

ACHIEVEMENT TO URBAN SUSTAINABLE FORM
(A Case Study: Yazd)

S. Zarabadi¹ and N. Karimi²

Science and Research Campus,

Azad Islamic University, Poonak Tehran Iran

Emails: zarabadi.s@gmail.com, karimi_nooshin@yahoo.com

ABSTRACT: City and urban form is sustainable when a city is accessible in its total aspect for its residents. In other words, a sustainable city necessitates circumstances which are changing after passing time. This paper is aimed by answering the following questions:

What is urban sustainable form? How is the level of city sustainability related to its form, size, density and structure?

The especial structure of historical city of Yazd as in central Iran is originated from its location at the desert margin. Also, Zagros heights prevent the city from sea humidity and many other factors which cause weather dryness and lack of step in Yazd city. But 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. Also they had avoided their designs from unnecessary decoration by using ornaments including aesthetic and function aspect.

They considered human scale in proper form based on resolving human need during time to create an urban sustainable form too.

This paper is attempting to recognize urban sustainable model by identifying the principles and concepts of sustainable design in Yazd old fabric. So, the urban structure and its component elements are categorized in three level of macro, medium and micro. After classification its obvious specification in different level from the whole to detail and vice versa, it can be analyzed to present the hidden model in Yazd city in which urban sustainable form follows them. The obtained pattern can developed during a creative process and utilize it in future city design.

Key words: Sustainable form, Pattern recognition, Sustainable principle, Yazd.

¹ Academic Staff & PhD student

² MSc student

1. INTRODUCTION

This paper analyses the sustainable design principles and methods of traditional architecture and design system in historical Yazd city in the central part of Iran. This analysis will result in the development of a suitable framework for sustainable planning of cities as present and future settlements.

Originally the aim of this study was to prove that erosion or depreciation of historic urban fabric was not only the result of building material's erosion, but also of a wide range of cultural, economic, social and political factors.

It also aims to prove that along with the physical rehabilitation and conservation of the urban fabric, action should be taken toward the cultural and social improvement of a city.

For a historic city like Yazd, probably the most important aspect is its history. Because structural and socio-cultural heritage is intimately linked, it is possible to learn from our ancestors experience when sustainable design and planning for the future.

Therefore it was our duty to consider the history of the city as an important part of the study.

To reach this aim, living in the study area with a close relationship to resident was the first and basic step to be taken. The second step understood the importance that in historic fabric as Yazd, the structure of the city was a collection of different systems of which each one had its own special characteristics.

Apart from collecting the necessary information from different sources, it was necessary to investigate every single building.

2. GENERAL SITUATION OF THE CITY

Yazd City is located to the east of Isfahan and to the south of Kavir-e-Loot, in the longitude of 54°, 24' and the latitude of 31°, 25' and 1200m above sea level in the central part of Iran. The city is surrounded by Kharayegh and Taft mountain chains from northeastern and southeastern sides respectively. A regional main road along the southeastern to southwestern direction and its interference with several byways towards the south brought about an appropriate situation from the access viewpoint for the city. The direction of the gradient for the conduction of water by the Qanats from the southern mountains has developed the residence possibility.(1980,Bonine)

