

## Planning Sustainable Urban Square with an Emphasis on Physical Dimension (Case Study: Azadi Square of Yazd-Iran)

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### ABSTRACT

Square (also known as plaza) is one of urban spaces, which represents citizens living and is the base for the formation of social, religious, economical, etc. activities. Meanwhile, inappropriate planning of urban squares impeded their positive function. Built near (National Park) green space in Mohammad-Reza Pahlavi era, Azadi (National Park) Square of Yazd-Iran is one of the main squares of the city. There are no such things as spatial determination and restriction. The purpose of this study was applying the principles of stability in the re-planning of the square, which was achieved using descriptive and analytic method. Due to this, the physical features of Amir-Chakhmaq Sq. and Shahid-Beheshti (Mojahedin) Sq. which remained sustainable in the history were exploited. The result of this study is a plan, in which the general form, placement direction, applications, combination of spaces, etc. was provided deriving their pattern and aiming at reinforcing axle due these three squares. And, the plan will transform the space of the square to a lively, sustainable and identity-having one. It is proposed to apply in the similar cases the results of this study of urban interventions.

**KEYWORDS:** Square, urban square (aka: plaza), stability, sustainable development, sustainable planning.

### INTRODUCTION

Being one of the essential and necessary elements of urban everyday life, spaces and public areas of the cities, including urban squares (also known as Plaza), are the most important places that provide the position and base for the pursuit of social relationships and civil life. As defined, urban spaces are spaces within cities which are capable of being used by all the city dwellers. If properly designed and maintained, this public open spaces can gather people together and provide them places for their meetings and social events, in this way the disintegrated social relationships and bonds of people of different regions can be strengthened. The longer the life of these spaces, the more distinguished identity they will construct and they will give identity and the sense of belonging to future generations (Habibi et al. 2012). Following the issue of sustainable development, the architect and urban planners, similar to other experts, provided patterns to adapt their activities to stability framework. These endeavors were introduced with different topics such as "sustainable urban planning", "green urban planning", and "ecologic urban planning" (Golkar, 2000:45). Therefore, based on the requirements of sustainable development, the then-existed conventional principles of urban planning were repeatedly revised by pundits (architects and urban planners) and they were revised and supplemented to meet these requirements till now. Emphasizing on protection of natural and man-made environments, these principles are urban planning instructions which appropriately link urban forms and activities, hence bringing sustainable environments (Habibi et al. 2012). Therefore the planning of urban squares based on stability principles and values are drastically significant. Some of these stability principles are appropriately applied in the design of old urban squares, which will be very useful for new designs. Examples of such squares are of Amir-Chakhmaq Sq. and Shahid-Beheshti (Mojahedin) Sq. both in Yazd City, which represented the identity of the city for many years. These two squares are in a same route with Azadi Sq. and form together the route of Imam-Khomaini St., one of the main routes of the city. From many years before, Amir-Chakhmaq Sq. participated as a valuable space in Yazd. Being one of the main squares in Yazd, Shahid-Beheshti (Mojahedin) Sq. was repaired in Pahlavi era and now has circular form and uniform porches all around. Being an applied research, this research first gathered theoretical preliminaries relating to urban squares and sustainable urban planning, and then using descriptive method, it investigated and realized Amir-Chakhmaq Sq. and Shahid-Beheshti (Mojahedin) Sq in Yazd and utilized their applied principles in the design of Azadi Sq. with regard to sustainable development and sustainable urban planning teachings.

#### Theoretical Preliminaries

##### Urban Spaces:

Urban space is a space that is organized based on different residential, commercial, educational, and therapeutic activities (Kalantri: 2012:11). Urban spaces is nothing but of space of citizens everyday life which

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is consciously or unconsciously perceived along the way from home to work (Pakzad 1997:32). Urban space as one of the subsets space notion is not excluded from space category. That is, the social and physical dimensions of city have a dynamic relation. In fact, urban space includes social and physical spaces (MadabiPour 2000:48). An urban space can be studied based on different environmental, geographical, architectural, etc. approaches. Urban space is the scene for playing the roles of actors which are agents of their society, including positive or negative, pale or dark, and general or specific roles. Urban space is like a scene in which the general activities of urban life occur. Streets, squares, and parks of a city form the human activities of a city. These dynamic spaces versus static spaces of work and resident form the main and vital components of a city. Motion networks, communication centers and public spaces provide fun and recreation in the city (Bahraini 1998:313). Square can be noted as one of urban spaces.

### Square

As an urban space having more destination activities and less passing ones, square has common notable features like wideness that depends proportionally on number of cross route, having special functions constantly or during specific times, and existence probability of physical elements at its center (Soltanzadeh, 2006:82). The features of square depicted differently in different cultures in different periods. In Iranian culture, square was a (regular or irregular dimensioned) space performing as a place for activities and its name choice showed its main activity (Naghi Zadeh, 2006). Concerning the meaning of urban square (also known as maydan or meydanin Persian), Dehkhoda encyclopedia contains: "a wide space around which houses and shops are located", and adds that this word is originally Persian. There is "Plaza" in English, "Piatzza" in Italian, and "Praça" in Spanish, all derived from Latin "Plati" corresponding urban square. Plaza is defined as an open urban public space which is paved mostly with hard materials, to which entering of automobile is forbidden, and mainly there is a space for waking, sitting, relaxing, eating and drinking, and looking at near views (Sa`eedi Rezvani, 2004:61). Tavassoli and Bonyadi introduce urban square a space performing the role of combining houses, urban elements, and valley elements (Tavassoli and Bonyadi, 1992:61). Pakzad mentions squares as one of most influential urban spaces on citizens' minds, as far as he mentions that usually the realization of different urban regions and the simplest way of giving address to any stranger is guiding him using squares as the urban indexes. In his viewpoint, stillness, aggregation, and integration can be mentioned as significant features of urban knots, which can be created using some strategies. Table 1 shows these strategies.

