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INVESTIGATING THE SUSTAINABLE CITY INDICATORS THROUGH PROMOTING PHYSICAL SECURITY IN THE MARGINS OF THE SILK ROAD (CASE STUDY: YAZD CITY)

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Introduction

Safety and security have been significant issues throughout history, from early prehistoric cave-dwelling societies to medieval and modern cities. There are some notable commonalities between the concepts of sustainable development and urban security which require exploration. In addition, City and urban form is sustainable when a city is safe in its total aspect for its residents. On the other hand, physical security was one of the most important issues to the attention of Iranian traditional cities which caused the achievement of sustainable cities. Especially Iranian desert cities had sustainable and secure tissues.

In this paper at first the physical security indicators are determined, then with the aim of benefiting from one example of a sustainable city in the margins of the Silk Road, Yazd city is chosen to prioritize the physical security indicators affecting urban sustainability. Yazd as a good example of a sustainable deserted city is located in the central part of Iran. The city has a 3000 year long history, dating back to the time of the Median Empire, an ancient settler of Iran.

Indeed this paper is attempting to present an urban sustainable model by identifying the principles and concepts of physical security in Yazd old fabric and investigates the extent to which safety and security are integrated within urban sustainability. For this purpose a hierarchical model with three levels is suggested. So, the physical security indicators are categorized in three groups of form, meaning and function. These indicators later are prioritized using pair wise comparison logic and fuzzy group Analytic Hierarchy Process (AHP) method for determining the relative importance of each factor on achieving urban security.

Method

This paper has been used two types of methods including library-based method and fuzzy AHP method. The method which is adopted for Identifying the criteria and sub-criteria of the proposed model is descriptive and library-based, in the sense that it is based on documents and archives. The reason for adopting this method is that this research attempts to explore historical and cultural phenomena requiring documentary evidences and references.
Indeed, this paper proposes the use of fuzzy AHP method and presents an analytical model to determine the relative importance of indicators affecting urban sustainability based on their physical security, in Iranian traditional cities in the margins of the Silk Road.
Results

The proposed fuzzy AHP model is composed of the following steps (See figure 1):
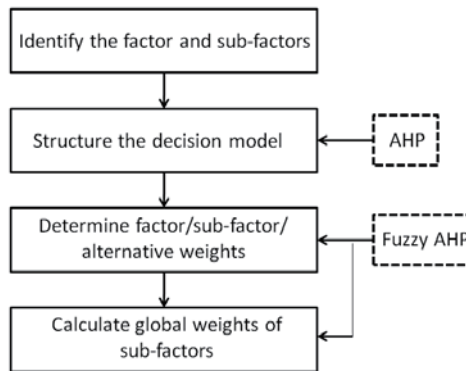
Figure 1: Schematic framework of the proposed fuzzy AHP model

Step 1: Identify the criteria and sub-criteria of the proposed model.