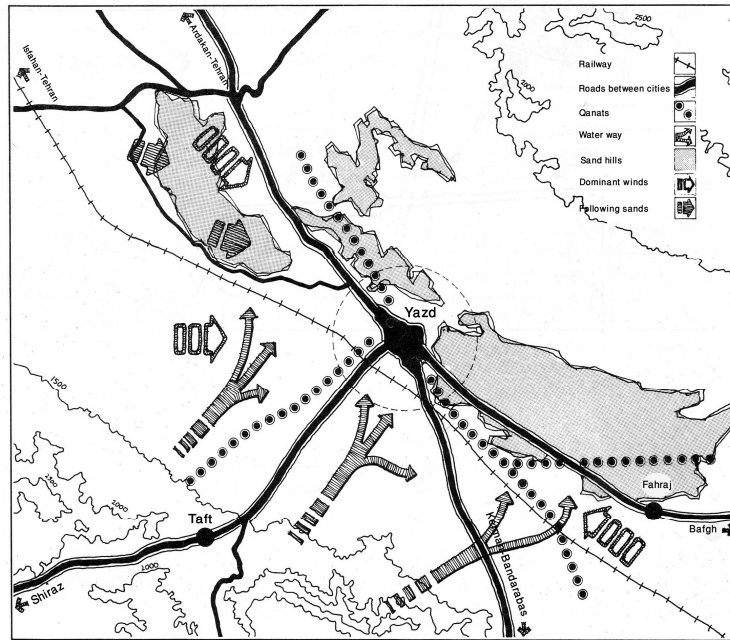


Figure 1. Situation of the city

Source: Author

The location of the city at the desert margin and the existence of Zagros heights preventing the permeation of sea humidity as well as several factors have caused the dry weather of Yazd. But in the past the creative designers of the city utilized from the "Qanats system" (underground water channel), which brings water to ground level land through a simple traditional technology, transfers it to gardens, dwellings and public services. In these areas water is stored separately for each neighborhood.(1983,Kamiar)

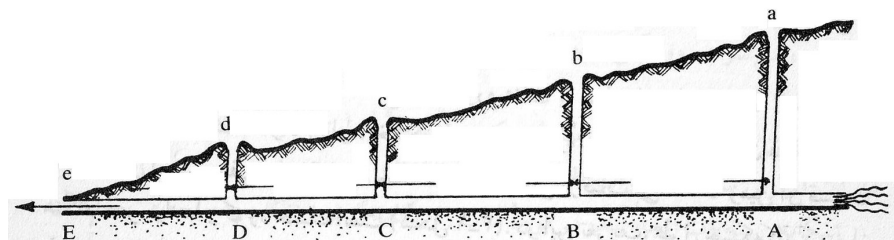


Figure 2. Diagram of a typical Qanat

Source: Author

1. URBAN SUSTAINABLE MODEL IN THE HISTORIC SITE OF YAZD CITY

3.1 urban structure and urban fabric (Macro level)

a. *First Stage: Formation of primary core*

According to history on the formation of the primary core of the city, before Islam and during the Haecamanid era (330 to 550 bc) a city called Isatis was located in the present location of Yazd. However there is no reliable document in this regard, the primary core of Yazd was in the form of a castle due to its location and the defensive necessities the city was taken control of by Muslims in the 7 century and continued its life in the form of a collection of cities including Aghda, Meibod, Fahraj and Haftadar until the late 10 century.(1996,Ebrahimi)

b. *Second Stage*

Maybe one dare say that the substantial transformation and change of Yazd into a reliable and integrative city dates back to 11 century when the gates were developed all around the city and the new existence thereof was introduced. The first wall for the city along with the main four gates was formed in such era within which the development of the city was towards the south and the city center was formed around the great mosque. In this stage, the main axis of the city is the main passages. Such passages led to the city gates and the main places in the city were connected therewith. Traditionally, the city market had to be easily accessed by each and every part of the city. The market was regarded as the performance heart of the city. The arrangement around the market proves such issue. The users of the market accessed to it by the least change in direction. In the 4th century the city was developed towards the south and southwestern and new walls as well as seven gates were built.(1988,flamaky)

The reasons of the development of the city towards the south and southwestern were expressed in different historical documents among them are the course of the sandy winds in the north, appropriate lands for building construction in the south and southwest and the underground course for the movement of waters from the south and southwest towards the city.

c. Third Stage

In the 15 century, the city heart was transferred into Mirchaqmag collection including the mosque, market, cistern around a large square in the southeastern part and the city center was transferred into such collection. The market which was at first developed in the "Jameh" mosque appeared in the proximity of the south gates and even at the back of the city enclosure and joined to Amirchaqmag Square. As a result, the market grew so fast and changed into an active trade center in the region.