Table 1: Purposes, strategies and policies of planning and designing of urban knots and how to supply them

Purpose	Strategy
Stillness	<ul style="list-style-type: none"> <li>-Persuading halt and non-motion behaviors through persuading of passers to decrease motion pace, decreasing passing-walking-traffic, and increasing destination traffic</li> <li>-Providing relaxing facilitation through existence of different areas for motion and stillness</li> <li>-Creating peace of mind in citizens through predictability of events in the space, predictability of space's framework, and creating supervision possibility of the space</li> <li>-Facilitating social contacts through facilitating ease of presence in the space, presence of different social groups, and easy seeing and being seen</li> <li>-Opportunity to perceive the space through perception of the whole space and its details</li> <li>-Communicating between human and the space through freedom of human activity in the space and possibility of manipulation of the space by the citizens</li> </ul>
Aggregation	<ul style="list-style-type: none"> <li>-Possibility of gathering of citizens through existence of required space for gathering and ease of presence in the space for the citizens</li> <li>-Absorbing different activities through having appropriate base for different activities, and possibility of getting involved in different activities for different people</li> <li>-Emphasizing on being center through gathering, human groups, and essential factors</li> <li>-Sense of belonging to the collection through possibility of individual's activity beside other social groups, association of individual with others in activities</li> <li>-Persuading to halt through persuasion of decreasing pace, persuasion of non-motion activities, and transforming passing traffic to destination traffic</li> </ul>
Integration	<ul style="list-style-type: none"> <li>-Integrity in physical elements through integration of body and pavement</li> <li>-Spatial integrity through lack of certain separation of spatial regions</li> <li>-Activity integrity through minimizing spatial separation and creating soft borders between activity regions</li> <li>-Possibility of creating mental picture of the whole space through perception of the whole of the space together and the relation of whole-part</li> </ul>

(Source: Pakzad, 2005)

Citizens' mental picture of this kind of squares and their scale is in a way that they expect a more common, diverse and eventful space either hosts the diversity of social classes, age groups, and other social groupings or be able to fertilize the gathering and interaction between citizens; that is, the square kind of create citizens and the citizens do the same for the square. The kind of activities done in its area, the kind of function of square's body, its public role, and the kind of physical organization are very affective on citizens' behavior and presence. Construction, maintenance and security of urban squares occur in a bilateral action between citizens and state

institutions. Citizens share the space usage, kind of activities inside the space, public control and supervision of the space, and to some extent the preparation of square for the celebrations, feasts, special ritual and religious ceremonies, funerals, and other ceremonies. About the expectations toward urban square, Pakzad says that the range of urban square should be recognizable and perceivable for the citizens in it, in such a way that it inspires the presence in the space and helps the understanding of individual relationship to environment, elements, and people inside the environment. In other words, it should have spatial determination. "Furthermore, for their durability, urban squares should be efficient, or better to say lively, for different functions and activities of numerous groups and population in various times. At the same time, urban square should be flexible for and adaptable to the content of the event inside it". Shape, dimensions, and size of the square, continued route access to the internal space of the square (e.g. through flooring), and most important of all, the better preparation of the square (in such a way that it hosts various activities within its scope and prevents the activities to spread about margins, citizens motion inside this space make a kind of feeling of attention to the center and involving with the atmosphere), are influential in defining the space of urban square and in determining its hard or soft margins. To meet the citizens' mental expectations, the urban square should be a lively space full of alacrity and merriment; this matter shows itself relating to two main qualities of variety (in function, activities, times of usage of space and the target groups) and expansion. The wider the square and the lower the height of its surrounding, the greater the share of the sky in the scene of the square and also the more the feeling of expansion will be created. Natural elements in addition to light and brightness are influential in creating expansion feeling. As activities and various actions easily change through time and needs, the effort in planning urban squares is to design a flexible framework because new construction and modification to the frameworks needs destruction and is costly and time-consuming. One of important tips in the flexibility of urban square is its integrity of space. In case the surrounding frameworks of the square have low value, these squares can have two frameworks: a hard framework which is the same as the framework of square, and a soft and relatively transparent framework placed in an appropriate distance, which is compatible with the form of the square. In the second layer, the elements of urban furniture, tree, kiosk, and other elements will be positioned. The advantage of being two layers is that the slow movements relating to frameworks occur in the first layer and the movements relating to the space itself occur in the second layer. The second layer is in such a way that won't impede the movement or the vision of internal space of the square, only the rhythm and sequence of its elements create a feeling of second layer. In this way, when population is at peak overflow, the second layer's elements can be pulled aside and the whole of the space can be used as an integrated; so that in the celebrations, ritual and religious ceremonies, and funerals, it can be used as a unified space by the citizens. Finally, the researcher believes that "the most important meaning behind the square is its nature of being a scene, and what is important for urban planning is that the square is the scene for gathering of human beings, forces and events". From the ancient Greek to the twentieth century, the European citizens held the most important and popular social events in the square. The Greek "Agora" (Αγορά) and Roman "Forum" mean gathering of citizens. Plaza and similar spaces were the beating heart of city and were the place of gathering and social interaction among European nations (Pakzad, 2001:8).

