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FUNCTIONALISM OF WIND RENEWABLE ENERGY IN VERNACULAR ELEMENTS OF WIND CATCHER AND MOSHABAK (CASE STUDY: QESHM ISLAND)

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Abstract: Qeshm, an island in southern Iran, has two significant elements of sustainable architecture—wind catcher and Latticework (Moshabak). So, it can be defined based on its performance-oriented vernacular architecture which results in the wind renewable energy. However, there are few studies on these sustainable elements. The present study attempted to analyze the performance and structure of these natural ventilation systems in the island. In our research methodology, we tried to use the qualitative approach. Initially, we used citation and library sources for gathering information. Later, we visited the site and the native architecture of the island was studied by analyzing and extracting architectural elements from 48 old buildings which are over 70 years old. Moreover, different types of wind energy and Moshabaks used in the island were thoroughly studied. Meanwhile, the temperature during different periods was compared and the height of the wind catchers and their influence on the rate of wind deflector, functional art, and ecology-oriented architecture of the island were evaluated. The results showed that in terms of function, these so-called sustainable native architectural elements have met the natural ventilation requirement appropriately.

Keywords: Natural ventilation; Lattice; Vernacular architecture; Sustainability; Wind renewable

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INTRODUCTION

In all areas, native buildings, used as a continual source of knowledge, are the result of centuries of thinking and practice (Oikonomou & Bougiatioti, 2011, Mirmoghtadaee, 2016). Climate, socio-cultural factors, economics, availability of materials and technology are among the factors that greatly affect the architecture of buildings and their sustainability. Since the optimal architecture of each area is determined on the basis of its environmental factors, its inhabitants can create its native architecture with local materials and based on their own social and cultural values (Engin *et al*., 2007, Bahrainy, 2014). Studies have shown that vernacular architecture is an important parameter for achieving sustainability in modern architecture. The term vernacular architecture is used to classify a construction method that uses local resources to address local needs (Szokolay, 2014, Faryadi, 2018). It can be said that these buildings are designed bio climatically and to achieve thermal comfort, acoustics and lighting, there should be an attempt to consider the climate, use the principles and local materials of the area to assure integrity of the building with its surroundings (Anna-Maria, 2009). In Iran, energy consumption through cooling and ventilation in the building sector is about 40%. There is a great need to reduce this consumption in order to reduce pollution in the environment (Farmahini-Farahani *et al*., 2012; Wu *et al*., 2009).

Since Iran is a country with different climates, in every corner, ancient architects have sought sustainability in construction using special architectural elements for natural ventilation. So, in every region, a specific thought had been adopted on how to use local architectural elements. These old architects have created several elements, such as wind catchers and Moshabaks to create building stability in hot and arduous climates of Iran. Of course, each of these elements comes in a variety of shapes and sizes. For example, in case of wind catchers, most studies have been done in hot and dry areas, while there is little research during hot and humid climate. Hence, the present research attempted to study these two elements in vernacular houses of the island in which ancient architects have used wind energy to achieve sustainable architecture through indigenous elements such as wind catchers and Moshabak (used for natural ventilation).

METHOD

Considering that two special architectural elements in a specified region with a historical perspective are investigated in this paper, thus, the data collection method is based on desk (library) studies and field observations. Hence, in order to determine the originality of these two elements of the vernacular architecture in Qeshm Island (**Fig. 1**), 48 houses from old houses of the island dating back over 70 years were evaluated, and wind towers and openings and their constituent elements, along with the application of the elements on how to use in natural ventilation were analyze.

STUDY AREA

Geographical location

Qeshm, in the Straits of Hormuz, is the biggest island of Iran and of the Persian Gulf. The island was named Abarkavan in the Sasanian period. Its area is 1491 square kilometers, i.e. about 2.5 times larger than the second largest island in the Persian Gulf, Bahrain. The annual average temperature of the island is about 26° C, with average maximum and minimum daily temperatures of 33° and 18° C, respectively. The island faces very large seasonal temperature differences. The hottest period is between July 10 and September 10. January and February are the coldest months. Absolute maximum and minimum temperatures of 46° and 16° C have been recorded in the island.

In terms of climate, the island is among the most hot and humid areas. Its summers are relatively longer and in winter, it is fairly cold in just in two months January and February. Owing to its adjacency to the sea, the humidity is very high but because of low rainfall, it has no vegetation. Except groves and fields, the area is generally barren (**Table 1**).

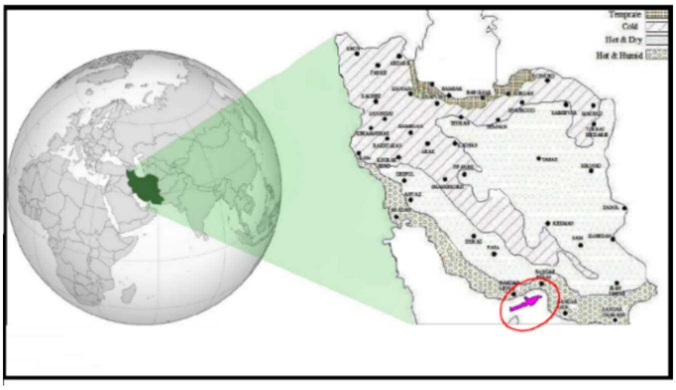


Fig. 1 Study Location.