d. Fourth Stage

During the 16th and 17th century, Yazd city was not developed compared to other cities of Iran like Isfahan Shiraz and Kerman.[4] In the late 17th century and the early 18th century another collection called Shaah Tahmaseb was developed including the service spaces and located in the southwest. These two square were connected by a local trade axis. The city center remained in the pervious place.

e. Fifth Stage

In the 19th century, a new collection called Khan including square, school, bath, market was developed and also in 1815, the construction of a wall to surround all around the city just began. Such wall did not act as an appropriate border for the city and the development of the city towards the south and southwest went on.(1988,Delamy)

f. Sixth Stage

In the 20th Century the construction of streets during Pahlavi Dynasty on the old fabric was conducted and new users on the margin of the streets formed. Yet the traditional city went on notwithstanding the internal changes.

The physical structural pattern of a city is linear-core. Its development follows a pattern of parallel axes perpendicular to the main initial axis, and stretched toward south of the

city. Several cores of the urban elements formed across each of the axes crossing the main axis. This growth trend gradually turns into a structure with a grid pattern made up of several axes and cores.

Sets of the urban elements and function that are established in each era occupy the suburban areas; locate adjacent to the city gate and along the main city and region connecting path. This array results from and influences the city growth.

Due to their potential in redirecting the city growth orientation towards themselves, the newly constructed edifices in each historical era located at the city suburbs tend to turn into core locations increasingly.(1997,Hamidy)

The general fabric of the collection of the city main structure spaces is compact and organic and there is a harmony all over the city fabric. Partitioning of the performance elements belonging to the city structure has a broader surface compared to that of the other elements.

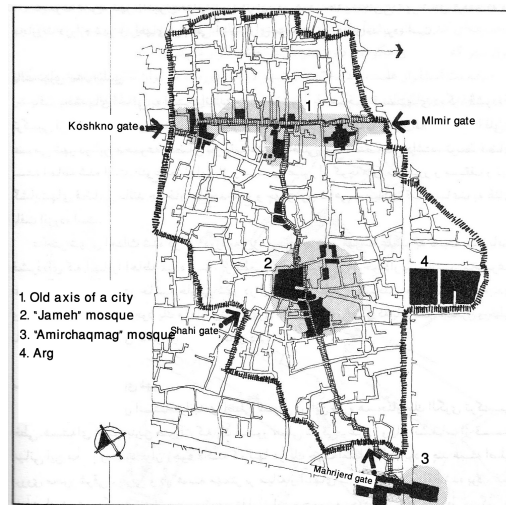


Figure 3. Historical development of Yazd city in six stages

Source: Author

The urban fabric pattern in the collections and traditional performance elements has been introspective and the open spaces of each urban element have been enclosed in the built spaces.

3.2. Urban Space and Urban Elements (Medium Level)

The urban open spaces in the city main structure are in the form of the large squares and enclosed by the public buildings. The designed squares are the main factors organizing some of the buildings and are in turn among the main elements in the structure. The main performance of the elements in the city structure includes religious performance like Tekiyehs, Hoseiniehs, Mosques, Altars, and Shrines. Cultural performance stands for schools and service performance is like baths, cisterns, inns and trade performance is like market, mini market and trade places.

Governmental and administrative applications have their own special scope and are far from the public ones. The applications joining the special performance collections in each historical era are the market places.(1993,kheirabadi)



Figure 4. "Mirchaqmag" square in Yazd city

Source: www.silkroadandbeyond.co.uk



Figure 5. "Jameh" mosque in Yazd city

Source : www.travel-earth.com

3.3 Skyline and image of Yazd city (Micro Level)

The image of traditional Iranian cities has been formed mainly along two factors, the cultural and climatic.

The unique sky line of an old city expose its activity, power, decline and the other characteristics and it is the first image which establishes the identity of a city in the sight of an observer.

Roof type, building material and even the color of traditional is subject to climate, but the form, structure, building order are cultural aspects.