Step 2: Structure the AHP model hierarchically based on the criteria and sub-criteria identified at Step 1. As can be seen in figure 2, the AHP model is structured in 3 levels such that the objective is in the first level, the main dimensions of urban design (function, form and meaning) as the criteria are located in the second level and the sub-criteria related to each criterion are in the third level.
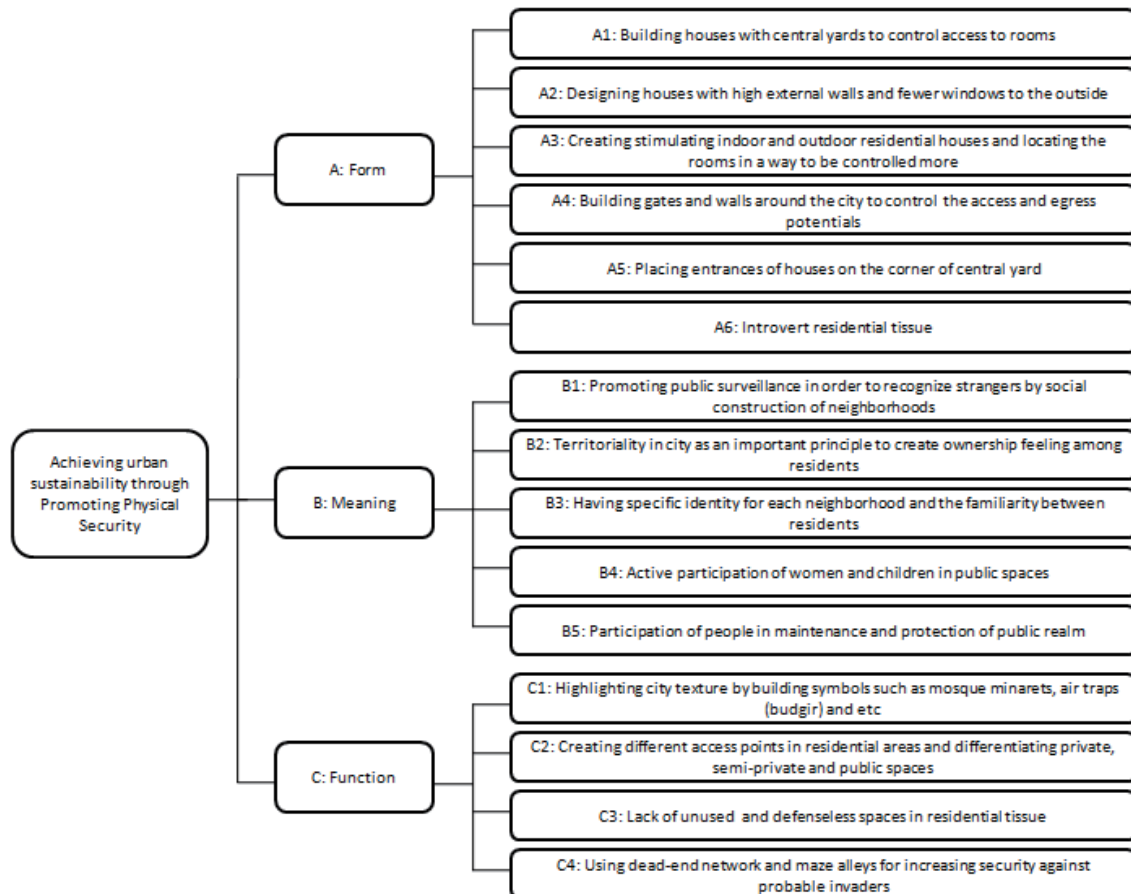

Figure 2: Proposed AHP Model

Step 3: Determine the priorities of the main principles with respect to the goal, by using pairwise comparison matrices (w1).

Step 4: Determine the local weights of the criteria (w2) and sub-criteria (w3 (Local)) (table 1).

Step 5: Calculate the global weights for the sub-criteria (w3 (Global)) (table 1).

Table1: Hierarchal Model with Local and Global Weights

	criteria		Sub-criteria		
				Local weight	Global weight
Achieving urban sustainability through Promoting Physical Security	A	0.558	A1	0.279	0.155
			A2	0.172	0.096
			A3	0.279	0.155
			A4	0.172	0.096
			A5	0.048	0.027
			A6	0.048	0.027
	B	0.097	B1	0.219	0.021
			B2	0.344	0.033
			B3	0.223	0.021
			B4	0.117	0.011
			B5	0.096	0.009
	C	0.345	C1	0.421	0.145
			C2	0.244	0.084
			C3	0.091	0.031
			C4	0.244	0.084

Discussion

Security is an integral part of sustainability. In a sustainable urban environment it is essential that the inhabitants should not have cause for fear for their personal safety and the safety of their possessions [1]. In addition, increasing opportunities for secure urban spaces can contribute towards the creation and maintenance of safer, vibrant and more sustainable communities, and it is now widely recognized that sustainable communities must therefore possess high levels of both safety and security [2]. So it is obvious that the proper design and effective use of the built city can lead to a reduction in the fear of crime and the incidence of crime, and to an improvement in urban sustainability.