Table 1. Average temperature of the ruling Qeshm Island

Month	Total rainfall (mm)	Temperature (°C)		Relative humidity (%)	Average wind speed (m/s)
		Minimum	Maximum		
Jan	3.2	14	25	44.4	2.33
Feb	9.3	15	30	42.7	2.83
Mar	19.9	19	32	51.6	3.08
Apr	0	21	33.4	52.4	3.54
May	0	25.6	36	58.5	3.39
Jun	0	25.8	42	62.2	5.04
Jul	0	30.4	38	72.8	4.86
Aug	0	28.6	38.5	73.6	4.37
Sep	0	25	37	80	2.9
Oct	0	18.6	37.4	80	3.67
Nov	0	13.4	34	82.7	4.41
Dec	15.9	13.8	29.2	86.5	2.28

NATURAL VENTILATION

Air conditioning refers to the act of replacing or displacing air in a space to provide fresh air, to send out warm and humid air, and to cool the space and provide human thermal comfort. In this way, during the air circulation process, warm air which is lighter tends to rise and in turn, heavy cold air tends to go down; hence, creating such positive and negative pressure, they cause air circulation. Forces of wind and buoyancy¸ which are the mechanisms of the forces that cause natural ventilation can be summarized into two general factors. (Hughes, Calautit, & Ghani, 2012)The shape and location of the building (e.g., being outdoor, dense, high or low) will determine the design of the natural ventilation. In fact, there are three modes of natural ventilation systems: unilateral ventilation, bilateral ventilation, and chimney ventilation. Each of these show that the way inside the air requiring ventilation associates with the flow of outside air (Andersen,2002).

NATURAL VENTILATION AND THERMAL COMFORT

Thermal comfort conditions refer to the temperature and humidity ranges in which the mechanism of regulating body temperature is at its least (Kristensen et al., 2010). Factors such as air temperature, relative humidity, air velocity, mean radiant temperature, velocity of the body's metabolism and coverage are effective in determining the thermal comfort conditions (Djongyang, Tchinda, & Njomo, 2010). Based on the Oleg thermal comfort, the standard comfort range of temperatures is between 21° and 27.7° C and the standard humidity rate is between 30 and 65%. According to US standards, this range for temperature and humidity is respectively between 22.2 and 25.6 ° C and 20 and 80% (Handbook, 2009). By analyzing the meteorological data obtained from Qeshm station, in early the April-early October period, it can be seen that in most days, weather conditions of the island are above the thermal comfort standard. Even in some cases, relative humidity of over 80% and temperature more than the standard 30° C are recorded (meteorological station of Qeshmisland, Ports and Maritime Organization of Iran). Therefore, it can be concluded that the use of natural ventilation in the warmer months of the year can be highly effective in offsetting the thermal conditions.

PHYSICAL SOLUTIONS FOR CREATING NATURAL VENTILATION

"Resource conservation" means achieving more with less. It is the management of the human use of natural resources to provide the maximum benefit to current generations while maintaining capacity to meet the needs of future generations(Wilson,1998).In order to use natural ventilation, there are some common solutions such as wind catcher or deflector, windbreaker, solar chimney, unilateral or bilateral natural ventilation windows and the shell 5 Atrium based on the chimney effect (Ghiaus & Allard, 2012). Given the diversity of the natural ventilation used in the Persian vernacular architecture, Qeshm island can be divided into two models of natural ventilation elements, including wind and natural ventilation windows on one side and double-sided, double skin facade (net of Moshabak) on the other. In the following sections, their performance will be discussed in detail.

NATURAL VENTILATION ELEMENTS IN QESHM ISLAND

The island has a stunning architecture, yet due to space limitation, just a small part of it will be introduced here. On one hand, it can be mentioned that in spite of its very unpleasant weather condition, the vernacular architecture of the region is compatible with its climate (Moghaddam, Amindeldar, & Besharatizadeh, 2011). On the other hand, the unique performance of the island's wind catchers is so brilliant that it will be described in the following parts of the articles. Accordingly, the natural ventilation elements can be summarized in **Table 2**.

WIND CATCHER

Local wind, known by the name wind catcher and Moshabak in the Persian Gulf region and in Arabic architecture, resembles Egyptian architecture (Hughes, Chaudhry, & Ghani, 2011). The wind catcher is one of the architectural elements which has been constructed for the vernacular architecture in hot, humid, and dry areas of Iran and is seen as a vertical channel in the face of most cities. Wind architecture is so effective in cooling buildings that it can be regarded as a sign of maturity of architects who have designed and constructed them (Moghaddam et al., 2011). Ancient Iranians had designed this innovative system utilizing geometry, mechanical and architectural calculations to install such well-formed views in warm areas and hot and dry deserts to refresh air through the roof into houses, water storages, and even the mines (Behbood, Taleghani, & Heidari, 2010).

WIND CATCHER COMPONENTS

Deflectors can be classified into two parts: Shelf and shoot, each with different components given in **Table 3.**

Table 2. Natural ventilation elements in the island

Natural ventilation island	
Windcatcher	Moshabak

Table 3. Components Windcatcher

	Row	Two- part Windcatcher	description
Shelf	1	Crown	Top of the wind catcher which is mostly decorative
	2	Blade	Blade is a part of the deflector that is used for conditioning and natural ventilation by wind
	3	Blade decoration	decorations operating on top of wind catcher's blade
root	4	load-bearing and decorative Body	Part on which the main burden of wind catcher is mounted, with various decorative models in various dimensions, sizes, and openings.
	5	Windbreaker	Part of wind catcher operating as a 45 ° diagonal used for breaking wind and entry of air into the inner space

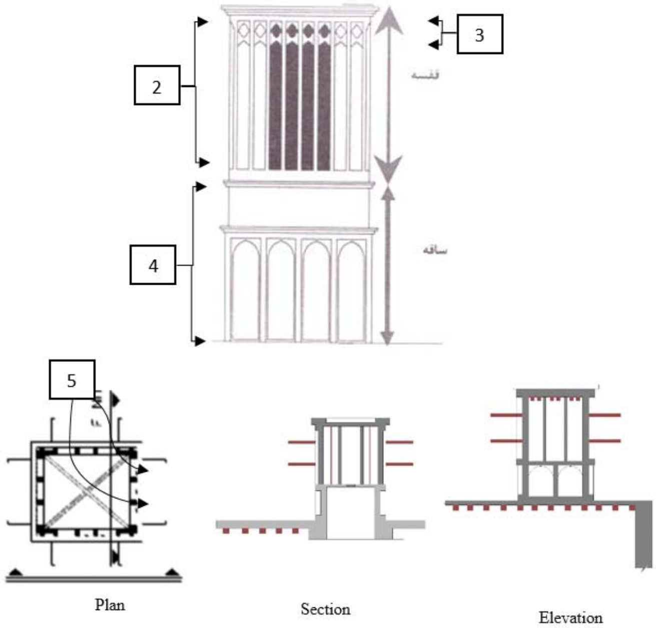


Fig. 2 Wind catchers with X-form blades.