Using any definition to review square, in the science of urban planning, we think that the important value for the square is the social interactive role which this space fulfills in the social life of citizens.

Table 2: purposes, strategies and policies in planning urban square

Purpose	Strategy
Liveliness	Creating expansion through adopting natural elements, appropriately bordered
	Creating variation in function and physical elements
Spatial determination	Determination of scene of square in the bounds, the space size, and the center
	Form of square in terms of proportion and simplicity
Flexibility	Integrity of the square's scene
	In firmly-fixed elements: in fittings and materials
	In function: about the function of framework and about activities inside the space
	In the body: through avoiding sharp geometry in construction

#### Definitions and notions of stability and sustainable urban development

"Sustain (v.)" derived from the Latin root of "sustinere", which is from two elements of "sub" (meaning: bottom-to-up) and "tenere" (meaning: to keep, to preserve), and was used from 1920 onwards in English. This verb is mixed with the notions of "support and durability"; the adjective "sustainable" describes "state or condition" of something being supported or durable through supplying (PesarakLi and Yadegari, 2011).

Moein Persian Dictionary gave the synonyms of: slid, stable, eternal, and remains constant. (Moein Persian Dictionary) the stability of sustainable phenomena results from the stability of pattern, method, or system of such phenomena in the long term. That is, in this state, the original phenomenon with all its material and non-material characteristic won't remain, but it will repeat in each period based on unique and stable pattern, hence sustained through time. In this repeat and re-repeat it will develop itself and will try to be of more harmony with

the situated conditions. In fact, sustainability is measured with the amount of positive effect of desired development on the social, economic, and environmental conditions of people in other places and times (Cowan, 2005). The sustainability was sparked first when the environment was degraded intensely. Nonstop usage of natural resources and pollution of environment in addition to the fear of endangering life of future generations triggered the notion of limiting environment degrading. Rio Conference and "Agenda 21" was the start of public efforts for decreasing environment degradation, therefore sustainability entered in all the scientific fields, emerging sustainable urban planning, sustainable environment, sustainable architecture, sustainable traffic, etc. (PesarakLi and Yadegari, 2011). Sustainability is a notion that can be inferred and expressed through different methods. For example, it can be achieved through living in compressed cities, using public transportation, and decreasing energy consumption and garbage production, or can be achieved through living in organic, agriculture-based and small societies with wide open spaces. It seems that each of these notions a level of credit. In fact, it seems that sustainability is more a process than a series of integrated ideas; its basic principles result from change of conditions, ideas, and technological facilities (Sendich, 2006).

Mainly, providing a clear definition of sustainable development is not possible. Sustainable development is a multi-dimensional notion which is derived from somewhat other than sustainable architecture. Sustainable development can be described as returning to the nature after a century of industrialized-business dominance and urbanization as indexes of national development. International Commission on Environmental Development gives the simplest definition of sustainable development as follows: a development that meets the current needs without paralyzing future generation from meeting their needs (SharifNejad and Qamari, 2008). The notions of urban sustainability and sustainable urban development are often used interchangeably because of their approximate meaning. To differentiate these two, in fact, we should note that sustainable development represents a process in which sustainability can happen, but sustainability is a set of conditions that last in long term (Maclarens, 1996).

### **Sustainable Development Indexes**

A sustainable development plan at least should be based on the following process stages:

- Determining the purposes to achieve the sustainability agenda;
- Determining indexes for measuring level of sustainability;
- Determining function of the city due to the criteria;
- Proposing alternatives in order to improve function of the city and to achieve sustainability.

(Newman, 2005)

Also, in 1990, in order to help the cities which are moving towards sustainable development, UN planned the sustainable cities program. This program includes the following actions:

- Determining the sustainable development indexes;
- Realizing environmental issues and problems of the city;
- Determining methods and approaches for developing inter-section cooperation and consensus;
- Establishing modern and developed management planning;
- Updating of strategies and action plans;
- Conversion of strategies and action plans to applicable projects;
- Refining of measures.

As mentioned, the first step for moving toward a sustainable city development is determining of desired indexed (Pag, 2004). Sustainable development indexes provide a thorough view in order to evaluate the long term efficiency of economic, social, and environmental systems. These indexes will be defined based on the main realized purposes of sustainable development. In this relation, in 2007, UN defined sustainable development indexes in different major topics in a report named as methodology and guidance of sustainable development (UN, 2007).

