

A Comparative Study of Traditional and Modern Urban Architecture with an Emphasis on Features Consistent with Climate (Case Study: Tabriz City)

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Abstract

Climatic conditions in terms of its nature has caused some limitations and various designs in different parts of the world and it has had the most dramatic impact on the architectural form and urban texture over time. This study aimed to assess and compare the environmental conditions in the formation of new and old architectural texture in Tabriz, due to the fact that observing climatic conditions is one of the principles of sustainable architecture. For this purpose, two textures of Roshdih Residential Complex of Tabriz as a symbol of modern architecture and Maghsoodieh Neighborhood as the traditional context have been selected for a case study in this research. The method applied in this study consists of 1- survey and collection of field data and 2- documentary and library. This study is an applied research which has been conducted in the form of a case study. This study has attempted to understand observing the issue of climate as one of the principles of sustainable architecture in Tabriz old and new textures by analyzing sample residences in these two neighborhoods and which one of them has been able to consider this principle of sustainable architecture and overcome inappropriate climatic conditions and have the maximum use of the existing potentials and capabilities.

Key words: climatic conditions, formation of architecture, Sustainability, old and new texture, Tabriz.

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Introduction

Traditional architecture and its different types in Iran, has accepted the greatest impact from the climatic and environmental conditions throughout history. Despite being in the hot and dry climate, factors such as height differences and the mountains along the east - west in northern and central parts have caused significant variation in climate in the form of four seasons. Nowadays coexistence with the natural and climatic conditions has become one of the most important measures of architecture and urban planning that requires the designers to follow certain rules and principles in this area (Zandieh, Parvardi Nezhad, 2010: 2). The nature of the human shelter depends on life circumstances to a large extent and it is the basis for determining the type of shelter (Oliver, 1973). The formal relationship between climate variability and architecture diversity can be clearly seen in various parts of the country, until recent decades, and until the late Qajar period. Since then due to the industrialization process of building and construction materials, construction methods took distance from the traditional process and chose the industrial production cycle. This issue along with the increase of the population in cities and increased land value has led the style and architecture of the buildings to be inconsistent with the climate and biodiversity and maximum welfare of the residents of the area, and made it to be associated with factors such as political, economic, land added value, the land speculation, and so on. This shift in attitude about housing as a place for relaxation and comfort in traditional architecture into the modern architecture as a valuable commodity for profit has had consequences of large cities and people. So the lack of paying attention to the circumstances and concerns of climate in different areas and similar construction and architecture prescription for climate types and climatic regions of the country led not only to the ignorance of comfort of traditional architecture but also the housing and its form has become one of the key factors in creating stress and unrest to the inhabitants.

Importance of the problem

The addition of each resident to the urban citizens has several implications, the most important of which is the provision of housing (Mahmoudi, 2009: 7). The increase in energy consumption in Iran is more than 5 times of global consumption. The residential buildings with uninterrupted flow usage consume more than one-third of the country's energy (Singeri, Abdoli Naser, 2012: 53). Studies show that 70% of natural gas consumption in buildings is spent on heating (Ali Khiavi and Lahroudi, 2010: 52). A look at recent structures in different areas shows that little constructions have considered the climate requirements and higher benefit and less cost has always been the main priority of responsible officials and those in charge of construction in the country. Tabriz as one of the main historical metropolitans in Iran has always been one of the centers of formation of various types of architecture. Traditional architecture and pre-industrial architecture, in many parts of the world, is largely based on the environment and environmental conditions prevailing in the area and was inspired by it. The highest symbol of the struggle between humans and the environment can be found in the form of buildings built in the whole world. No the necessity of considering this important issue is one of the most important factor for the welfare of the residents and urban housing. Here the organization of urban elements, climate control and its use in

different ways, such as the correct orientation of the main roads, selecting the right wall height of buildings, the use of appropriate plant species and... has made the human being to cause a evolution in the design of urban and rural texture by understanding and the proper use of climatic design methods.

Research question

This study seeks to answer the following questions in order to achieve the goal of the study:

- What are the climate considerations, the optimal patterns and housing designed priorities in such a climate?
- How consistent the traditional and modern residential textures are designed with taking into account the climatic conditions of the region?