FORMATS OF DEFLECTORS IN QESHM ISLAND

Wind catchers in Iran are diverse in form and geometry so that any format can be more interesting with better look than the others. Of the 28 types of wind catchers found in Iran, those in Qeshm island can be referred to a general category called x which have been set up on the roofs of buildings in specific sizes and heights.

As it can be seen in **Fig. 2**, all win catchers are similar except for their height and decorative elements that differentiate them. As illustrated in **Fig. 1–2, 2–2 and 3–2**, it can be inferred that the two parts—the stem and the body—can be regarded as decorative components of wind catchers. On their shelf, several wind absorbing walls and even wooden decorative elements are used to attach each side to the sidewalls and make the required bending strength between the walls.


Fig. 3 view of wind catchers in historical context of Qeshm.

PERFORMANCE OF WIND CATCHERS IN QESHMISLAND

Today, studies have shown that in ancient times, the natural ventilation system had been the best scientific way for conditioning and moisturizing hot as well as humid and hot along with dry areas. Wind catchers of the island act in two ways: (1) sending indoor air to the outside (tail)and (2) entry of pleasant air into the building (suction). Here, it should be mentioned that those wind catchers which cool the building's interiors just through air movement are the most common type in hot and humid areas of southern Iran, including Qeshm, Lenge Harbor, Hormuz, Khamir Harbor, Bushehr and Minab.

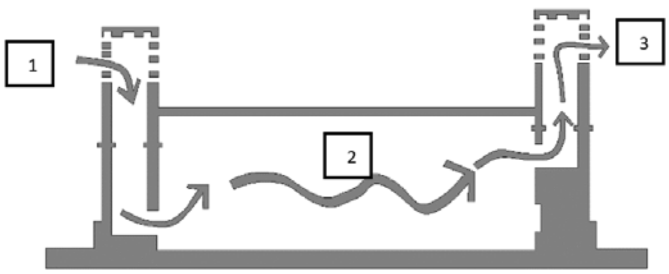


Fig. 4 Interior space of Mollah- Ahmad building, air circulation for natural ventilation in QeshmIsland.

In **Fig. 4**, it can be inferred that (a) cool air entering from outside tends to move downward into the inner space of the building, (b) air circulation goes on in the interior spaces, and (c) venting interior hot air takes place through the other edge of the wind catcher to the outer space. Iranian wind catchers are built according to specific climatic conditions of the area; for example, display wind catchers in the city of Yazd, which have a dock-like area for simultaneous passing of air and water through an underground channel to cool the air coming into the building **(Fig. 5).** Owing to the hot and dry

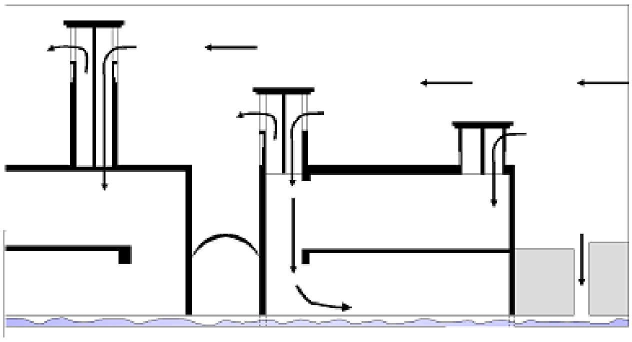


Fig. 5 Wind catchers in arid regions such as Yazd.

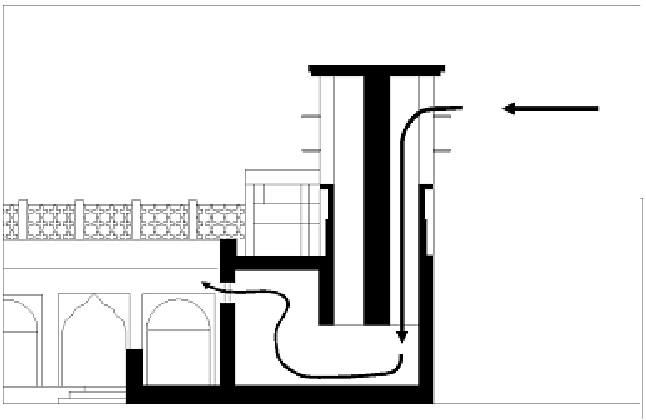


Fig. 6 Wind catchers in wet areas such as Bushehr Harbor, Bandar Abbas, and Qeshm Island

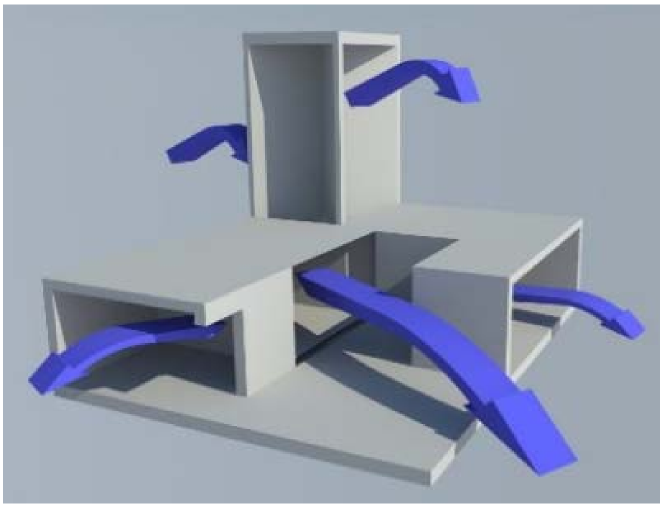


Fig. 7 Natural ventilation through Qeshm wind catchers to interiors and output of warm air.

climate, the wind catcher requires a channel for air and water circulation which leads to coolness from the water and air flow through an underground hole. In this way, it can carry air into the interior space of the house for natural ventilation.

