Environmental Factors in Iranian Architecture

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Abstract: Evolution of architecture is influenced by many external factors including environmental, ethnical, demographical, cultural, and religious factors. Among these, we consider environmental factor as the most active and powerful factor considering its objectivity and remaining constant. This article deals with the environmental conditions of Iran by zoning its territory and considering that the traditional principles in Iranian architecture and urbanism is directly connected with the country's nature, as well as regional characteristics of individual regions. Moreover, problems of construction design zoning, and also traditional designs and materials in architecture of civil buildings depending on climatic, seismic, wind conditions and other objective factors are discussed. Predominant influence of the spiritual Islamic culture on traditions of Iranian architecture is addressed. The author concludes that the coincident use of modern Iranian architecture, just like other countries, and the traditional principles and the forms is not anachronism, and the organic continuity of architecture development is historically justified, functionally useful, and compositionally effective. Naturally, this provision does not preclude the active search for improvement of these guidelines and forms, while maintaining their unity with the natural and climatic conditions.
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1. Introduction

In today's world, the idea of organic architecture has become increasingly popular. Numerous lectures have been presented and many famous architects proudly identify themselves as adherents of this trend. The essence of organic architecture from its very definition is most appropriate according to the architectural forms of social processes, just as the forms of living organisms, plants or animals that are most suited to the life of these organisms in a particular environment. Broad prospects are in view considering shifting the foundations of wildlife in the building structure, organic form, and principles of operation of an architectural practice. However, there is a fundamental difference between architecture and natural forms (William et al, 2007).

Wildlife is a self-organizing system that has no other purpose than to maintain the constancy of life. The entire course of evolution ever confirmed that it is perfect and best fulfills its mission. Architecture is the inanimate nature. Buildings that are created by a human being can be tailored to serve its specific needs, in particular, protection from adverse influences of nature and society. Nevertheless, depending on many factors, these structures are not always prove successful, and are often ambiguous and sometimes just wrong for the purpose (Moradchelleh, 2008).

Traditional architecture is an area in which the most viable forms and objects of architectural activity have arisen, tested, and approved by seeking harmony with the natural environment and the internal content. Operating factors in traditional architecture are similar to factors of natural evolution in terms of its time period, the desire to achieve the greatest effect by the lowest means, the continuity of the most successful solutions, and no sharp qualitative leaps. Traditional architecture accumulates many centuries of experience in use and creation of architectural forms in the local environment from local materials, and thus from generation to generation synthesizes optimal functional home and design schemes and systems. The above-stated issue gives grounds to assert that now it is still relevant to carry out further in-depth study of the objective foundations of the traditions of architectural shaping of all aspects of architectural design and their successful use in modern architecture.

2. Environmental conditions of Iran

For centuries, traditional housing architecture of Iran protected its people from the harsh climate. Much of Iran is situated in the tropical continental climatic zone. Average July temperature is +29.5°C, but occasionally reaches +40°C - 50°C in day time. Rainfall does not exceed 200-400mm per year, except in the Persian Gulf coast (Alijani, 2002; Kasmai et al, 2003; Tavassoli, 2002). Occasional incursions of cold masses from north are accompanied by temperature decrease, strong winds, and dust storms mainly under clear skies. Given the high volatility in excess of the amount of precipitation in 10-15 times, it becomes clear how serious the issue of lack of moisture is.

The desert climate of the Iranian Plateau is characterized by an extreme continental pattern, i.e., sharp daily and annual variations in temperature, and low humidity and low rainfall. Summer is without rains and hot, and lasts about four months - from May to August. The warm weather is accompanied by persistent dry hot winds. The average temperature is about +30°C in summer months and about -2°C in winter months. Relative humidity is low, especially in summer times. Agriculture is possible only with the use of artificial irrigation.

Nature and climate of Iran are significantly varied. Considering the temperature and precipitation, Iran can be divided into six environmental zones (EZ), conventional boundaries of which are related to geographical location, topography and landscape (Fig. 1):

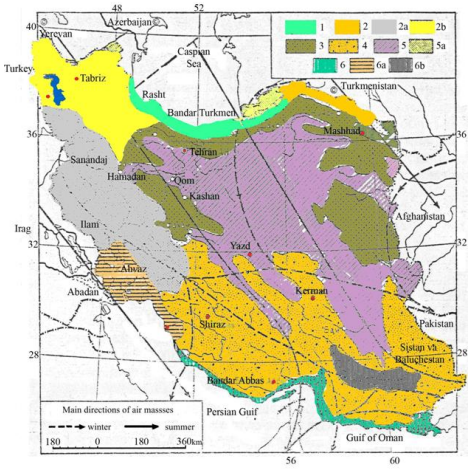

Fig 1: Principal environmental zones of Iran (1 - zone of humid subtropical climate of southern Caspian shores, 2 - zone of mountain subtropical climate of Kopet-Dagh, 2a - zone of mountain subtropical climate of south-western Iran, 2b - zone of mountain subtropical climate of north-western Iran, 3 – zone of mountain semi-arid climate of northern and eastern Iran, 4 - zone of mountain arid subtropical climate of southern Iran, 5 - zone of climate of subtropical deserts of Iranian plateau, 5a - zone of climate of subtropical deserts of Gorgan-Atrek valley, 6 - zone of climate of southern tropical deserts of the shores of Persian Gulf and Gulf of Oman, 6a - zone of climate of southern tropical deserts of Karun valley, 6b - zone of climate of southern tropical deserts of Jezmurian valley).

- Zone of damp subtropical climate (EZ-I);
- Zone of mountain subtropical climate (EZ-II);
- Zone of mountain semi-arid climate (EZ-III);
- Zone of mountain arid subtropical climate (EZ-IV);
- Zone of subtropical desert climate (EZ-V);
- Zone of southern tropical desert climate (EZ-VI) (Alijani, 2002; Kasmai et al, 2003).