Hypothesis

Tabriz traditional architecture despite all the shortcomings in providing the needs of modern man was able to meet the needs of the climate of the inhabitants of that period. In modern architecture in the city of Tabriz, the need to use some traditional architectural standards is consistent with the climate to improve the problems caused by the climatic conditions of the region.

Research Methodology

Climatic design is a method to reduce the overall cost of a building (Watson. Labs, 1937: 4). The design and construction history according to the criteria of natural and climatic characteristics of traditional Iranian architecture goes back to hundreds of years and it is considered as the architectural masterpieces in the world (Malek Hosseini. Dargahi, 2010: 23). In this study, we tried to look at the past and the traditional architecture of the city of Tabriz and identify important architectural factors consistent with the climate; we challenged these considerations on the new architecture and new housing to understand whether in the new architecture and modern buildings the consistency with the climate was among the priorities of the builders and architects and if the answer is positive, how successful such consistency was to overcome the climatic conditions and use the right power and potential of the environment and climate. This study is an analytical-descriptive study and has collected the required data by referring to the books and documents as well as through surveys and observation of Tabriz historic texture. This article has tried to compare the differences in traditional buildings architecture and its link with the modern architecture in the cold mountain climate along with the reference patterns.

Physical Characteristics

1. Maghsoodieh neighborhood

Maghsoodieh neighborhood is a traditional and historic region in the city of Tabriz. The surface area of the region is about 30 Ha the main part of which is composed of residential sector. Traditional buildings are designed in such a way that the distance between them has the maximum absorption of light and cause the least possible shadow. Also the buildings are established in east - west direction and due to the supply of light and solar energy have a long form by the vast southern façade with relatively smaller eastern and western facades.

The access roads in this neighborhood are narrow compared to the number of buildings and vehicles. There are also winding asymmetric walking paths in the texture regardless of the topography with slight height difference in some cases which prevents the draught in the alley and streets.

In most of these buildings to prevent the exchange of heat between the inside and the outside, few small openings have been used but on the other hand in order to use the thermal energy of the sun and indoor exposure on some fronts the openings with larger dimensions are used which is also used for traditional neighborhoods. For example, in the northern side of the yard of one of the famous monuments in Maghsoodieh admitted as Sanjesh museum of Tabriz, for an optimal use of sunshine, the openings were made bigger and longer. Meanwhile, deploying multiple openings to cold winds (the eastern and north-eastern side) is also avoided (Fig. 1).



Figure 1: Sanjesh museum openings northern side of the courtyard, the former home of Mr. Salmasi. Source: author

Roshdieh residential complex

Roshdieh residential complex located in the North West of Tabriz and Oon Ibn Ali hillside is one of the newly established residential complexes in this city with an area of 65 Ha. Over the past decade this complex has had a growing residential texture and right now its second phase is running. The analyses conducted suggest that in Roshdieh residential buildings the side of the openings and their dimensions is not based on climate but under the influence of other factors such as aesthetics, lack of nobility, the direction of the building and ... In other words it is the building façade that determines the location and dimensions of the openings and the climate conditions of the region, except in a few cases, play a limited role in determining this important issue and they are not consistent

with the cold and mountainous climate of the region. Typically orientation of the streets in such topographies must be such that they benefit from sunshine in more hours of a day (Qobadian, 1998: 102).

The textures of traditional and modern residential buildings

The direction of buildings is one of the very important issues for the use of sunlight in the winter in cold and mountainous climates (Brebba and Beriatos, 2011: 203) and it plays an important role in guiding the wing and creating drought in the interior as one of the five basic principles of solar and sustainable design (Norouzian Maleki, Hosseini, 2010: 26). Traditional architecture in cold climate mainly surrounds the central courtyard and other areas are around the courtyard (Figure 2).