During natural ventilation, via wind catchers in hot and humid regions, such as Qeshm island (**Fig. 6–7**), air enters the building through a side of the wind towers and after circulation in the inner area, the air becomes hot. This hot air tends to move upward, eventually leaving through the other side of the deflector. Of course, this type of natural ventilation differs in every climate and region; for example, in hot and dry areas, it works through cellars and pond water or water channels, whereas in hot and humid areas such as Qeshm island, no cellar or pool is needed because the climate of this region is potentially moist and air circulation is sufficient for natural air ventilation.

DIFFERENCES BETWEEN QESHM WIND CATCHERS AND OTHER WIND TOWERS

Based on the analyses (**Table 4 and Fig. 8**), it can be inferred that each installed and permanent vent on top of the roof of vernacular houses in the island has a certain element between its four-sided surfaces which illustrates a unique performance and architecture which is in harmony with its naturalistic climate and geometry. After evaluating previous studies on the island, the wind catchers can be divided into six parts. All the wind catchers are four-sided, and in some cases, such as A, B and C, wind is used as a two-way path. In the rest, one way is considered for air entrance and the other for exit from the opposite direction. Of course, it has been just by taste.

Figures 9–11 displays the rising number of models of wind catchers in different regions of Qeshmisland. If all the wind towers are identical in height, they would not be able to properly ventilate a house. Therefore, for example, the wind deflectors type C and D in **Fig. 9** would have heights of 4.20 and 4.60 meters respectively. Hence, it can be stated that if they are placed at the same height in two areas, they cannot provide natural ventilation. But now, there is a 40 cm height distance between the two deflectors. So, it will be a good design of natural ventilation for the vernacular architecture of Qeshmisland.

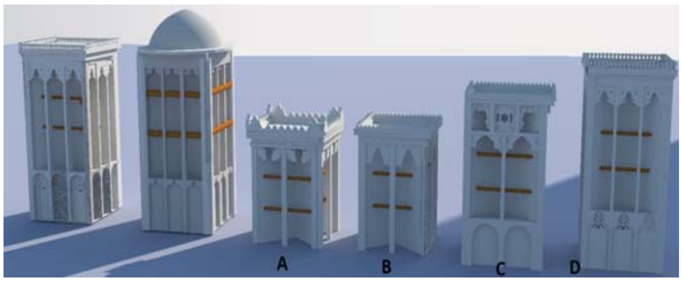


Fig. 8 Qeshm wind catchers: an expression of architecture corresponding with the climate in the south of Iran.

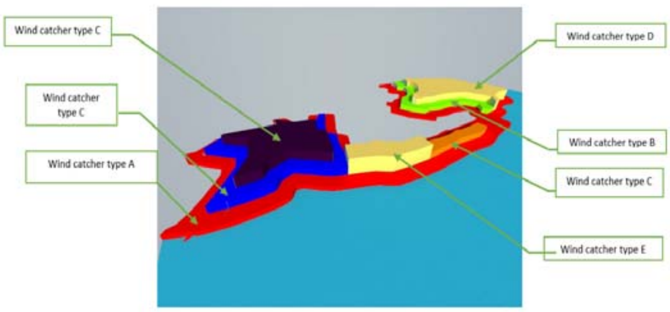
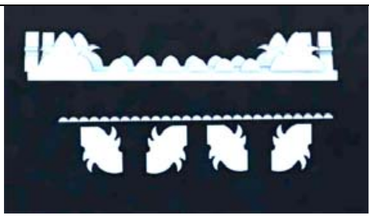
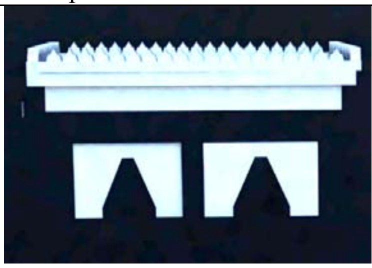
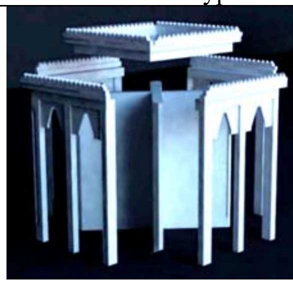
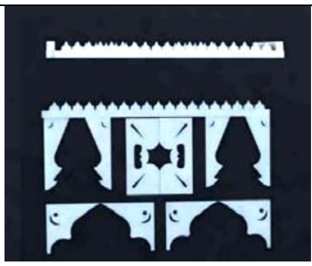
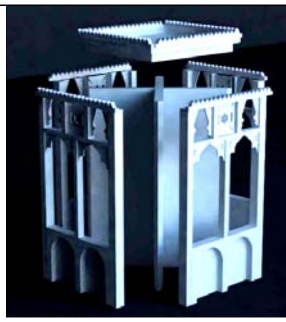
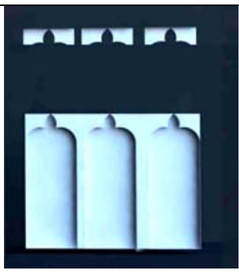
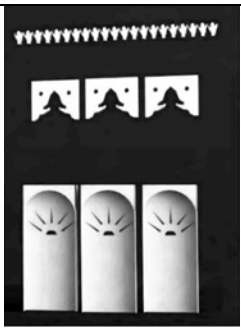


Fig. 9 The height of wind towers is provided on **Tables 4** (below)

