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Application of Urban Ron in Historical and Indigenous Urban Planning of Iran

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ABSTRACT

Based on their experiences and in terms of weather and climatic conditions in a city, architectures and urban planner have considered some geographical directions suitable for construction. The suitable direction for urban planning called "Urban Ron". There are three Rons in Iranian urban planning: Ron back, Ron Isfahan, Ron Kerman. Each of them created a different urban structure based on conditions. Management of natural and unnatural energies is determined through appropriate treatment of good shape of the city; because optimal utilization of energies such as wind, water, sunlight, etc. is directly related to suitable geographical directions, i.e. Urban Ron. This research which is obtained through observations and library studies aims to provide descriptive-analytical answers to following questions:

1. What is Urban Ron?
2. What are the kinds of Urban Ron?
3. What is its application in shaping of historical and indigenous architecture and urban planning of Iran?

KEYWORD: indigenous urban planning, urban Ron, energy management

1. INTRODUCTION

From different perspectives, human being's need for shelter has been the beginning factor or point of construction from the very beginning of his/her existence. Every human being has this intrinsic need which in turn is a driving force or construction.

How treat with surrounding environment and how to construct in it is the main factor for satisfying this need. How to treat with climatic, weather conditions, etc, how to confront with occurred insecurities (whether natural or unnatural), etc. are some examples of such treatments. Over times and obtaining multiple experiences and appropriate solutions, human being could overcome these factors, temporarily or permanently.

Methods of architecture and urban planning applied in a region with a particular geography are different from other region. Therefore, if we want to study different regions in terms of their architecture and urban planning methods, then we have to consider many many differences in a broad range (Memarian, 2006, 2).

The importance of climatic impact on architecture has made it essential to carry out exhaustive research and studies. This is especially the case in our country (Iran) where there are various climatic conditions (Kasmaei, 1984). This variety in climatic conditions provides architects and urban planner with many strategies for confronting such conditions.

Situation of Iran based on connection with and availability to the sea, natural conditions, and its location on approximate distance of three great continents creates a distinct situation for it in the Middle East. Remained historical monuments in Iran indicated evolution of residency in terms of different natural, social and historical conditions. Various factors are involved in construction of cities, this is also the case cities of Iran where many geographical, social, ritual and religious, defense and security, commercial, type of regime and so on influenced the design and construction (Shieh, 1999, 3).

To be survived, the cities need desired natural conditions, social and cultural relations, economical life as well as appropriate position. Regarding various environmental conditions in Iran (climatic, livelihood, culture and tradition), the above-mentioned factors have appropriately incorporated. In respect to natural factors, tradition cities of Iran have suitably adjusted with the environment. A mountain city in Iran has exactly the same properties of the mountain conditions. In desert regions, the cities have been constructed as a function of the environment.

Natural phenomena, whether desirable or undesirable, have been planned in cities of Iran. Desirable phenomena have been applied to improve residency conditions and undesirable phenomena have been restricted

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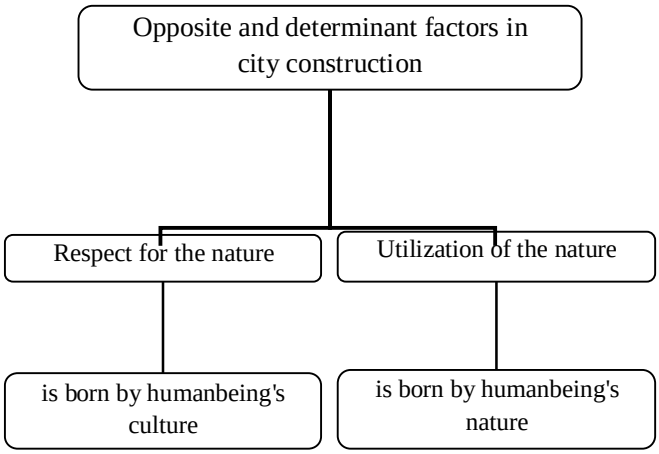
by special techniques and methods. Although, technical knowledge in respect to time had its particular features, urban planning in the past provided very interesting techniques to utilize nature desirably (Shieh, 1999, 4).