The visual characteristics of traditional cities are very important in giving them a special identity from outside and inside. Any observable element on the skyline of a Yazd city, apart from being a functional factor at the neighborhood level, water reservoir, mosque and Hoseinieh and at the urban level as minaret of "Jameh" mosque, "Amirchaqmag" square or wind tower, were and still are the main basis for urban characteristics and orientation subjects for visitors and residents. Apart from such urban elements, the spatial arrangements of urban spaces were also important in influencing the image of a living environment. (1986.Soltanzadeh)

The minaret and dome of the mosque are probably the only urban elements, which still play the main role in the image of an Iranian-Islamic city.

In spite of all this ignorance, still are the wind towers on the roof of the building of the Yazd which built the historic image of this city.

The old form and elements of traditional cities have a strong effect on the mentality of their inhabitants. For example the minaret along with its religious aspect has always been an important orientation abject in the city.

New areas of cities develop broken from old structure and attention to special quality of traditional city is not to be seen.



Figure 6. Skyline of Yazd city

Source: www.fahadaneyazd.blogfa.com

4. CONCLUSION

The historic site of Yazd city has a special identity through its form and structure, which developed on a long period of time. Yazd city is representative for all historic cities in central part of Iran. The traditional urban design principles and methods of Yazd city are:

A. Sustainable Form and Structure:

- Historic citadel has developed based on the needs for progress and communication.
- Historic citadel contributed service centers.
- The historic centre includes closed neighborhoods and a comprehensive pedestrian network within whole city.
- This urban fabric tackled the climatic problems, providing a suitable ecosystem by using the existing natural and man-made potentials.

B. The development principles of Yazd city are based on natural and cultural factors:

- Neighborhood typology.
- Neighborhood centre.
- Relation and balance between empty, half full and full space.
- Urban symbols as the most important cultural elements within the urban fabric.

C. Design principles:

- Climatic balance by the help of underground water channel system.
- Encountering the desert sandy winds and air circulation with the help of green belts around the city.
- Planning covered alleys, which provide shadow.
- Deep courtyards inside the residential buildings.
- Green spaces full of shadows.
- Verandas.
- High ceilings and arches walls.
- Light color building material with low thermal capacity.
- Irregular design of alleys to prevent circulation of inconvenient winds within the city.

This paper was simply a review of what we know as sustainable urban design and architecture in central part of Iran. Now the situation of the cities such as Yazd raises the question: are the traditional characteristics of these cities, which have their roots in the culture of this country so strong and functional that we appreciate their real value and give them a respectful place in our modern cities; or, so we simply put them aside and replace them by new and modern approaches ignoring climatic and cultural differentiation?

Architects, urban designer and planners and transport engineers should accept more responsibility toward these cities.

To show the ability and value of sustainable traditional way of life in providing desirable living environment, in this part the special urban design principles and methods of Yazd city will be demonstrated.

5. REFERENCES

1. Bonine, M.E., (1980), Yazd and its hinterland, a central place system of dominance in the central Iranian plateau, page 95, Marburg/Lahn.
2. Deylami, M., Architecture, (1988) Urban Development, and Urbanism of Iran in passing the time page 107, Tehran.
3. Ebrahimi, A.,(1996) Integration Socio-cultural Tehran, pp 46-51, in environmental design Iranian Architecture in search for a new identity , Tehran
4. Falamaky, M., (1988),Faaraby and fellow citizenship in Iran ,Tehran
5. _____,(1978), Rehabilitation of Ancient Buildings and Cities, Tehran University, Tehran
6. Hamidy, .M., (1997),Structure of Tehran City, pp 129-132,.,Tehran Engineering and Technical Consulting Organization , Tehran
7. Kamiar, M.,(1983) The Qanat system in Iran ,page 303 ,Department of Geography, Michigan State University , USA.
8. Kheirabadi, M, (1993), Iranian Cities, Formation and Development,pp 73-76,Texas University press Austin, USA.
9. Madanipour, A.,(1989), Redistribution of Urban land and the Quality of Environment, public and private responsibilities in Housing Design and Settlement Planning , pp 115-126 , Open House international Association, Conference Proceedings
10. Soltanzadeh, H., (1986), History of City and Urbanism in Iran,pp 67-69,Tehran.