Figure 2: The central courtyard of Sanjesh Museum of Tabriz In Maqsudiye (the former home of Mr. Salmasi).
Source: author

These buildings have a coherent plan and dense texture and the form of the building is such that it reduces contact surface with the outer walls of the building to reduce thermal exchange. Usually, the North surface has a few small openings while the south has main openings for the maximum use of sunlight. This issue is observed in traditional architecture of buildings in the city of Tabriz but in the case of new construction including buildings in Roshdieh residential complex this is somehow ignored and other issues are prioritized. The same applies to recent constructions in the old neighborhoods of the city of Tabriz including Maghsoodieh neighborhood because of factors such as economic issues, increased value of the property, policies related to urban management and ... and it has caused them to fail in following the historical architecture of the neighborhood and they do not obey the traditional and ecological design of the area. In villas of Roshdieh complex the yard is in one side and the building is located in the other side which follows the land separation and proximity principle factors. The location of the spaces in such buildings is such that in some cases the building is in the northeast and the yard is in the southwest, in other cases the building is in the northwest and the yard is in the southeast and in other cases the yard is defined centrally (Fig. 3).

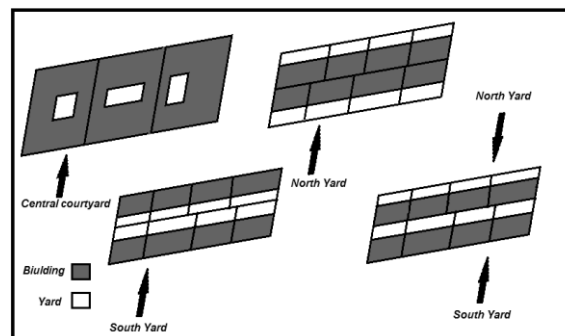


Figure 3: The location of the yard in different direction of villa houses, Roshdiye. Source: author

In this type of buildings the south side units mostly enjoy the climatic conditions.

The building façade of the building in cold seasons is covered with dark colors. In such cases it absorbs more heat (Almusaed, 2010: 252) which is somehow considered in Roshdieh towers.

Side surfaces of traditional architecture and modern buildings in Tabriz

The history of most houses in Tabriz goes back to Qajar period (Zomarshidi, 2011: 2). In traditional architecture of the Maghsoodieh neighborhood residential buildings have a cube form with a cube and compact texture. Changing the peripheral area can affect the influence of factors such as wind, rain, humidity, sun and temperature on the building. The reason for this is the decrease in the area of the external walls due to its effective volume to reduce the influence of the outdoor cold weather through walls that are in contact with the open air. Volumes the structure of which is closer to spherical and curved volume are more resistant to wind erosion and more compatible with the climate which are seen in the towers and apartments of Roshdieh complex and they are more efficient than the cube volumes. In traditional architecture for fast heating of the interior spaces building large spaces was avoided and the shorter ceiling height was considered (Majedi, 2003: 5). Dividing the interior spaces of Maghsoodieh houses indicates compliance with these principles in traditional construction; however in residential plans of Roshdieh complex, we observe large living spaces and high ceilings that it is not compatible with the climate. The changes performed because of personal tastes and current view of the society regarding the luxury that is contrary to the principles of traditional architecture increase energy consumption significantly in buildings.

In the traditional architecture of monuments in the city of Tabriz, usually flat roofs are used which is to adapt to the climatic conditions of the region. The form must be such that it would keep snow and prevents it from sliding (Zekavat, 1996: 6). In Roshdih complex we witness the design and implementation of both types of roofs. In similar Villa houses built over a period of time the roofs have a mild slope (Fig. (4)).



Figure 4: Roshdih complex residential texture including villas, towers and apartments. Source: author

Points before concluding

Global climate change and the related dangers to human settlement and survival of organisms and the biosphere, necessitates the modifying the housing and interact with the ecosystem (Sharifian Barforoosh and Mofidi Shemirani, 2014: 100). The use of suitable materials with high thermal insulation capacity is one of the solutions that can be used to deal with external cold air (Dangel, 2010: 94). Today the climatic conditions and the special architectural design needs in building new houses have been ignored by the architects and designers which have imposed a lot of problems and additional costs on the residents. The solution is to return to the roots of the idea of the traditional architecture which is self-relying, human-oriented architecture and combining functionality, beauty, technology and climatic design such that they are hard to be preferred over each other.