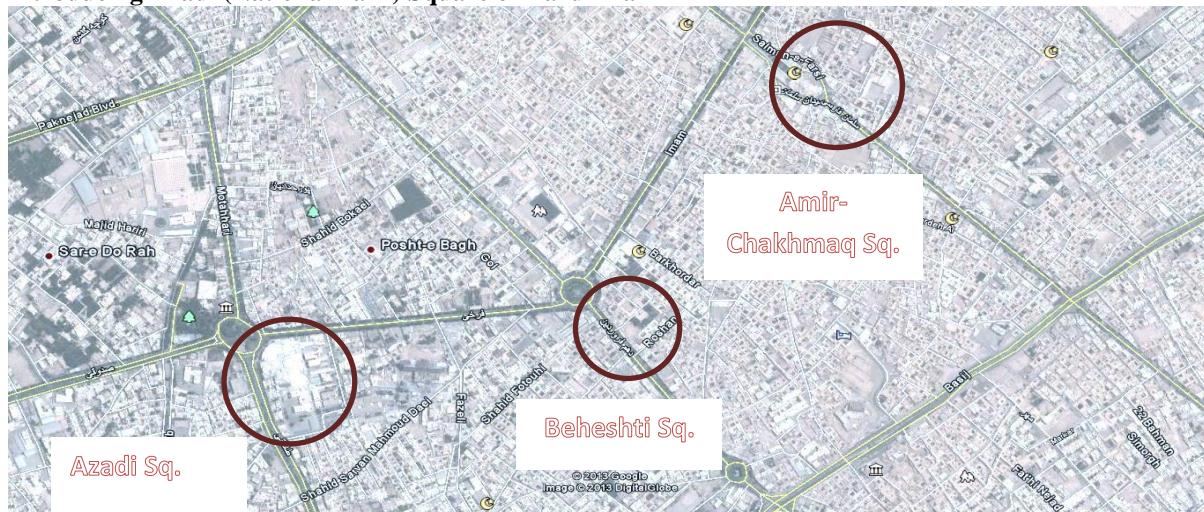
A definition of sustainable development indexes is that: "they are tests of sustainability to depict basic subjects for economic, social and environmental health of a society during different generations". This definition provides a good starting point, but it needs supplementation. With an accurate glance at "index" element among indexes of sustainability of city, it should be remembered that most of these indexes are simple tools for a complicated fact. Therefore, the word index should only be used in contexts that provide refer to states of issues. As far as each index cannot provide a complete picture, for discriminating features of different dimensions of a location, it is necessary to adopt a vast set of indexes (Wiler, S. and Emo Bitley, 2005). The sustainability indexes can be determined based on the fact that they are combined, prospective, distributive, and created by different groups inside the society. All the sustainability should have the last feature (Wiler, S. and Emo Bitley, 2005).

### The necessity of adopting local indexes in the process of sustainable urban development

Based on Agenda 21 contents and emphases of Rio Conference in addition to offers of conference of Johannesburg, South Africa, all of the countries are obliged for codification and determination of local indexes in the process of achieving sustainable cities. All the experiences discussed in the above conferences and projects executed all around the world, e.g. Seattle, US, sustainability plan, emphasized on the locality of sustainability indexes. The origin of this issue goes back to the notion of sustainability, why sustainability is a principle that is defined and formed through the development of history in a consistent settlement. Other reasons for the necessity of adoption of local indexes can be collected as follows (Sharif Nejad and Qamari, 2008):

- Correct realization of amount of sustainability of current situation using these indexes,
- Guidance for codification of different alternatives of sustainable urban development,
- Proper criterion for evaluating alternatives of development,
- Proper criterion for evaluating the plan after execution,
- Re-producing local-historical identity of the city.

### Introducing Azadi (National Park) Square of Yazd- Iran



Map1: the placement of the squares (source: Authors)

### Process of urban planning

The process of Azadi (National Park) Square of Yazd- Iran urban planning was done recursively as follows:

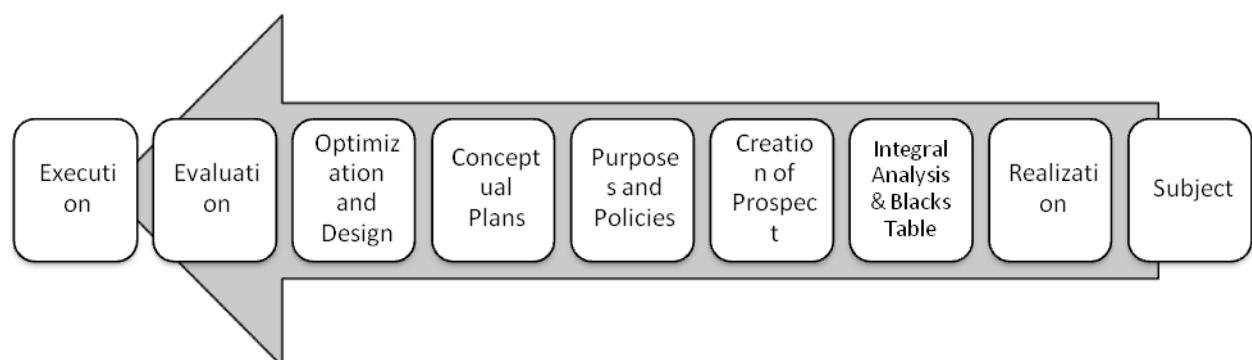
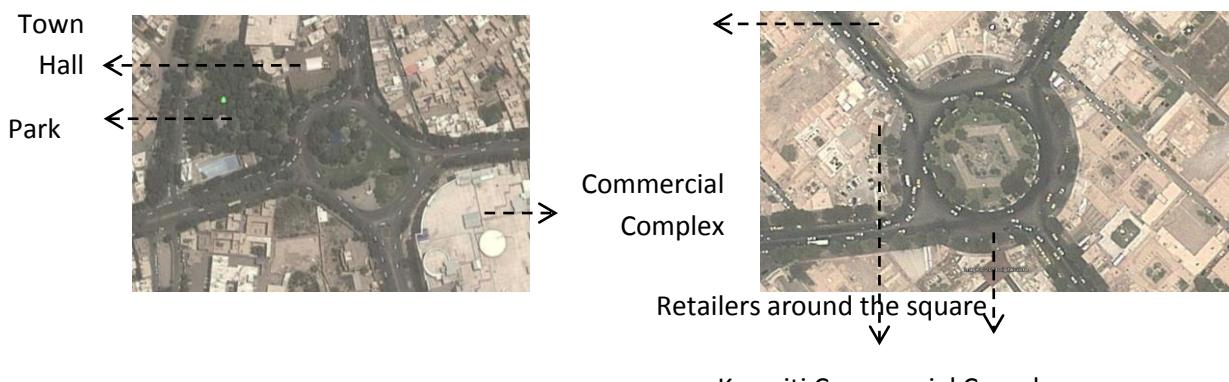


