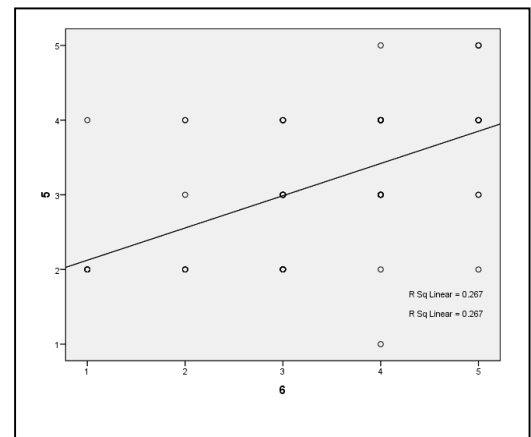


Figure 12. Positive correlation between social participation and sustainability objectives

With the analysis of Table 7, the relationships between social sustainability indicators and citizen satisfaction with city hall can be expressed in the following diagram.

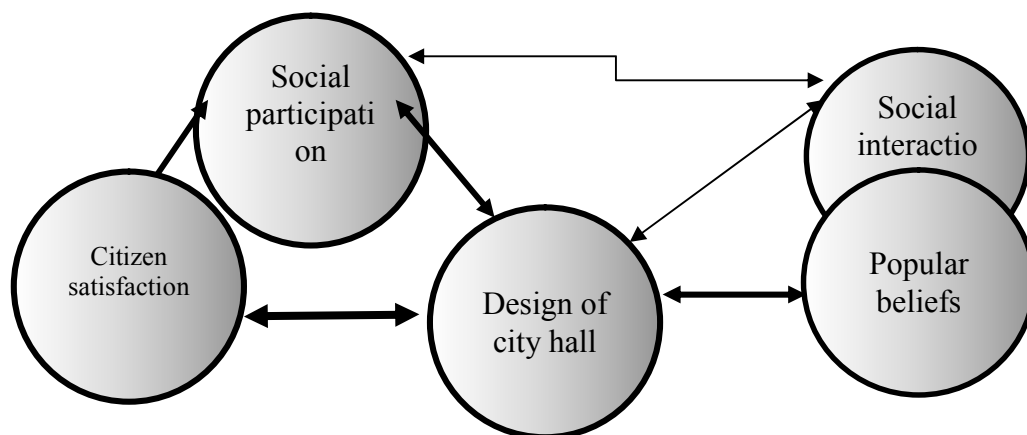


Figure 14- The relationships between social sustainability indicators and citizen satisfaction with city hall

CONCLUSION

As determinants of the quality of spaces and the context of people's lives, architects and urban developers play an important role in the application of sustainability criteria in cities and buildings. In this regard, if a harmonious and coordinated living environment is created with social values among citizens for the long term, we can create communities where people enjoy healthier and more active lives, to take steps towards social sustainability objectives. According to studies, the social sustainability indicators in architecture include quality of life and social justice, social security, social participation, architectural identity, popular beliefs and finally flexibility. Also according to the results of the analysis of the research questionnaire, the following conclusions can be made from the perspective of experts:

- Quality of life and, with a little distance, social interactions can be cited as the most effective indicator of social sustainability in architecture (Figure 4), with respect to Figure 6 and 7, in accordance with the purposes and principles of sustainability. Therefore, a sustainable architecture can be achieved more than ever by improving the quality of life in both objective and subjective dimensions of social interactions (attention to the sociopetal nature of architecture space).
- Social capital is particularly important among the indicators influencing social sustainability, which can be directly affected by any increase or decrease in the four components of social security, social participation, social justice and social interactions. In addition, they can be ranked as follows (in descending order of importance): social justice, social interactions, social participation and social security.
- The special position of social participation in achieving social sustainability objectives is evident in the evaluations made to explore the relationships between social sustainability indicators (Figure 12), and the two components of social participation and architectural identity have a strong relationship with social capital, in conformity with popular beliefs.

Based on the foregoing, the hypotheses presented at the beginning of the paper are confirmed, and the following final results can be obtained.

The feedback in architecture is to create a responsive architecture that is consistent with the excellent basic needs and behavior patterns of human to improve the corresponding spatial qualities for all segments of society, especially the low-income and disabled people, and reflects the culture, beliefs and behavior patterns.

Therefore, the social sustainability indicators in architecture can include social security and trust, quality of life, social participation, social interactions, architectural identity in accordance with popular beliefs and finally flexibility. Although they have different values from each other, the following conclusions can be extracted from the final evaluation of the study:

As the main objectives and principles of social sustainability are valued, we can achieve a sustainable architecture more than ever by improving the quality of life in both objective and subjective dimensions and increasing social interaction (attention to the sociopetal nature of architecture space).

The most effective step towards social sustainability objectives is to promote social capital through the creation of architectural identity in conformity with popular beliefs and engaging people in the public processes (increase in social interactions) with the formation and expansion of social networks (increase in social participation).

Social interactions are the most effective indicator of social sustainability in the design and construction of city halls as bilateral relationship, which is directly related to citizen satisfaction with environmental-physical quality in city halls. Therefore, with increasing social interaction, the citizen satisfaction can be significantly increased by enhancing the sense of place through the three sub-indicators of "place attachment, belonging to place and commitment to place" - which can be particularly considered by architectural designers and urban developers.

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