Iranian cities throughout history had the important principles of urban defensible spaces under the physical and social dimensions, with creating a dynamic environment [3]. In fact, the old context of Iranian cities due to their physical structure, had the features and values such as security, privacy and identity that was necessary to achieve urban sustainability [4]. These cities were complete samples of the diversity and mixing land use for increasing public participation and raising social control. They also could be considered as a background in social capital, and a comprehensive model for creating defensible space, and environmental security of today cities. It should be mentioned that creating defensible spaces had an effective role in the sustainability of Iranian traditional cities. One of the important issues in Iranian traditional cities is the spatial domains and hierarchy of access to different spaces. Usually these cities had both public and private spatial domains and the exact definition of the interface between the domains.

The especial structure of historical city of Yazd as an example of a sustainable city in the margins of the Silk Road is originated from its location at the desert. In the past, the creative designers of the city utilized from modular concept in the form and the size of building, compatible with climate, the maximum use of potential and local materials [5]. Also they avoided their designs from unnecessary decoration by using ornaments including aesthetic and functional aspects. They considered human scale in proper form based on resolving human needs during time to create an urban sustainable form too. The most important factors for achieving urban sustainability in Yazd old tissue are mentioned in figure 3.
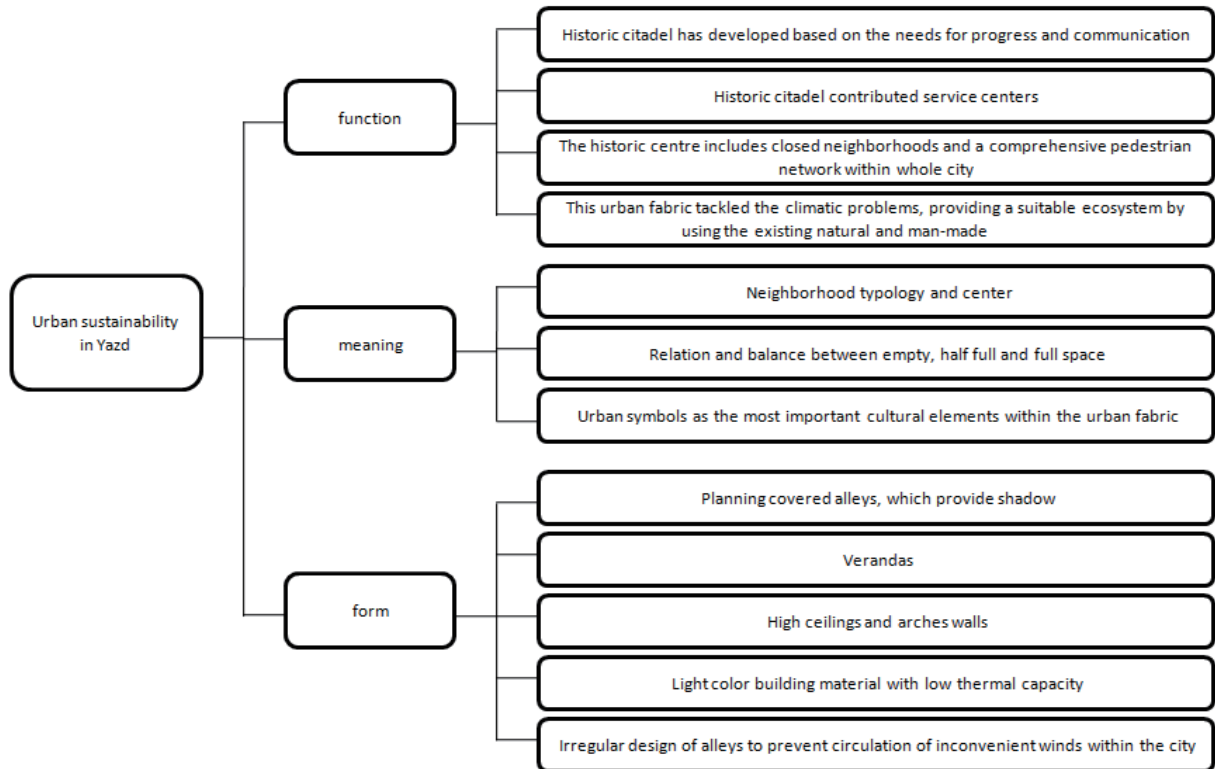
Figure 3: Factors for Acheiving Urban Sustainability in Yazd