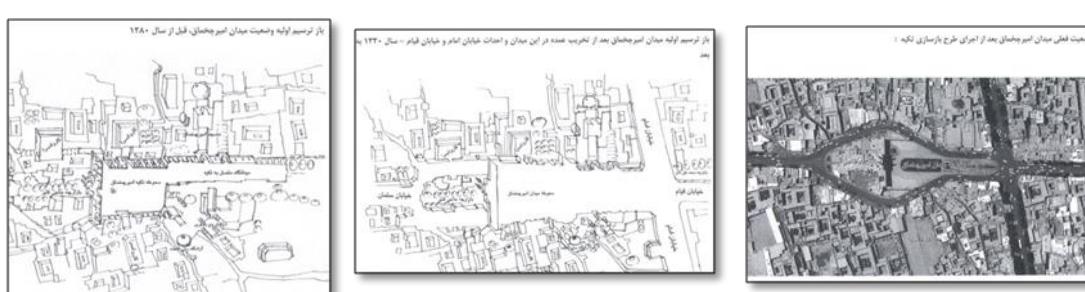
Figure 1: The Process of Planning of Azadi Sq. (Source: Authors)

### Realizing and Analyzing Azadi, Beheshti, and Amir-Chakhmaq Squares

In this project, the realization was carried based on three ecological, functional, and aesthetical components; using the blacks table in the Analysis, advantages and disadvantages, threats and opportunities are discussed. It should be noted that in the realization of Beheshti Sq. and Amir-Chakhmaq Sq., advantages were of more importance in order to benefit from them in re-planning of Azadi Sq.



**Map 2: Important functions of Squares (Source: Authors)**



**Figure 2: The process of change in the form of Amir-Chakhmaq Sq.**  
(Source: The plan of organizing the old texture of Yazd)

**Table 3: Blacks Table (Source: Authors)**

		Advantage	Disadvantage	Opportunity	Threats
Azadi Sq.	The Nature Dimension	Ecological Component	-Existence of Park -Proper slope of the ground	-Existence of noise pollution and air pollution because of high amount of traffic	
		Functional Component	-Existence of known and population-attractor functions -Existence of Masque -Existence of Retails -Existence of Park and gathering area	-Existence of inactive Town hall during night -Lack of continuous function of body	-The possibility of insecurity occurrence in power-off bodies
		Aesthetical Component	-Existence of Town Hall and Setareh Complex as prominent physical element -Existence of sign -Being located in the main route of religious ceremonies -Existence of National Park as stamping ground and memorial social space	-Existence of power-off body -Inappropriate sky line, broken by set are Complex -Existence of different components in the Square -Lack of spatial determination -Existence of visual pollution in the bodies -Lack of a unified body -Usage of climate- non-compatible materials	-The possibility of benefiting from National Park as soft body and creating beautiful prospect  -Existence of numerous component being a threat for the identity of the square

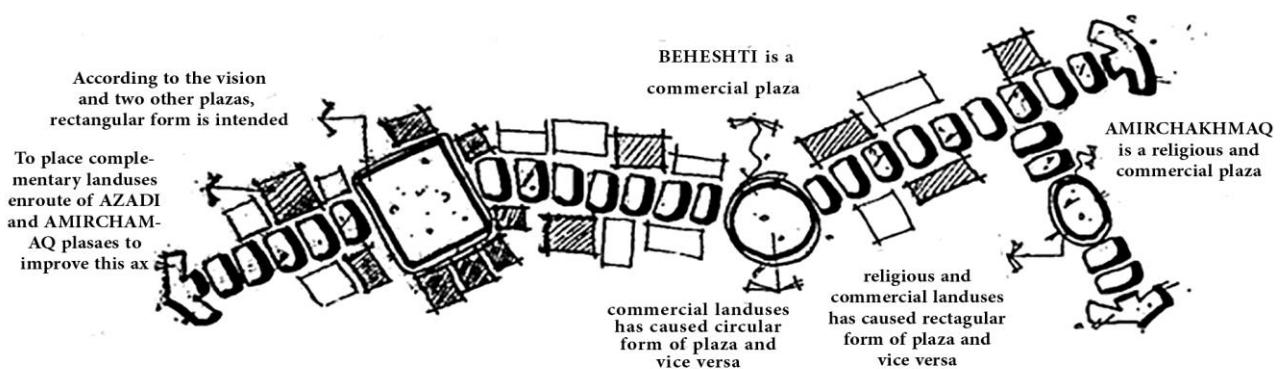
		Advantage	Disadvantage	Opportunity	Threats
Beheshti Sq.	The Nature Dimension	Ecological Component	-Using porches leads to climate comfort. The depth of anti-light body was less important.		
		Functional Component	-Most of the functions are at the level of urban functions.		