2. Shaping of City Based on Design and Plan

Designers and architects of traditional buildings in Iran using their power of thought and knowledge of surrounding environment had created unique works in which not only they considered the beauty but also took into account their utility and permanent function against undesired conditions of the environment. It also was an important issue in Iranian urban planning in the past, so as city positioning, building placement with respect to direction of sunlight and predominant wind, direction of city development, direction and type of alleys, and position of city squares for directing of air in alleys, Bazaars, and houses, all had been determined carefully in respect to geographical climate.

Diagram1: Effective factors on city construction. Source: the authors.



There are two opposite factors at work in construction of buildings and cities of Iran which answered to some why questions: 1. Utilization of the nature which was born by human being's nature and considers the phenomena, proportions, and relationships between phenomena during four seasons and during every twenty-four hours. 2. Respect for the nature which was born by human being's culture. It avoids any violation against nature and sometimes means holiness for the nature (diagram 1).

Through some studies on identification of architecture and urban planning in Iran, we simply found out that, in the past, Iranians had utilized the benefits of their natural environment in simplest but most prudent manners (Alpano et. Al, 205, 83). Most essential feature of urban planning in Iran, before and after Islam, is shaping and organizing based on predetermined plans and designs. It is especially evident in Iranian cities before Islam.

Study of list of the Iranian cities constructed since third millennium B.C. indicates that the context and physical construction of these cities and their networking had entirely been developed based on pre-studied and experienced plans. Position of the major urban buildings and their relationship with each others, open space between them such as squares, main and secondary connective networks, water supply and waste-water treatment networks, and sloping, all indicate that their location in the map of city had been considered with respect to each other to provide a context and physical construction satisfying the needs of residents. It was tried to positioning the city in such a manner, that in addition to availability to water, different parts of the city had a broader perspective than their surrounding nature.

Using skilled techniques for platforming in Takht-e Jamshid (Persepolis), observing volume proportion of the units and height of each of them in proportion with the other, considering direction of empty and filled surfaces, and stonecutting facades incorporated with radiation of sunlight provided valuable credit for this monument. It is believed that Takht-e Jamshid buildings in relation to the angel of sunlight radiation had been constructed in the first day of the year. Today, studies of construction affairs take carefully into account the direction of buildings on the basis of angle of sunlight radiation at its highest and lowest point during a year in order to utilize the solar heat during winter, to provide a shelter against it during summer and to decrease energy consumption in complex construction.

When constructing Bishapour city during Sasanian reign, urban designers, with respect to its geographical position and its warm weather during summer, consciously constructed all of its buildings in 35 degrees deviation from the geographical north (Varjavand, 1996).

1. Impact of Climate or Environmental Conditions

Climatic factor involves weather, evenness and unevenness and in general elements of natural environment. The later play so major role in shaping of living center and city that many researchers considered these elements as the essential factors of development early civilization and they believed that it would be impossible to construct physically without them and it will be so. What makes climatic factor so important is its definite effect on physical construction and spatial perception and manifestation of the living center and city which despite substantive advances in technology and science in providing unreal living conditions is still the most important factor in spatial organization. In order to identify a historical city comprehensively, it is necessary to provide detailed definitions for climate (Habibi, 2003, four).

1.1. Effect of Sunlight Radiation on the Building

In addition to sunlight for supplying the light of building in accordance with its design, the sunlight also turns into heat. To utilize sunlight in a desired manner, the sunlight needs to be harmonized with the type of building, local climatic conditions and its distribution in different internal and external parts of the building. It should be noted the position of light changed with respect to direction of radiation in different seasons; its position alternates from straight to inclined and vice versa (Zomarshidi, 2002, 2).

There are some points that must be considered here, including, the southern walls receive the most amount of sunlight radiation during Azar (Novemeber) and the least amount of it during Khordad (June). These walls receive sunlight radiation from sunrise to sunset from Shahrivar (September) to Esfand (March). Southeast and southwest walls receive more sunlight during winter. Although the energy of solar radiation on the earth is very high, it could just be considered as a weak thermal source which has high quantity and low quality. However if it is utilized appropriately and timely can provide a good substitution for fossil energies. Urban Ron and appropriate orientation of the city is highly effective in this regard (figure 1).