Zone 1(EZ-1): A characteristic feature of the damp subtropical climate of the southern coast of the Caspian Sea (Gilan, Mazandaran, Gorgan) is the large annual rainfall (over 500 mm) in the northern slopes of Elburz and in the Southern Caspian lowland (Talsheskie Mountains - from 500 to 800 mm) with an annual average temperature +8°C. In the mountainous area, 2000m or more above sea level, precipitation does not ensure the development of forest vegetation, so the upper belt of Elburz Mountain range is treeless. The western part of the area is saturated with moisture stronger than the eastern one. Maximum precipitation falls during the autumn, and the least in the summer. Temperature of the zone is favorable for development of agriculture and the general infrastructure of civil buildings locates in rural settlements. The average annual temperature hovers around +16°C. Maximum temperatures in summer reach +40°C.

Sometimes droughts take place, so irrigation is needed especially in Eastern part of the Caspian shore. Considering the difficulty in bearing warmth and high levels of humidity, climate of this zone is hard to live in for the human. Climate of mountain districts is much softer. Crops are harvested twice a year and during the cool winter, plants of temperate latitudes are grown (Alijani, 2002; Kasmai et al, 2003).

Zone II (EZ-II): Formation of mountain-steppe and mountain-forest subtropical climate of western Iran (Lorestan and Iranian Azerbaijan) is associated with the presence of mountain ranges and the influence of Atlantic air masses that bring precipitation in the winter-spring period. As a result, western and north-western regions of Iran are moistened considerably stronger than the central and eastern parts. Annual precipitation here is 500-600mm. summer and winter average temperatures reach +25°C and -1°C, respectively. Summers are hot and dry. As in any mountainous area, there are three vertical climatic zones.

- The alpine zone is located 2000m above sea level. The climate is dry and cool. Autumn, winter and spring are relatively rainy, while summer is almost cloudless.
- Mid-belt forests of mountain slopes, valleys, and hollows. Winter is relatively mild and snow melts fast. Summer is hot and almost with no rains. The climate of mountain valleys lying at an altitude of

1200-2000m above sea level is characterized by very dry and hot summers. In the middle mountain belt of Lorestan, there are individual areas of mixed forests, thickets of pistachios, pomegranate, and figs trees.

- Foothill lower semi-desert belt is drier and very hot. It lies below the forest and is characterized by abundant winter rains, with no snowfall. Summer is dry with no rain, so all the vegetation fade. Vegetation only begins in October after the first rains.

Zone III (EZ-III): The zone covers mountainous semi-desert climate mountain ranges of northern and eastern Iran, bordering the desert of Dasht-e-Kavir. The climate of dry mountains of this part of Iran has a distinctly continental character with large amplitudes of diurnal and annual temperatures, dry and cold winters, and the classical alternation of seasons. Semi-mountainous desert area of Iran includes extensive uplands, where depending on the topography, climate is strongly differentiated. The inter-mountain valleys and foothills in the Iraqi highlands have a climate milder than the upper belt of mountains.

In the mountain valleys of northern and eastern Iran, spring begins in late March and lasts until early May, when grass cover fades. Hot and very dry summer lasts from May to September. Maximum temperature reaches +43°C. The average temperature of the hottest months is + 24.8°C. Winter starts in December with rains and sometimes with snow. Snow melts fast in the mountain valleys, but it remains until spring in mountains and closes the passes. At an altitude of about 1500m above sea level, the average temperatures in January is close to 0°C, and frequently reach minus 25-30°C. The characteristic features of semi-desert mountains of northern Iran are its dryness and annual rainfall 200-300mm, mostly in the spring (Alijani, 2002; Kasmai et al, 2003; Tavassoli, 2002).

Zone IV (EZ-IV): The Zone of mountain arid subtropical climate includes mountain and foothill areas bordering the Dasht-e-Lut Desert at the south and the mountains of central and southern Iran, including Mekran Mountain. The northern areas of this region have a more severe winter than the southern parts (Baft, Bam, Shiraz, Behramabad, and Mekran).

In the northern districts, lemon and orange trees are cultivated and in southern districts, date-palms can be found. In general, the climate of this zone is hot, arid continental climate similar to the southern Turkmenistan. The average annual temperature in the foothills is about +17°C. The annual rainfall is over 1100mm. Maximum precipitation falls in winter-spring period. Precipitation is greater in the western districts of the zone. Winters are mild, occasionally there are frosts (minus10-11°C), and average January temperature is considerably above zero. Snow in the foothill areas is rare and melts fast. Spring begins in March, in southern areas - in late February. Summer comes in April. It is very hot, with maximum temperature +45°C.

In the districts, closest to deserts, sandstorms are usual.

Zone V (EZ-V): This zone includes all desert plains of Iranian Plateau including Dasht-e-Kavir, Dasht-e-Lut, Sistan and the surrounding desert valleys Gavhane, Shurab and others. Desert climate of the Iranian Plateau is characterized by extreme continental pattern (abrupt diurnal and annual variations in temperature, low humidity, and low rainfall). Summers are hot and without rain and lasts for about four months. Average temperature of summer months is about +30°C. Autumn is dry and warm and the winter is very wet with precipitation. In winter months, the average temperature is about minus 2°C, and rainfall is less than 250mm. Maximum rainfalls occur in the winter-spring period and the least in summer. The vegetation in this area is rather scarce.

The arid subtropical climate of Gorgan-Atrek lowlands is characterized by mild winters; with temperatures not lower than 10°C. Summers are hot and dry (+43°C in the shade). Autumn is also dry and without rains (Alijani, 2002; Kasmai et al, 2003).

Zone VI (EZ-VI): This zone extends along the coast of the Persian Gulf and the Gulf of Oman in a narrow strip, almost from the lower reaches of the river Shatt al-Arab in the west to the borders with Pakistan in the east. The climate of the coasts of the Gulf of Oman and the Persian Gulf is tropical and the climate of Jaz Murian basin is transitional from tropical to subtropical climate. The climatic features of the Persian Gulf and the Gulf of Oman are developed by considerable protection from the cold masses formed in the interior of Asia in winter. Based on the special climatic conditions and proximity to water, this area may well be regarded as a promising tourist area of Iran (Alijani, 2002; Kasmai et al, 2003).