Yazd, like other historical cities of Iran, has been increased the environmental security with the use of physical indicators. Another positive feature of Yazd old tissue was the consecutive residence of generations of the family in one neighborhood that caused a strong social relationship, sense of security and cooperation among residents. Most of the houses in Yazd old tissue had a central courtyard and were made up of two quite distinct parts. The external part or courtyard was completely private space that awarded to the women and children, and the internal or exterior part of the house belonged to the owner of the house and his guests (figure 4). Also affluent people's house had a special independent yard for guests.
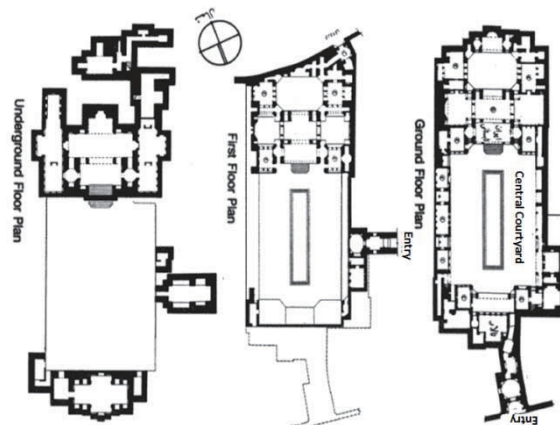

Figure 4: Plan of a House With Central Courtyard

The city texture was dense, so residents could focus on more limited space and be able to defend against invaders. On the other hand, one of the most important features in the desert cities of Iran was privacy. In addition, houses were isolated from the external spaces with high walls and fewer windows to the outside. Lattice - windows, despite of making privacy and aesthetic criteria, allowed to see from inside to outside of the house, while prevented the view from outside (figure 5). The location of these windows in the height above the 2/5 meters, created privacy in the first place, and on the other hand, increased the supervision of

residents on the environment. Also the house doors had two types of knots, one for women, and the other belonged to men (figure 5).

Figure 5: A Lattic-window and Door with Two Types of Knots

Conclusion

This paper aimed to clarify the key role of physical security in achievement of urban sustainability in the Iranian traditional cities. In addition, proposed an analytical model for investigating the Sustainable City Indicators through Promoting Physical Security. For this purpose criteria and sub-criteria affecting physical security in the Yazd city have been prioritized by fuzzy AHP method.

Results of applying the model in studied area showed that in order to achieve physical security, 'form' with the weight of 0.558 is the most important criteria. In addition, the most significant sub-criteria determined to be 'Building houses with central courtyards' and 'Creating stimulating indoor and outdoor residential houses' with importance global weights of 0.155 and 0.155 respectively.

As the paper shows that increasing opportunities for secure urban spaces can contribute towards the creation and maintenance of safer, vibrant and more sustainable communities, and it is now widely recognized that sustainable communities must therefore possess high levels of both safety and security [6]. Also a review of the literature clearly indicates that safety and security can seriously undermine the broader aims of urban sustainability [7].

On the other hand, a sustainable community must be the one that is defined as safe, perceives itself to be safe and is considered by others to be safe. Finally, a brief look at the history of the ancient land of Iran is a proof of claim that in traditional Iranian cities, physical security had a key role in urban sustainability.

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