TYPES OF WIND CATCHERS

Table 4. Six wind catchers available in the island

Dimension (cm)	Geometry and decorative elements used in the main frame of wind catchers	Wind catchers shown as separate splits
Length 120 Width 120 Height 300 Features of wind catchers with the lowest height used in the suburbs	 Geometric features: Adopted from the geometry of plant branches along with elements of soaring domes on top of wind catcher walls	 Wind catcher: type 1
Length 110 Width 110 Height 320 Features: A kind of windward after deflector type (A) was set up towards the centrality on top of houses	 Geometric features: Adopted from linear geometry on the wall	 Wind catcher: type 2
Length 130 Width 130 Height 380 Features: A kind of wind catcher set up after wind catcher type (b) towards centrality on top of houses	 Geometry features: High geometry adopted from soaring cypress trees and low expression of the body geometry porch output used in Islamic architecture	
Length 140 Width 140 Height 420 Features: A kind of wind catcher set up after wind catcher type (c) towards centrality on top of houses	 Geometry features: High geometry adopted from soaring cypress trees and low geometry, an expression of blossoming flowers	 Wind catcher: type 1
Length 140 Width 140 Height 460	 Feature Geometry: Geometry used by the elements used in Iranian-Islamic architecture.	 Wind catcher: type 1

Length 140 Width 140 Height 420 Features: A kind of wind catcher set up after wind catcher type (d) towards centrality on top of houses	 Geometry features: High geometry adopted from soaring cypress trees and low geometry, an expression of blossoming flowers	 Wind catcher: type 4

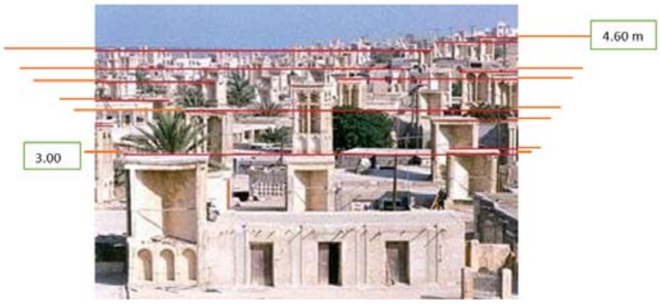


Fig. 10 Higher altitude of wind catcher in central part and their lower altitude on outskirts of Qeshmisland

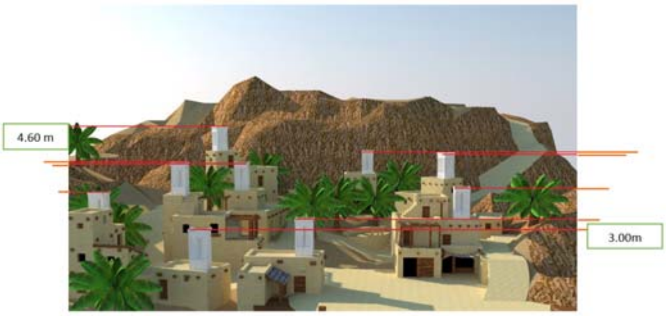


Fig. 11 Altitude of wind towers in country of the island toward its downtown

In general, it can be stated that **Fig. 9–11** highlighted in red shows that the closer it gets to downtown, the higher are the wind catchers. That is because if they all had the same height, it would be impossible to create proper air circulation to cool the temperature of the island. Of the eight groups of wind catchers used in the ME (20), those found in Qeshmisland can be divided into two main groups, each having several sub-divisions. Of course, they all perform the same function and as stated earlier, their only difference lies in their decorative elements. The most brilliant models in the island are X and K.

MOSHABAK

There are numerous skylight elements in Iran. All 12 model elements (Moshabak, meshed door and window, tiny holes, flower cup, light, pachang, darafarin, teahose, ursi, freeze and khovan, palkane and pacholaghi (defected leg)) are among the skylight elements, except Moshabaks which is used both for skylights and natural ventilation. It is useful for areas with hot and humid climate, especially Qeshm island. Shabak is a Persian word which has its own meanings in various local dialects of Iran, whether in Dari Persian, Pahlavi, Avesta or Old Persian.

USING MOSHABAK IN PROVIDING LIGHT

Not only is there little research in this area, but the topic has not also been introduced completely and analyzed nationally and internationally. So, in this article, we have attempted to analyze this type of iranian architectural element in accordance with researchers' interpretations. Moshabaks can be introduced as a mesh surface made of tile, brick, wood, or plaster. They consist of two full and empty spaces, so that they can be seen from the other side.

Iran's variable weather and bright sunshine, wind and rain, storm, and specific religious beliefs are among the reasons why buildings in the country have not only windows and doors, but also screens or Moshabaks for protection. Such screens weaken the light's intensity and make it dimmer. As light rays hit the painted screen, they disperse. So, uniform light and brightness spreads. Meanwhile, despite all the space during the day, it is easily visible from inside but not from outside [12].

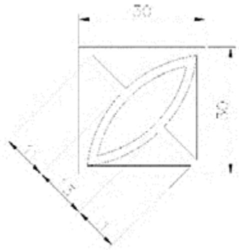
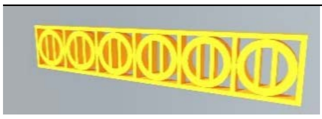
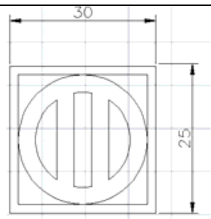
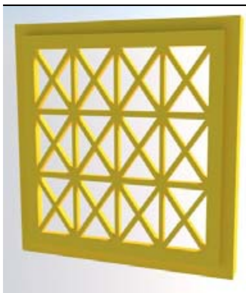
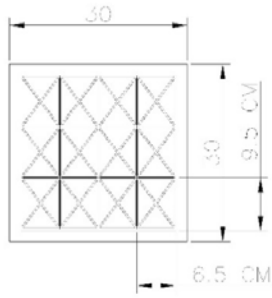
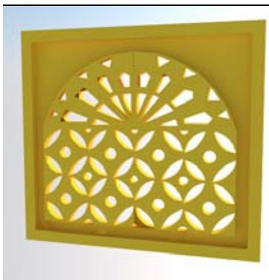
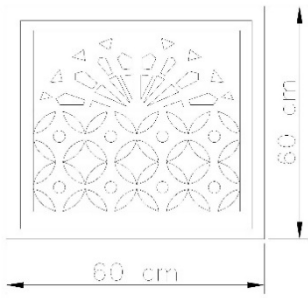
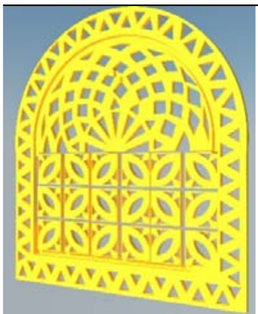
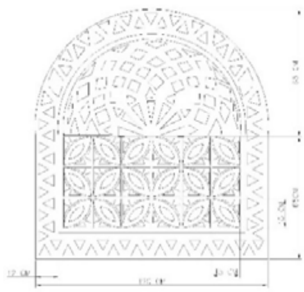
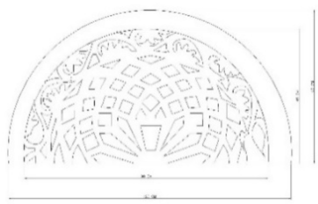
MOSHABAKS AND THEIR APPLICATION IN NATURAL VENTILATION