Four basic modes of weather can be recognized on the coast of the Persian Gulf and the Gulf of Oman:

- Winter anticyclone regime, which is characterized by a small cloudiness and a predominance of relatively cold north-westerly winds.
- Winter cyclonic regime caused by cyclones and coming from the west, which is characterized by a change of cold northwest winds by warm winds, increased cloud cover, frequent fogs and drizzling rains, and the appearance of thunder squalls.
- Transient regime comes at a time from September to November and from March to May and represents

a gradual shift of summer-type weather to winter, and vice versa.

- Summer type weather prevails from June to August and is characterized by exceptionally low rainfall, insignificant cloudiness, and high temperatures of air.

The coast is characterized by irregular rainfall seasons: winter (rainy season) and summer (dry season), the transitions between which are weakly significant. Average June temperature is up to +33°C and the maximum reaches +48°C. The temperature in winter on the coast is about +10°C (Alijani, 2002; Kasmai et al, 2003; Tavassoli, 2002).

Speaking of the active natural factors shaping architectural form/design/…, you cannot ignore those called seismic factors. The territory of Iran belongs to the Mediterranean belt of seismic activity of the Earth, which accounts for more than 50% of earthquakes through the world. The Iranian plateau may be described as a zone of active faults, and some regions are vulnerable to devastating earthquakes. Data on earthquakes of Iran show that the greatest activity is concentrated along the Zagros fold belt traction, and smaller activity is observed in central and eastern Iran. Considering the number, borders of the zones vary in different sources, and are based on the analysis of seismic history, mobile hub for the past few decades, the tectonic environments, active faults, regional geomorphology, as well as plate boundaries (Zomorshidi, 1994).

3. Traditional means of architectural microclimate optimization

Main parameters and features of the natural environment of Iran in general, and its individual regions determine the lifestyle of the population. Moreover, in the final analysis, it is to a great extent the centuries-old human exposure to these special environmental conditions determined the anthropometry and the very nature of the indigenous peoples of Iran.

Climatic factors - gelioclimate (streams of sunlight and heat treatment) and air movement (wind flows and precipitation patterns) provide the greatest influences on shaping of the architectural form-building. These factors largely determine the logic of buildings' three-dimensional solutions, especially the residential parts, their premises, exterior wall coverings, fences, and roofs.

The impact of the earthquakes (landslides, avalanches, floods, mudslides, tsunamis, etc.) should also be taken into account when designing buildings, structures and systems to be developed in seismic areas. Considering seismic factors is including the effect of these factors in the project-estimated documentation and carrying out follow-up projects of special events ensuring the seismic resistance of buildings and structures to see if the probable seismic effects have a significant impact on the architectural formation. However, the issue is beyond the scope of this study. The attempts of human to reduce the negative impacts of climatic factors and making use of their positive influence since ancient times are reflected in the traditional folk architecture, traditional transformation of the natural environment into an artificial environment - architecture.

Not surprisingly, the main challenges in designing civil buildings has been associated with the formation of their functional space and designing-planning structure related to the protection of the premises from direct rays of the sun, wind, rain, overheating and hypothermia, and making use of favorable characteristics of the ambient air including variations in temperature throughout the day, increasing energy efficiency of buildings with direct use of solar energy and wind energy and so on. Over the time many original effective solutions in architecture and urbanism have been developed in the Middle East to protect people's life against the negative impact of climatic conditions. To this end, an extensive system of traditional architectural forms at all levels of organization of an architectural environment - from planning settlements to furnish equipment and facilities have been created.

Residential areas of historic towns contained a maze of narrow streets, winding and often dead-ends (Fig. 2).

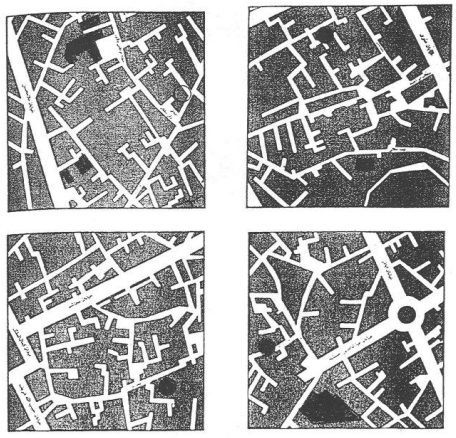

Fig.2. Traditional planning of living city quarters (Ganjnameh, 1996; Ganjnameh, 1998).

Twisted streets traced to ensure freshness and protect against prolonged winds. For protection from hot winds, private manors were enclosed with high walls, forming a maze impervious to hot winds coming from the desert. Residential and business premises squatted inside to the outside wall, forming a patio - hyatt, partially shaded at any position of the sun. Condensed structure of the build-up area was a key

factor that prevented the high temperature and air flows to penetrate the city. For that reason, such a build-up area was considered as a way to resist unwanted heat (Ghobadian, 1998; Tahbaz, 2008; Tavassoli, 2002).

Each mansion was a kind of fortress with an autonomous state isolated the inner world from outsiders'. Moreover, a condensed build-up area with a closed patio provided protection from the heat and winds, as well as meeting the requirements of Islam and the people's life by allowing the closing of the inner world of a family. Entrances to the manor were developed to prevent people passing the street or lane seeing what was happening in the yard. Central entrance portal of the building (hashti) and half open transit rooms, where guests could expect a host, had doors that were located not in a row. If necessary, the patio was shielded by a special partition. In order to enter the premises of the house, one should go through the hyatt, which played a role in the perception of the architecture, comparable to the role of the European facade of the building. Hyatts were usually equipped with water basins for more aeration, planted trees, flowers and climbing plants to absorb heat and act as parks and squares (Fig. 3).

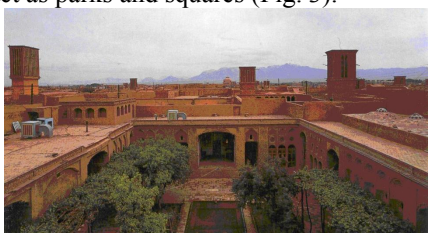

Fig.3. Mansion Larigha, Yazd, *Hayat* (Ganjnameh, 1996).