<i>Amir-Chakhmaq Sq.</i>		<ul style="list-style-type: none"> <li>-Existence of population-attractor functions</li> <li>-Existence of complimentary and retail functions</li> <li>-Application of first layer fine and coarse dorsal</li> <li>-Separation of infantry and cavalry routes.</li> </ul>
	Aesthetical Component	<ul style="list-style-type: none"> <li>-Existence of proper sign element in the middle of square</li> <li>-Circular shape of the square because of commercial functions that tend to gathering and concentration</li> <li>-Existence of porches and creating climate comfort</li> <li>-Existence of visual corridors</li> </ul>
	Procedural Dimension	<ul style="list-style-type: none"> <li>-The main form of the square is important because of proper relationship provided between main constituents of the square (Market-mosque-old cistern-caravanserai)</li> <li>-The destination of religious ceremonies is this square.</li> </ul>
	The Nature Dimension	<ul style="list-style-type: none"> <li>-The direction of placement of the square is parallel to sunlight that prevents intense sunlight.</li> </ul>
	Ecological Component	<ul style="list-style-type: none"> <li>-The direction of placement of the square is parallel to sunlight that prevents intense sunlight.</li> </ul>
	Functional Component	<ul style="list-style-type: none"> <li>-Existence of important and population attractor functions like market and mosque</li> </ul>
	Aesthetical Component	<ul style="list-style-type: none"> <li>-Existence of proper skyline</li> <li>-Existence of readability, vision balance, and diversity in the square</li> </ul>

### Forming Prospect

Regarding the location of Azadi Sq. on the route on the route of Imam-Khomaini St. that connects the three squares, and having in mind the commercial-religious role of Amir-Chakhmaq Sq. and the commercial role of Beheshti Sq., A prospect is considered as: "Azadi Sq., the cultural-recreative center of Yazd". The general form of the square is configured as a rectangle using Amir-Chakhmaq Sq., and its orientation is the same as current orientation because of mental picture of people.

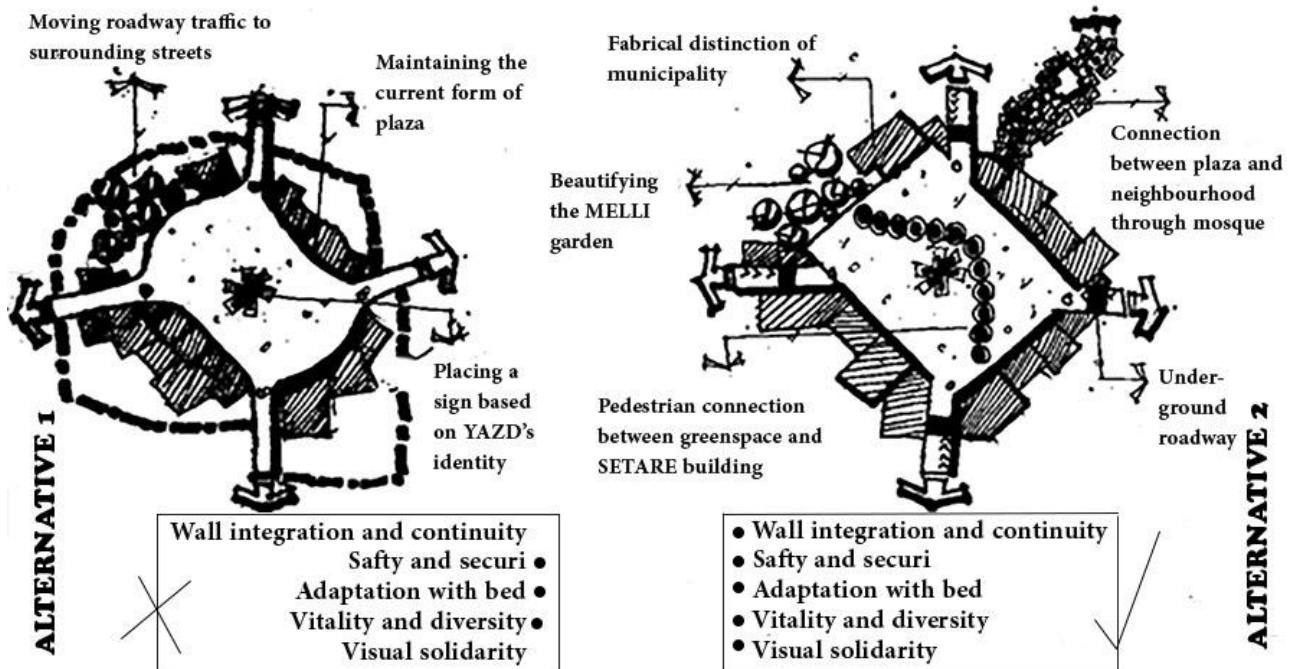
### Vision: Azadi plaza as Yazd's cultural and recreative center



Map 3: prospect of Azadi Sq. re-planning (Source: Authors)