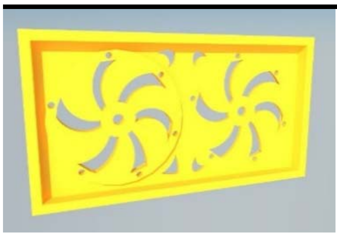
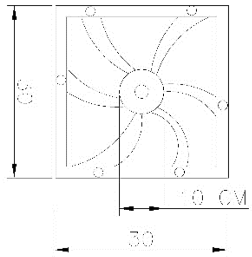
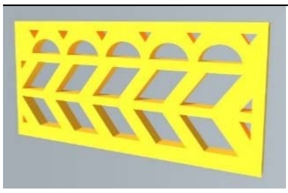
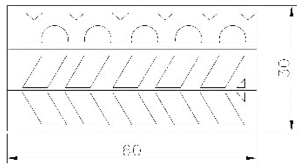
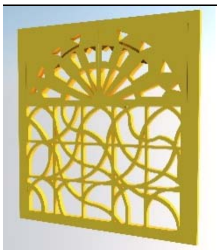
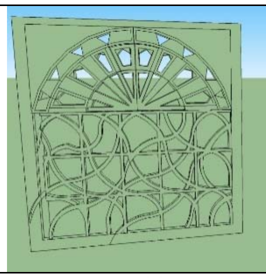
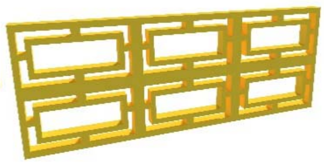
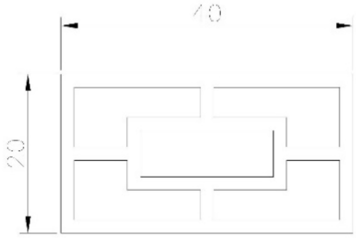
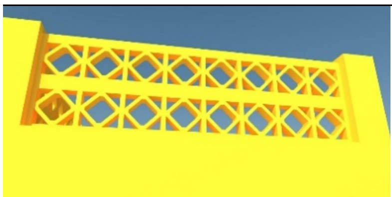
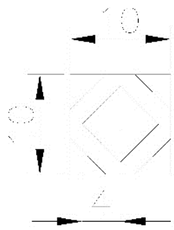
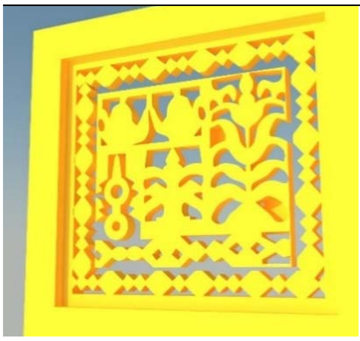
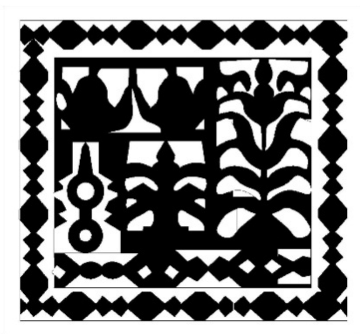
Moshabaks are used in square, rectangle and square-rectangle sides of external walls to refresh the inner space. That is, wind blows from outdoors and circulates indoors, and finally goes out through the Moshabaks of the opposite side, providing natural ventilation.

The Akrami House is made up of 14 Moshabaks built in different sides for natural ventilation. In this process, wind crosses the open space of the entrance and cools the interior of the house and exits through the Moshabaks built in the exterior walls. This air circulation during the day results in natural ventilation in the interior spaces of houses in the island.

TYPES OF MOSHABAKS IN QESHMISLAND

Table 5. Types of Moshabaks used in Qeshm village, Qeshmisland

Geometry and 3-D Moshabaks	rate of using this type of Moshabak	Type of Moshabaks
	- Kitchen 60% - Yard wall and above the entrance door 20% - Living room 15%	
	- Turret 5% - Kitchen -- - Yard wall and above the entrance door 90% - Living room --- - Turret 10%	
	- Kitchen 25% - Yard wall and above the entrance door 75% - Living room --- - Turret ---	
	- Kitchen 25% - Yard wall and above the entrance door ---- - Living room 75% - Turret ----	
	- Kitchen 25% - Yard wall and above the entrance door --- - Living room 75% - Turret ---	
	- Kitchen --- - Yard wall and above the entrance door 100% - Living room --- - Turret ---	

	- *Kitchen 25%* - *Yard wall and above the entrance door ---* - *Living room 75%* - *Turret ---*	
	- *Kitchen 25%* - *Yard wall and above the entrance door ---* - *Living room 75%* - *Turret ---*	
	- *Kitchen 25%* - *Yard wall and above the entrance door ---* - *Living room 75%* - *Turret ---*	
	- *Kitchen* - *Yard wall and above the entrance door ---* - *Living room ---* - *Turret 100%*	
	- *Kitchen ----* - *Yard wall and above the entrance door ---* - *Living room ---* - *Turret 100%*	
	- *Kitchen ----* - *Yard wall and above the entrance door ---* - *Living room 100%* - *Turret ---*	