Evening recreation patio has always been an important part of everyday life, so the owners tried to organize the most pleasant microclimate, due to which you can relax after a hard day stay in the hot sun.

Fruit trees were preferred among trees, especially common fig, mulberry, apple, plum, and pomegranate trees. In coastal areas where the climate is damper, orange and tangerine trees grow. Grapes are capable of absorbing heat and, its vines entwine pergolas and façades in the yards or on rooftops. Pomegranate trees are the best protection from heat. The forms and images of leaves and inflorescences of many plants went into the traditional mosaic designs, moldings and carvings (Kasmai, 1980; Zomorshidi, 1994).

The hot climate with a large difference in temperature between day and night in summer and winter is reflected in the nature of the buildings layout, as well as the set and location of the premises. This, in particular, was applied to a certain orientation of premises to the cardinal points, as well as a large number of summer outdoor spaces. Ayvans, galleries, terraces, and roofing played a significant role in regulating the microclimate of the home and making optimal use of its space.

Traditional life prompted the best pastime destination during the day (Moradchelleh, 2008) (Fig. 4).

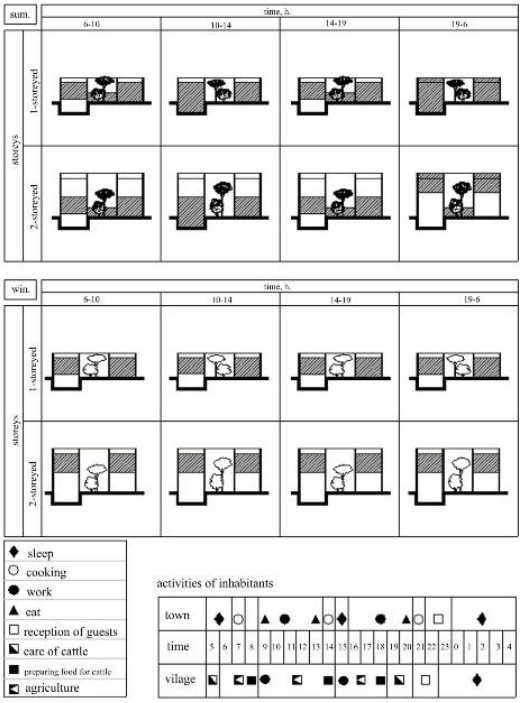

Fig. 4. Functional structure of traditional Iranian dwelling (Main locations of inhabitants in traditional Iranian dwelling).

Many household functions could occur in the open loggias - ayvans. Moreover, the same room had almost no furniture, people sat and slept on mats in the lower zone of the room where cool air collects. Furthermore, members of the family ate, sat on the carpeted floor, blankets and pillows (often on a low podium), read, sewed, and wove carpets. Most of the rooms connected to the hyatt were additionally ventilated by doors, but windows were equipped with sun-barred or stained glass. Houses were built with thick walls made of bricks (adobe), large thermal inertia of which allowed them to keep cool during the daytime and heat at night. High vaulted ceilings allow warm air to rise up, maintaining constant comfort conditions in the space of human presence. Roofs were made flat; they could arrange with pergolas or sleeping places in the summer.

In mitigating the effect of high temperatures on people, a variety of sun protection devices such as grilles and shutters with fixed or movable elements

were traditionally of great importance. The final elements which closed the external windows and, partly, doorways played an active role in the external appearance of the buildings (Fig. 5).

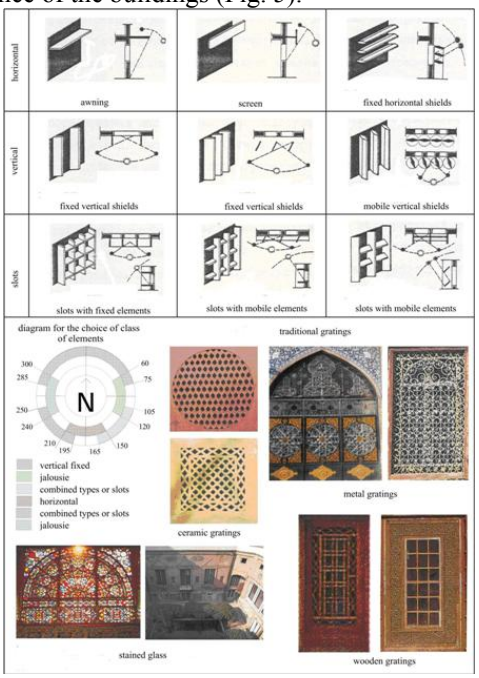

Fig. 5. traditional and modern solar-protection devices (Moradchelleh, 2008).

One of the most important traditional means of aeration and ventilation of premises were – bhud-geers (air traps), power vent pipes that went down to the cellars and underground wells and air ducts, provided a continuous natural ventilation and aeration of rooms (Ghobadian, 1998; Tahbaz, 2008; Tavassoli, 2002; Zomorshidi, 1994) (Fig. 6).

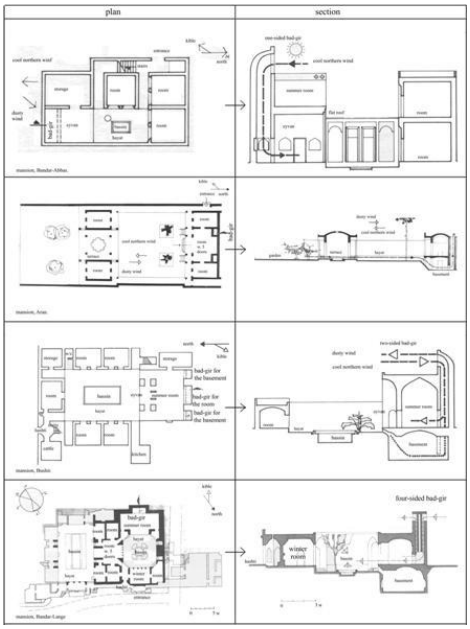

Fig. 6. Windtraps as traditional means of climatization (Ghobadian, 1998).