1.2. Effect of Wind

As wind is resulted from pressure differences, air current in a building will also be driven through the pressure differences in its two sides. Winds and air currents are among important and effective climatic factors in different regions of Iran. Wind currents have significantly influenced positioning of the cities, shape and architecture. The variety of winds regarding their direction, velocity, humidity, and season of their flowing have variously influenced living complexes.

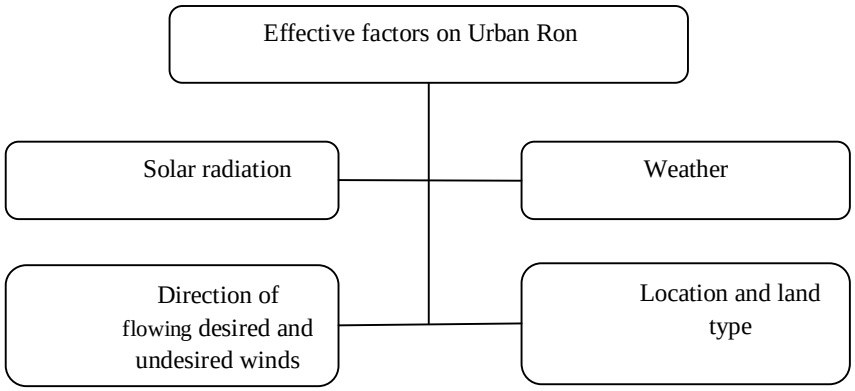
2. Urban Ron

Architects and urban designers based on their experiences and weather and climatic condition of a given city have adopted suitable geographical directions. These suitable directions are called Urban Ron (Rasouli, 2010, 9).

In a dictionary of vocabulary of Iranian traditional architecture, Saied Fallahfar defined Ron as follows: direction of placement of a house or any building, common direction of buildings in a region, building orientation in accordance with geographical direction suitable for weather and climatic conditions (Fallahfar, 2010, 135).

Therefore, one of the important issues related to urban planning is orientation of the house or "Ron" which was traditionally determined in terms of weather of the city, solar radiation, direction of desired and undesirable winds (storm, whirlwind, etc.), location and land type. Iranian architects applied a rectangle surrounded with a hexagonal which was the Iranian golden ratio. Hexagonal is a shape that can't be drawn incorrectly, because it consists of equilateral triangles which also can't be drawn incorrectly. Six equilateral triangles together make a hexagonal. Based on the placing rectangle within the hexagonal, three Rons could be considered (diagram 2).

Diagram2: Effective factors on Urban Ron, Reference: The authors.



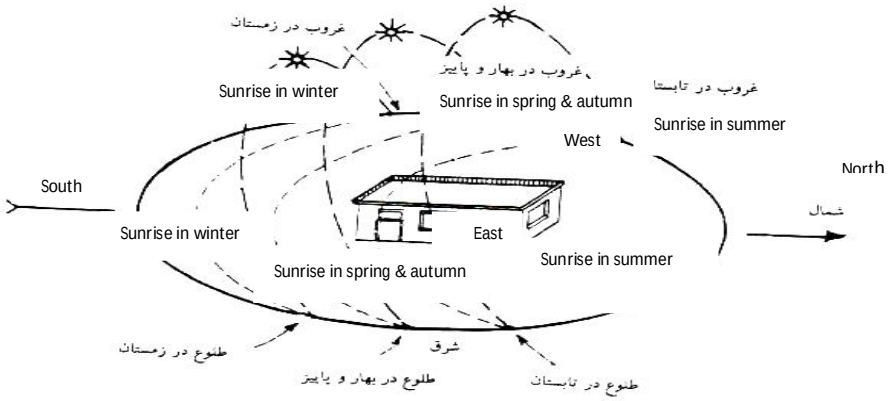
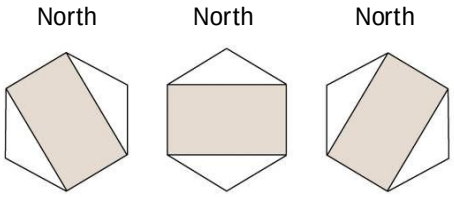


Figure1. Position of the Sun in different seasons of the year. Source: Zomarshidi, 2002

1. Types of Urban Ron



There are three Rons in Iranian urban planning: 1. Ron Back, 2. Ron Isfahan, 3. Ron Kerman (figure 2).