Conclusion

By comparing the native residential buildings with new residential buildings in Tabriz it is possible to understand the principles of the compression of the plan (building multi-level buildings) and increasing the lateral surface area of the plan (blocks distribution) in new buildings, while this is not true in traditional buildings and they have compact plan and the lateral surface area is reduced. Building height in order to prevent the penetration of moisture into the building, openings with different size in order to make draught, the forms and types of roofs to reduce the burden of snow and rain, the use of local materials and reduced cost of construction are among the factors that under climatic conditions have brought a specific type of architecture for housing in the area. The most important factors to be considered to take advantage of the climate compatibility of buildings include:

- Enjoying a dense texture and integrated residential to minimize external walls of the building and therefore less heat exchange with the environment that should be considered and prioritized in the construction of modern buildings.
- Given that the openings are the most important factor in the exchange of heat and light in the building, the number, size and type of materials used in the construction must be considered, which are subjectively used in the modern architecture of the city of Tabriz and meeting the climatic requirements have not been the case in selection. Openings should comply with the modern technology at the same time that they are consistent with the climatic conditions.
- Due to the cold mountainous climate and snowy areas, based on the analysis of both textures, the proposed form of the roof is the flat one that could act as an insulation by keeping the snow and prevent thermal exchange with the outer areas.

References

1. Ali Khiavi, P., Lahroudi, Mahmoud. (2010). dynamic building heating modeling. Journal of ARC message. Eighth year. Number 24. Spring. Pp. 58-52.
2. Almusaed, Amjad (2010), *Biophilic and Bioclimatic Architecture: Analytical Therapy for the Next Generation of Passive Sustainable*, Springer, London.
3. Brebbia, CA. & E. Beriatos, (2011), *Sustainable Development and Planning V*, WIT Press, Greece.
4. Dangel, Ulrich (2010), *Sustainable architecture in Vorarlberg: energy concepts and construction systems*, Springer, London.
5. Mahmoudi, MM. (2009). *Housing development compatible with sustainable development*, Institute of Tehran University publications, Tehran.
6. Majedi, Hamid. (2003). *Contemporary Iran Urban planning. Changes in the rules, structure and methods of preparation*. Abadi, 5 and 6, the new course.
7. Malek Hussein A., Dargahi, Mohammad Mehdi. (2010). Analysis of the characteristics and principles of architecture in harmony with cold climate (case study Hamadan). *Geographic Quarterly Outlook Zagros*, Issue 4.
8. Norouzian Maleki, Saeed., Hosseini, B.. (2010). Architecture in the era of climate change. *Journal of Housing and Rural Environment*, 20-31
9. Oliver, J.E., (1973), *Climate and Man's Environment*, John Wiley & Son, New York.
10. Qobadian, Vahid. (1998). *Climatic study of traditional buildings*. Institute of Tehran University Press (2010).
11. Sharifian Barforoosh, Sh., Useful Shemirani, SM. (2014). Urban environment configuration criteria in the eyes of theorists. *Journal of Architecture and Urbanism Garden Art Research Center*, the number 31 (the eleventh), 99-108.
12. Singeri, M., Abdoli Nasser, Sarvnaz. (2012). Comparison of shells in the context of traditional and modern residential buildings in Tabriz with a sustainable approach. *Journal of Islamic Studies of Iranian cities*, number seven, 53-62.

13. Watson, D., Labs,k. (1937)., Climatic design. Translated from English by Ghobadian, V., Faiz Mahdavi, M. Tehran: Institute of Tehran University Press.
14. Zandieh, M., Parvardi nezhad, Samira. (2010). Sustainable development and its implications on residential architecture in Iran. *Journal of Housing and Rural Environment* (2011), 2-21.
15. Zekavat, Kamran (1996). Street Architecture. Proceedings of the First Congress of Architectural History, Volume III.
16. Zomarshidi, Hussein. (2011). architectural museums and residential buildings of the Qajar period until today, *Iranian Journal of Islamic Studies*, No. 3, Spring, pp. 10-1.

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