The most common use of wind-traps was to cool and ventilate the summer living rooms on the ground and basement floors of buildings: the air trapped in the tower, sank, chilled, and in turn cooled the rooms by convection and evaporation. When the wind was weak or missing, air rose up in the tower, whose walls were heated by the sun, thus drawing the cool, humid air from the patio and the basement through the summer rooms. Light bamboo screens were often arranged across the mines on which set the jugs with water to further cool and humidify the air (Ghobadian, 1998; Tavassoli, 2002).

Wind towers are found throughout the Middle East, from Pakistan to North Africa, where they were built since ancient times. Their design and shape are very diverse, but they all perform a common function, directing down the caught wind on the roof of the building to cool and ventilate the rooms below. Wind towers, bhud-geers, over the roofs of Persian buildings and housing, and public houses, as the chimneys of the old European buildings, create a completely unique silhouette of buildings of Iran and the Middle East (Fig. 7).

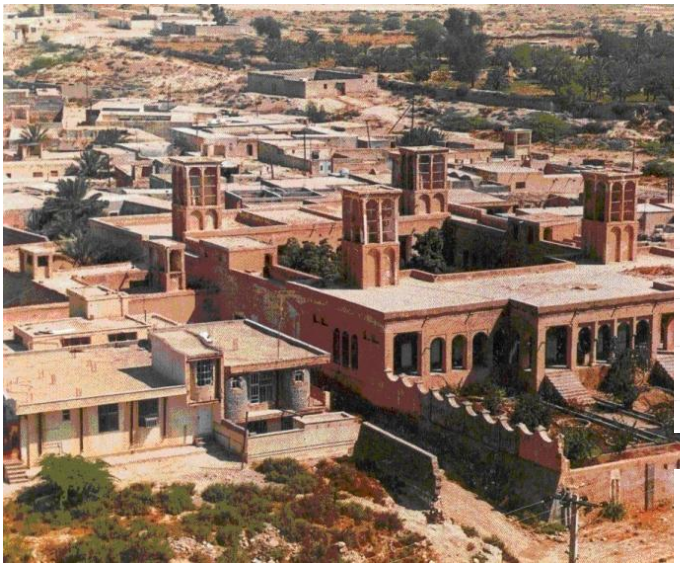

Fig. 7. *Bad-girs* in traditional housing, Bandar Langeh.

These and many other features of traditional houses meet the objective conditions of climate, religion and way of life in Iran. These three major factors shaping the architecture of homes remained unchanged for centuries, and have remained virtually unchanged and retained their importance nowadays.

4. Features of regional architecture

Organic time-tested methods of building, forms and designs are local, natural, and best way suitable for use; the materials were the result of successful work of local architects. Data analysis of six major climatic and environmental zones in Iran have made it possible to suit the local climate (geoclimate and movement of air masses), the seismic activity of the Earth, availability of the basis of design and construction in a particular area, and well-established traditions of public life, and highlight four construction design zones (CDZ): Northern, North-western (central), South-eastern and Southern (Fig. 8).

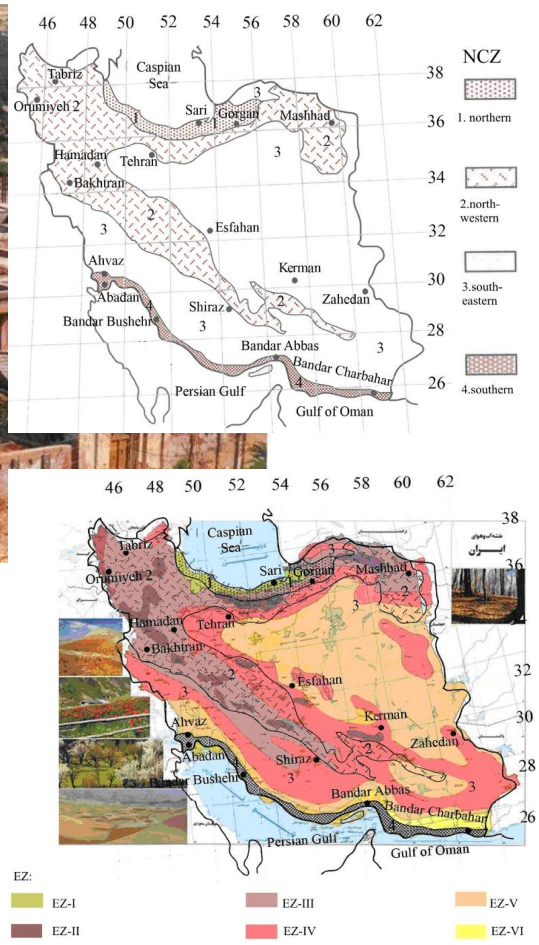

Fig. 8. Main design and construction zones (DCZ) and their connection with environmental zones (EZ) (Moradchelleh, 2008).

The Northern construction design zone coincides with the first environmental zone (EZ), of warm damp subtropical climate of the southern coast of the Caspian Sea. The ethnographic and historical centers of the North CDZ are towns of Qazvin, Gorgan, and Rasht.

The North-western construction design zone includes two environmental zones: the second zone (EZ-II), mountain-steppe and mountain-forest climate of Western Iran and Kopet-Dag and the third zone (EZ-III), mountain semi-desert climate of Northern and Eastern Iran. Ethnographic and historical centers of the zones are Tehran, Orumiyeh, Bakhtaran, Tabriz, Mashhad, and Hamadan.

The South-eastern construction design zone is characterized by hot, arid climate and also includes two environmental zones: the fourth zone (EZ-IV) mountain arid subtropical climate of southern Iran, and the fifth zone (EZ-V) subtropical desert climate (with sub-districts). The ethnographic and historical

centers of the zone are Shiraz, Kerman, Zahedan, Esfahan, and Birjand.

The Southern construction design zone is characterized by hot, damp climate, coincides with the sixth environmental zone (EZ-VI) climate of southern tropical and subtropical deserts of the Persian Gulf and the Gulf of Oman (with sub - districts). Ethnographic and historical centers of the zone are towns of Bushehr, Bandar Abbas, Ahvaz, and Abadan.

Let us consider the four formed construction design zones (CDZ) in more detail with the specification of the features of their architectural traditions.