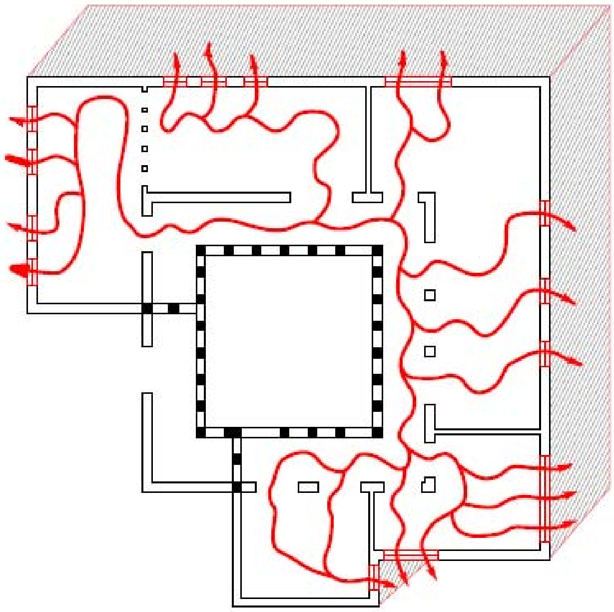


Fig. 12 Air circulation in house of Haj Akrami, Qeshm Island

DIFFERENCES BETWEEN QESHM MOSHABAKS AND OTHER MOSHABAKS

Geometric shape is not just a concept; it is also a visual image with features that are not common in concepts.That is, they are the intellectual representation of spatial features. Analysis of these designs includes the architectural solution method among which the most interesting part is the “unitary" identity of the designing process. One of the methods used to analyze the process is studying the findings of ancient research.

There are 12 Moshabak models in Qeshmisland. According to previous research conducted by the authors, the geometry of this Moshabak can be regarded as a fusion of Persian and Hindi Moshabaks. For example, in the Moshabaks, in rows 9 and 12, there is no trace of geometry, but Iranian art can be seen. The rest is based on geometry and is meant for hot-humid and hot-arid climates. Percentage of Moshabaks used in spaces and different parts of building spaces have been shown in **Figs. 13–14**.

ANALYSIS OF NATURAL VENTILATION AND THE EFFECT OF VERNACULAR ARCHITECTURE ELEMENTS (WIND CATCHER AND MOSHABAK) ON THE INNER SPACES OF THE HOUSE

Regarding **Fig. 15–17**, it can be inferred that all wind catchers and Moshabaks in Qeshmisland are bilateral. They absorb wind from one side and send it out through the other side. In some areas, they are built as a mesh in the exterior walls of the house to dissipate heat from the space.

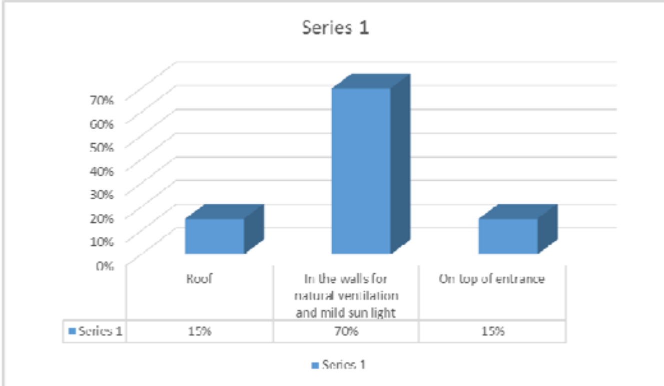


Fig. 13 Percentage of Moshabaks used in different parts of building spaces

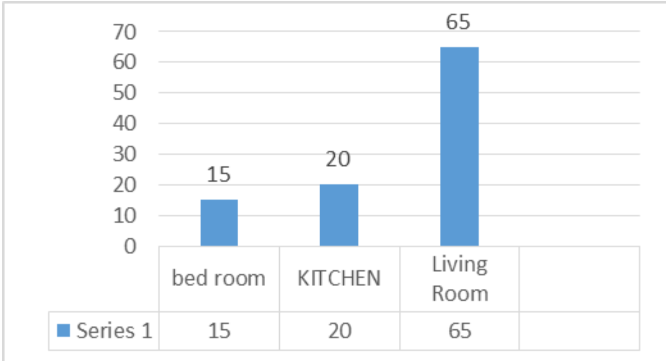


Fig. 14 Percentage of Moshabaks used in building spaces

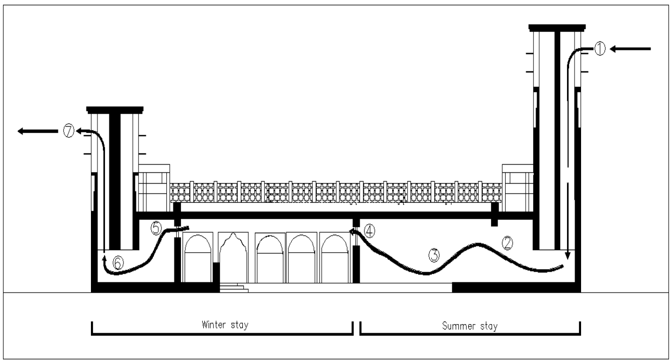


Fig. 15 Performance of wind catcher andMoshabaks in natural ventilation of interior space of Amir Khan’s house