### Conceptual design:

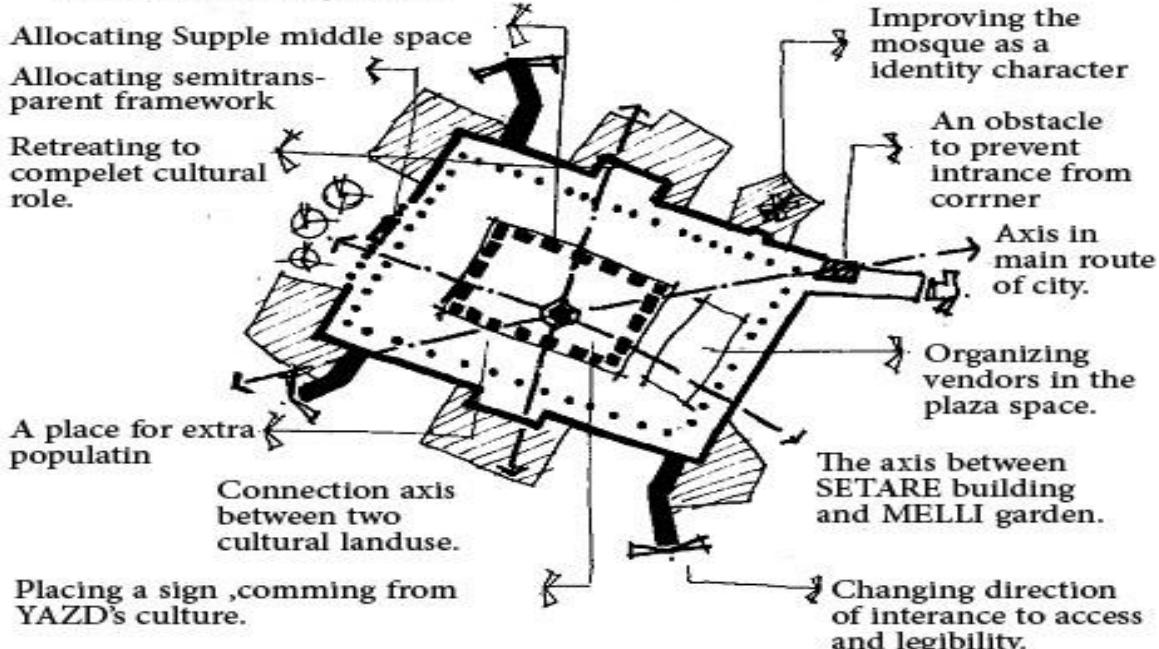
Each of the conceptual designs is acceptable, however, due to the principles of sustainable urban planning that have been extracted from the other two squares and the proposed prospect, the Alternative 1 is chosen as the optimum conceptual design.



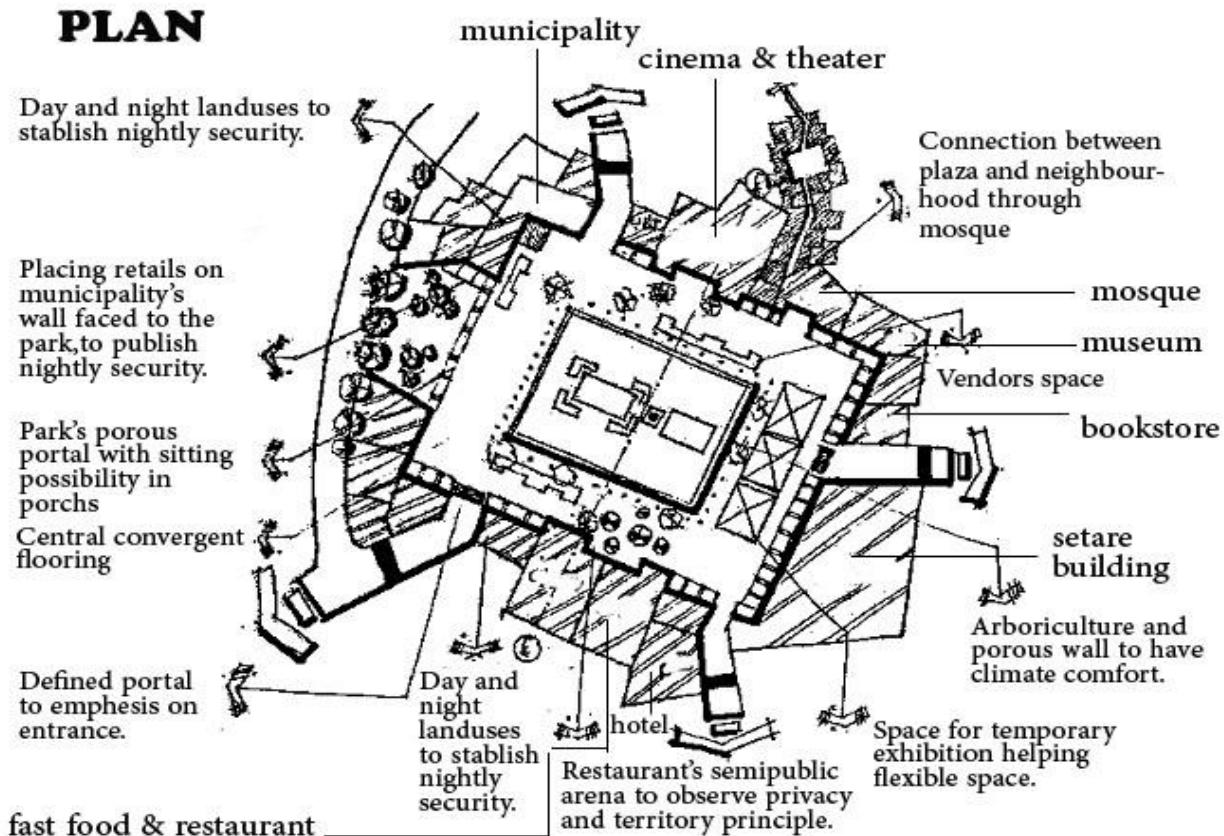
Map 4: Conceptual design (Source: Authors)