The Northern construction design zone (N CDZ) with hot summer weather is characterized by gallery-type, low-rise residential building, which is based on planning methods to ensure cross-ventilation (to lower the temperature and humidity). This is achieved through proper design of a house; the arrangement of broad galleries, terraces, and deep summer room.

In the traditional architecture of the region, buildings are arranged separately standing on plinths, with the orientation of the dwelling spaces to the east and west. Relief and the possibility of visual perception of marine views from each house are taken into account for the location and planning of buildings. This zone is identified by the use of low-density build-up areas of separately standing and blocked buildings. Two types of low-density building formation are offered (Moradchelleh, 2008):

- Spot build-up area, sparse staggered and mansion staggered buildings, and group staggered type of build-up area, which provide broad guidance and taking into account the prevailing wind direction (west, north-west), as well as daytime and night breezes. Sparse and staggered homes (necessarily with patios which provide aeration of build-up area and houses), the disclosure of the main facade to the sea, and the visual perception of the sea are recommended. For nature conservation, it is advisable to trace transport links in the build-up area parallel to the sea at the distance over 300 – 400m.
- Blocked line type of building, linear with ledges and a concave front of build-up area and blocked (group) with ledges and a curved front of building. Front side of the build-up area is chosen, depending on the nature of the coast outlines (its topography) and the provision of recreational areas. In order to minimize heat loss at night and overheating during the day, it is suggested to block houses and use various types of buildings; fan-shaped, staggered, jagged, sparse, and linear.

In the traditional architecture of North-western DCZ, two- and four-sloped roofs are usual, and flat roofs are rare due to high precipitations. Living rooms usually faces SE, S, and SW. To protect inhabitants from the chill of ground, foundations are high. Bhud-geers are found rarely. Dwelling houses are usually blocked to decrease heat losses (Ghobadian, 1998; Tahbaz, 2008).

In the mountainous region, terraced houses and two-tier type are distributed. On this basis, we should build a manor blocked and carpet build-up area. The manor type of a house may have a rectangular, dotted, Г-shaped and П-shaped in plan with the latitudinal and meridian orientation, and placing a central priority on home within the garden area. In the blocking and carpet types of build-up areas , houses are arranged around the yard with a garden and have O-shaped perimeter, Г -shaped and П - shaped in plan. The structure may include galleries, ayvans and terraces.

The South-eastern construction design zone (SE CDZ), which occupies a significant area of the country, due to unfavorable climate is sparsely populated (the lowest population density in Iran). Seismic activity reaches 7-8. These are the least urbanized provinces. The industry, construction, production, and design facilities are underdeveloped there. This requires the active use of the design-construction base of adjacent regions of Iran (Zomorshidi, 1994).

In the traditional residential architecture of the region flat and dome roofing are dominated, and particularly in sultry provinces double roofs for the condensation of warm air and heating at night are arranged. To protect from the sun, buildings are placed mainly not on the plinth, but on the ground, and a highly developed application of bhud-geers of all types for natural ventilation is widely used. To be protected from the sun, premises are built blocked (Ghobadian, 1998; Tahbaz, 2008; Zomorshidi, 1994).

In the hot and arid climates of SE CDZ, materials of great strength are used for public buildings, characterized by a compact (point) and the perimeter shape of the plan with one or two, more courtyards, a large number of windows and door openings (with a focus on the south-west and south). Bright and light colors are used in decoration of facades.

In the climatic conditions of South-eastern CDZ, common gallery and terraced houses, complexes with patios - from half-open to closed- are widespread. Build-up area is recommended, depending on the landscape to form a sparse mansion type to the group and carpet blocked one. In order to improve the microclimate in the build-up areas, the followings are recommended depending on climatic sub regions (Moradchelleh, 2008):

- arrangement of traffic and pedestrian links, yards, pools and fountains, natural ventilation (bhud-geers), and vertical and horizontal shading;

- planting, watering, shading and landscaping of areas, parking lots, patios, utility yards, streets and pedestrian linkages;
- locating the transport link in the direction of south-western, southern, and south-eastern winds and the entrances of the houses on the leeward side to protect them from wind, sand and dust;
- providing high-density aeration (to increase the shade), reducing the area of external walls and coverings, mutual shading of buildings, streets, yards;
- designing the predominant location of pedestrian streets from north to south.

The following requirements emerged by designing civil buildings: compactness, space-planning solution with one or two patios; protection from excessive heat (horizontal sun shading); increase in the (cubic) space of premises; ventilated attic spaces, open spaces with transforming guards for evening and night stay; arrangement of modern ventilating shafts, vineyards on terraces and galleries; aeration facilities, i.e., arrangement of pools, fountains, and paddlings; high quality thermal protection, fencing (hollow), and ventilation of multi-layer structures).

The Southern construction design zone (S CDZ) with a hot damp climate (on the coast of the Persian Gulf and the Gulf of Oman, south of the country) has fairly comfortable environmental conditions for development of spa and recreation centers.

In the traditional architecture (housing), flat and domed roofs are dominant; the main living premises are oriented to the south or south-east, the buildings are often placed on the ground or on a small plinth, and for natural ventilation, it is a very popular to arrange bhud-geers; and building lines in the plan are detached. In the civil architecture of South CDZ building materials of not-high strength; a large number of window and door openings; and a bright color palette of building facades can be used (Ghobadian, 1998; Zomorshidi, 1994).

The main types of residential build-up areas on the coast are homes, formed around a half-open or enclosed patio (two, three yards). Different types of housing groups can be used. In order to improve the microclimate in the building, the following items are recommended (Moradchelleh, 2008):

- protection of public playgrounds, walkways, patios and dwellings from the scorching desert north-west (with sand and dust) and north-east winter winds;
- formation of a high-density compact construction, in order to combat overheating;
- planting, watering, landscaping and shading of open spaces.

By designing civil buildings, the following demands emerged: the linear arrangement of buildings along the beachfront, orientation of rooms and public spaces of long stay to the sea, transparent (through) and angular airing of buildings, protection against the premises overheating in summer (increasing thermal protection by multi-layer protections, vertical and horizontal sun shading, arrangement of vineyards, and arrangement of open summer premises (hyatts, galleries, terraces)).