1.1. Ron Back: in this Ron, rectangle surrounded by hexagonal is situated northwest-southeast. This Ron has been used in central cities of Iran such as Tehran, Yazd and Tabriz, in northwest cities of Iran and some other cities. This Ron is approximately facing Mecca.

1.2. Ron Isfahan: this Ron is northwest-southeast and it is applied in Isfahan, Estakhr, Takht-e Jamshid (Persepolis) and Fars.

1.3. Ron Kerman: this Ron has west-east direction and cities like Kerman, Hamedan, villages of Azarbayejan Gharbi in Orartoha's region and some other cities of Iran have been built by this Ron (Pirnia, 2002, 155).

Figure2: applying of hexagonal for different Rons; from right to left: Ron Back, Ron Kerman, and Ron Isfahan.

It was said that if a city was constructed with due consideration of its Ron, it was afflicted by many contagious diseases and by a wretched state (Rasouli, 2010, 9). Tabriz is an example for application f Ron Back. Generally speking, orientation of building in Tabriz is facing south between 15 degrees of southeast and 10 degrees of southwest, so that the main spaces located in north front such as Tanbi , earrings and sitting rooms are facing to the south (Keynejad & Shirazi, 2005, 162) (figure 1).

Figure1: Aerial photo of old context of Tabriz. An example of Ron Back in indigenous urban planning of Iran. Source: organization of topography

Isfahan is a successful example of Ron Isfahan in indigenous urban planning of Iran which was organized and shaped in order to create coordination between artificial environment, nature and human's needs. It was tried to provide livable, balanced and coordinated urban environments for human beings through utilization of natural laws and identification of properties of natural elements including water. Since Soltani (Imam) Mosque in Naghsh-e Jahan Square of Isfahan should be constructed to be faced Mecca and hence it would have a Ron different from general orientation of context (Ron Isfahan), therefore to adjust the mosque with adjacent context, it was constructed with a compound geometry. In particular due to its urban functions and multiple accesses to it, the mosque along its external sides was constructed to be adjacent with surrounding pathways, hence to be adjusted with side lines of the pathways. This compound geometry was consisted of geometrical shapes (most often right angeled) which are arranged together based on the principle of adjacency (Habibi Vaheri, 1999, 63) (figures 2, 3).

Figure2: Aerial photo of Isfahan in 1956. An example of Ron Isfahan applied in indigenous urban planning in Iran. The role of water in shaping and developing of Isfahan is significant. Source: Organization of Topography.

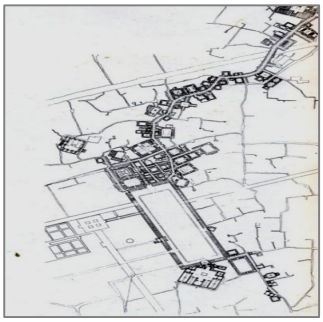


Figure3. Naghsh-e Jahan Square in Isfahan and 45-degree rotation of Soltani (Imam) Mosque of Isfahan. Source: Personal archive.

2. Conclusion

Management of natural energy has been an important issue in our historical and indigenous urban planning. The essential requirement to utilize natural conditions and to appropriately manage them is to adjust and harmonize the buildings and city with climatic conditions respective to any given region. Through experiences of the past, we could still utilize natural sources of energy in urban context which is consisted of a series of buildings. Hence we could also reduce fossil energy consumption and improve quality of life and health in residential areas. Therefore to adjust environment with climatic conditions dominated in a region is the first step for exploitation of natural energies.

What could be considered effective in old context of Iranian cities for energy efficiency was, in one hand, some principles of traditional architecture in accordance with climate and application of desired materials for that environment, and in the other hand, context constructed of small and compact units which led to adjacent houses and buffer yards. This paper presented some issues regarding external shape of the city context which try to manage natural and unnatural energies through adopting an appropriate orientation in terms of climate.

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