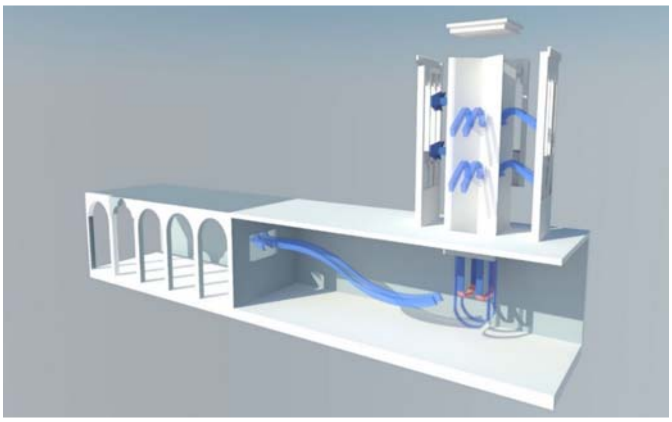


Fig. 16 Wind performance in summer parts of Amir Khan’s house

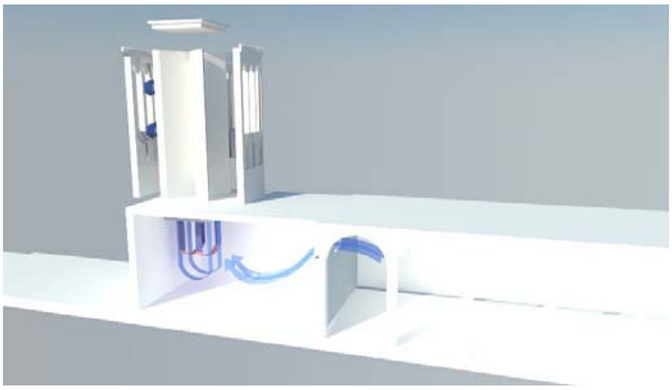


Fig. 17 Wind performance in winter parts of Amir Khan's house

Modern buildings in different cities of Iran are made of materials such as brick, tile, stone and metal. On one hand, there is no proper way to satisfy the vernacular architecture's needs in different climate of Iran. However, vernacular buildings in the island are built with ecological materials, including sedimentary rock, straw mortar, mangrove wood and date logs prepared from the closest neighboring areas and they are compatible with the climate. The cost of construction is also and low.

According to **Fig. 14–17**, an analysis of the effect of incoming and outgoing winds to the interior and exterior spaces is done in **Table 5**. It states that the temperature difference between the outer and inner spaces taken in five different times is 17.3. This shows the effects of natural ventilation on the vernacular architecture of Iran's indigenous elements in terms of wind catchers and meshes. Dramatic effects of these elements can be observed in many parts of Iran.

CONCLUSION

The natural landscape of Qeshm Island is very noticeable. In terms of architectural style, the most prominent architectural feature of the island is various open fretworks (openings) and numerous wind towers (wind catchers) in different sizes; as we move to the center of the island, the height of the wind towers increases. In addition to its admirable natural beauty, the island also includes important historical and valuable works and documents. In this paper, by examining structural systems of the existing texture, we addressed the recognition of main features of the indigenous elements in Qeshm Island, so that this approach can be used to revitalize the native textures like of it. According to the perceptions and analyzes, it can be stated that the main objective of the vernacular architecture of Qeshm Island is to deal with the severe climatic conditions, taking into account 2 elements of performance-orientation and harmony with the climate including wind towers and open fretworks, each of which somehow carries out its performance in natural ventilation. Given the investigations conducted on wind towers and openings used in native houses, the native texture of Qeshm Island is generally composed of 6 different styles of ventilation performance in the implementation of wind tower, which also has very beautiful geometries with aesthetical performance and can create a more favorable temperature setting for users of the inner space in rooms where their wind catchers are implemented on either side of the room and on the side opposite of each other. As well as, in terms of climatic recognition, it can be found that, the more taking away from the sea, we are faced with the implementation of stepped houses or with a higher height wind towers that the structure serves to absorb winds by wind towers to be able to respond appropriately to the building users, and opening element also has functions such as a sustained helper for wind towers to absorb cool wind, repel hot wind and also for a high light failure that the most presence of openings can be in spaces, where the greatest human presence is understandable there, so that the most enjoyment and the presence of users throughout the day can be attributed to the living room with a 65% opening. The kitchen with 20% and the bedroom with 15%, after the living room space, enjoyed the most opening in the native houses of Qeshm. And with respect to the numerical results obtained from analyzes, it can be stated that the main purpose of the vernacular architecture of Qeshm Island is to deal with the severe climatic conditions, considering the 2 elements of performance-orientation and harmony with the climate including wind towers and openings, each of which somehow performs its function in natural ventilation. So that the climate of this hot and humid island, according to the findings obtained, has indoor temperature of 24.8 and outdoor temperature of 35.6 that these temperature differences are such as to say that wind towers and openings are a good natural ventilation for the climate of the island, as the wind towers with an height of 3 to 5 meters absorb the conditioned air and enter the interior space of the house and the hot air outs the other side.

The results of examining openings and wind towers used in native texture of Qeshm Island revealed that architects and users of buildings have been looking for performance and beauty in architecture and urbanization, indicating the thinking and reasoning of users and architects in the past, thus it is hoped that this research be so helpful to identify architects of sustainable patterns that have a long history, so that, based on which, a suitable model can be created according to the present situation.

Table 2. Example journal abbreviations (They are in italic just because they are journal's names)

Row	Sample climate	12/04/2016	15/04/2016	04/15/2016	04/15/2016	Average of temperature sample within 5 different days	Average of temperature sample within 5 different days in both interior and exterior spaces
1	Sample n. 2	18° C	20° C	22° C	24° C	20.8° C	24.8°C
2	Sample n. 3	19° C	20° C	21° C	21° C	20° C	
3	Sample n. 4	26° C	28° C	24° C	24° C	25° C	
4	Sample n. 5	28° C	28° C	29° C	31° C	29.2° C	
5	Sample n. 6	26° C	29° C	29° C	29° C	29.2° C	
6	Sample n. 1	41° C	40° C	44° C	44° C	38.8° C	42.1°C
7	Sample n. 7	48° C	47° C	41° C	49° C	45.4° C	

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