Main features of traditional Iranian architecture are represented in (Fig. 9) and (Table 1).

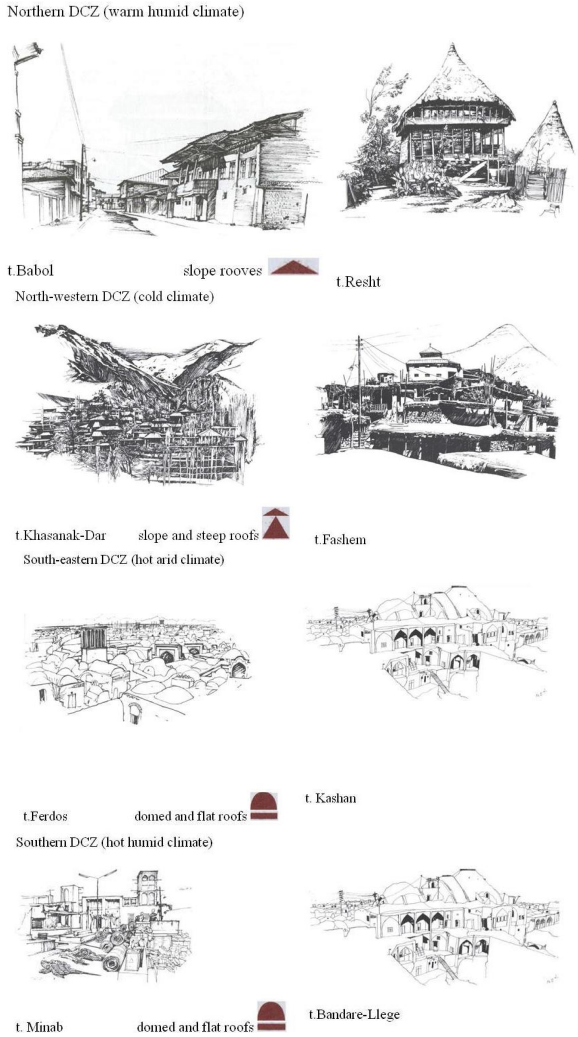

Fig. 9. Influence of environmental conditions over the forms of traditional housing (Moradchelleh, 2008).

Tab. 1. Characteristic of traditional architecture in various regions of Iran

DCZ, climate	materials used	plan	roof	facing	Floor, foundation	windows	use of natural ventilation	housing	colours
Northern, warm, humid	limited heat transmission resistance	extended	sloped	E, N, W	high foundation	large	medium	separate	free
North-western, cold	high heat transmission resistance	compact	steep	SE-SW	on ground	small	little	blocked	dark
South-eastern, hot, arid	high heat inertia	compact	flat, domed	S-SE	on ground	small	much	blocked	bright
Southern, hot, humid	Limited heat inertia and heat transmission resistance	extended	flat	S-SE	on ground	medium	much	bright	sparse

5. Trends in development of architectural and urban practice

Modern development of world civilization is becoming more global. At the same time, broad anti-globalization movements show this process to be largely one-sided. Lifestyles of developed European and North American countries are actively extending to the so-called third world countries, including even the large states of Asia and Africa, many of which have ancient cultures that cause some resistance. In such countries, particularly in Iran, the following two trends opposing each other in the architectural and urban policy and directly in design: successful development of architectural structural morphology in accordance with national cultural characteristics of the nation as well as active implementation of a national architecture, and the methods and means of international architecture.

In recent decades, rapid development of new production technologies in general and construction in particular in the Western world and many Eastern countries led to Western technology aggression toward the east. Many Iranian architects are educated abroad. In recent years, most built or designed objects in Iran are provincial imitation of western architecture with more or less successful use of sun protection technologies, borrowed from the architectural practice of the southern regions of the developed countries (Fig. 10).

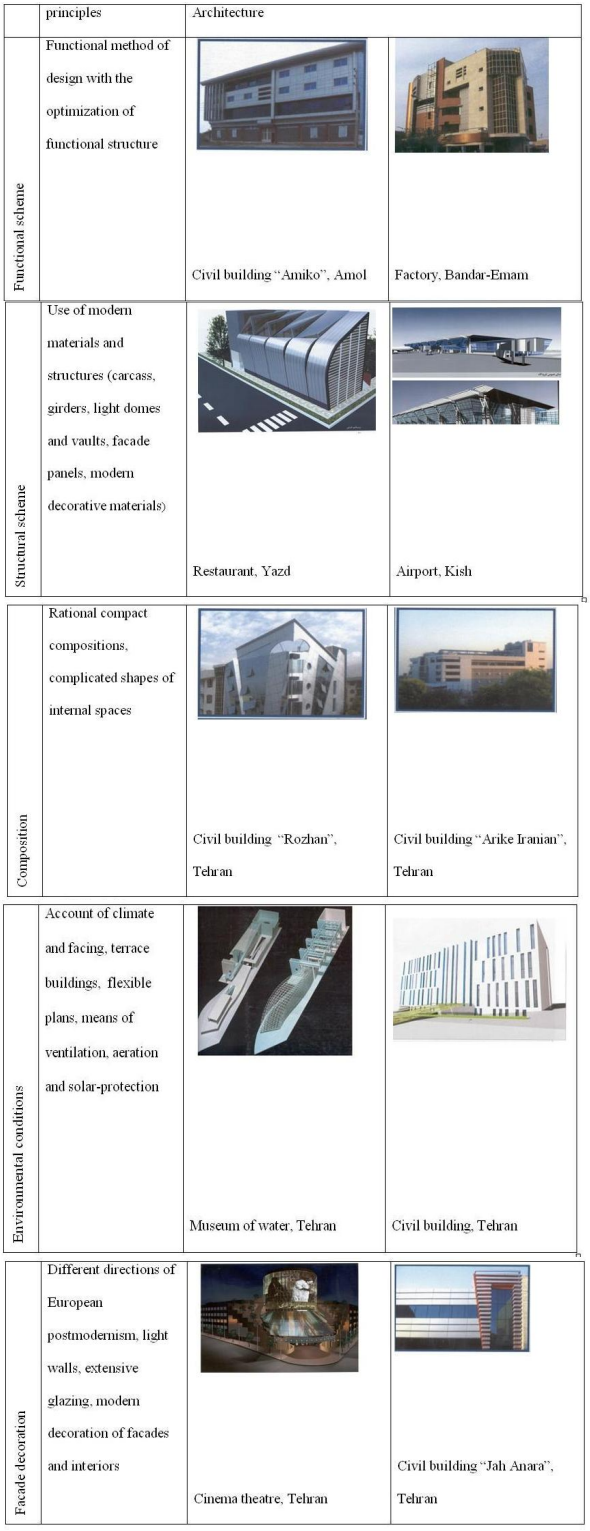

Fig. 10. Influence of international architecture over the civil buildings in Iran (Moradchelleh, 2008).