**Principles of sustainable urban planning extracted from Amir-Chakhmaq and Beheshti squares**

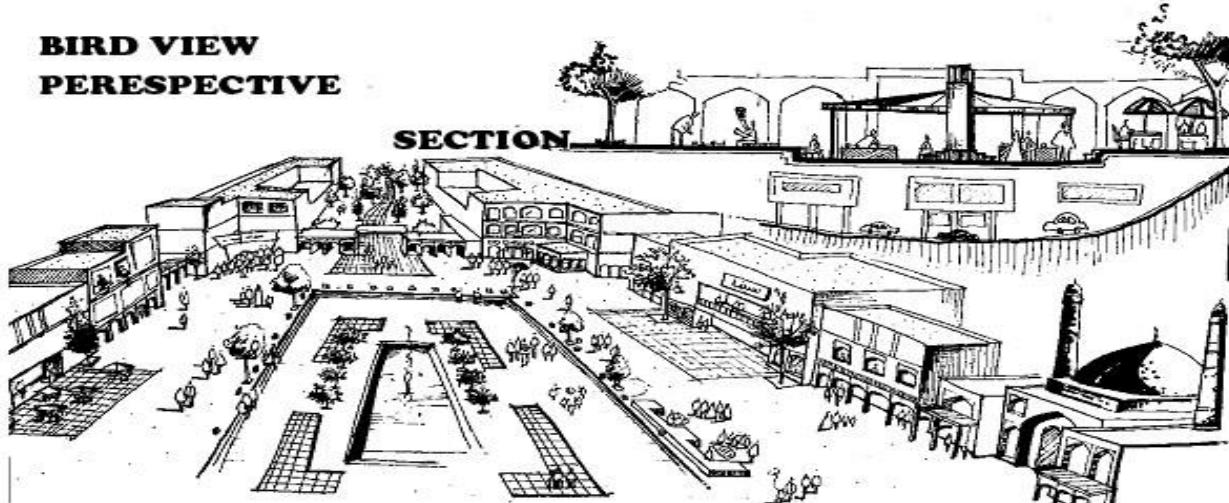
- The use of the porch existed in Beheshti Sq. leads to human scale in the space.
- The use of contrast existed on the wall of Amir-Chakhmaq Sq.
- The use of different applications in two squares
- The use of functional, access and visual relation among main constituents (market, mosque, and cistern) in Amir-Chakhmaq Sq.
- The use of components derived from Yazd's identity (windward symbol) in the center of Beheshti Sq. and water-basin in Amir-Chakhmaq Sq. made centership.

**IDEOGRAM**

Map 5: Ideogram of the plan (Source: Authors)



Map 6: The proposed Plan (Source: Authors)



Map 7: Section and perspective of the proposed Plan (Source: Authors)

#### Summary and Conclusions

Squares can be divided into local, urban, military, governing, sport, etc. but the common thing is that square is a static space and leads to people gathering. Squares are the most important urban elements that remain in the public mind and are inferred as the urban characteristics. In the re-planning of Azadi Square, all the factors and principles of sustainability have been considered: the relationship with the base and context was preserved and enforced in a way that the route of Imam-Khomaini St. preserves its main and vital function. As this square is located along with other well-known and important squares, i.e. Amir-Chakhmaq Sq. and Shahid-Beheshti (Mojahedin) Sq., it derived its physical and functional effects from these two squares. Besides the commercial-religious role of Amir-Chakhmaq Sq. and the commercial role of Beheshti Sq., the cultural-

commercial-recreational role was considered for this square. And, with sequencing the route of Imam-Khomaini St. and considering commercial functions, as approaching to Azadi Sq., approach more to cultural and recreation functions, the relationship with that two squares was enforced. From ecological point of view, the old cistern was preserved and organized between the existing trees and center of the square. Existence of different functions not only attracts people and leads to alacrity, but also leads to boom of economy, production, and bargains, and in the long term helps to the social and economic sustainability. The identity maker elements like Setareh Complex, Masque, and the National Park was preserved and enforced to keep collective memories and promote the sense of belonging to the place and the identity in Azadi Sq. following special climate conditions of Yazd that is hot and dry, the porches was used in the body and the sitting spaces was considered in the shades in a flexible way. Liveliness is a case expectation toward urban square, which is a preliminary of sustainability in urban planning. In this regard, the liveliness and presence capability of the square is decreased through creating diversity in the functions around the square, increasing security of people within the space through light placement, observers, and appropriate pavement, and preventing of sudden height differentiation in the pavement plus control and guidance of cavalry traffic outside of the square.

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