In part, this is logical - the typology of traditional architecture meets the little challenges facing modern

architecture. Traditional architecture with many, as the Iranians and foreigners is associated exclusively with its outside stereotypical elements: arches, ornaments, Persian carpets, finishes, and mazes of medieval towns. Accordingly, the monuments of traditional architecture can be considered exclusively as historical monuments. At the same time, Iranian architects are increasingly eagerness for careful study of the cultural heritage and even the world's best achievements, not just borrowing the elements. Among the architectural competitions in recent years there were projects with features of traditional national structures: a low-rise even with a large total floor space, using half-closed internal spaces such as patios (courtyards) and alleys, extensive galleries, walls lined with local natural materials such as sandstone, marble and ceramics with high reflectivity, and thermal protection.

Among recent projects Zourkhane - a complex of traditional sports- can be identified in "Enghlab", Tehran (Fig. 11).

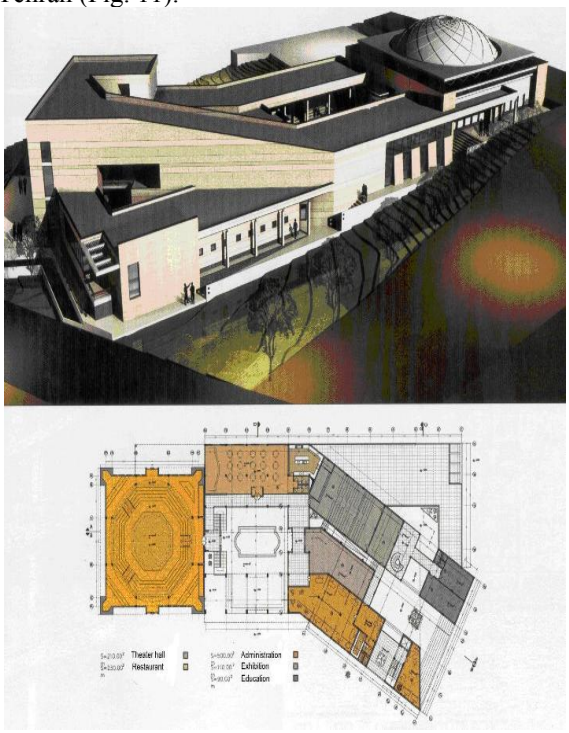

Fig. 11. Zourkhane “Enghlab”, Tehran.

Some examples of traditional architectural forms given here are the author's project of individual residential house (Fig. 12), the Iranian ambassador residence in Seoul, South Korea, Fereshteh Administrative Complex in Tehran, Literature and Science Administrative Complex, Educational Institution of Tehran.

Fig. 12. Design of a mansion for the construction in Iran.

The problem is that modern architecture meets not only the western way of life, but also a new way of life in eastern countries. Indeed, many functional elements for a traditional house are secondary or simply decorative for modern living. For example, a wood-burning fireplace is only a toy for the modern urban dwellers, not a vital heating system. Modern buildings are constructed with more limitations of place and time. It is difficult to imagine the modern life without modern furniture or, for instance, found the space for a TV and a computer in the traditional structure of everyday life.

The transition from the principles, elements, and forms of Iranian traditional architecture to the principles and forms of the so-called international architecture is logical and desirable in the case of applying to buildings and facilities that cannot be built using the traditional designs and materials (such as skyscrapers); or may not have functional and spatial volume counterparts in the Iranian traditional architecture. However, at the same time and in this case, some particular architectural forms that are linking the modern with the traditional architecture can be found.

However, it is unacceptable to neglect the enormous experience of optimizing microclimate space facilities, obtained by traditional architecture for centuries by the most natural, simple and accessible means. Means of folk architecture do not require the equipments such as air conditioners and fans with additional energy consumption, or expensive materials that are often imported from other countries like sunscreen materials such as architectural glass.

This provision does not preclude the fact that the current pace and nature of construction works require certain changes in the use of traditional materials primarily related to adaptation of their tasks to construction industrialization (for instance, transition from bricklaying to mounting of large blocks; a complement of traditional metal line of modular ferro-concrete designs, development of modular floor panels and coatings based on traditional brick vaults, and the introduction of long-span spatial structures using modern synthetic materials).

5. Conclusion

In this study, the tendency for studies and full use of modern architectural and construction practices of historically formed types of planning structures of civil buildings, as well as the traditional architectural forms and details was outlined in the development of Iranian civil architecture. The experience of Iranian traditional culture and traditions of architecture throughout the long history of civic buildings was explained with a lot of amazing examples, reflecting the attitude of society to solve this problem. Analyzed architectural analogues and references provide an information base for research and can become the basis for comparative scientific analysis.

Analysis of construction and planning methods and characteristics of the regional architecture is a strong basis for understanding the living conditions of the population. The proposed zoning of the territory of Iran on four construction design zones, in addition to natural and climatic features of the country, describes the architectural and building community-orientation and commonality of individual regions. These suggestions on area development, construction, use of organic forms and details, and making use of materials provided by effective technologies is the basis of successful solutions of the problems of architectural and urban practice.

It is hoped that the observed trends and developments be successfully used in the design of civil buildings in the Muslim world and further in-depth researches into the problems of tradition in structural morphology of modern civil architecture be carried out.

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