J. Basic. Appl. Sci. Res., 3(2s)12-19, 2013

ISSN 2090-4304
Journal of Basic and Applied Scientific Research
www.textroad.com

Identifying the Identity of Iranian Wind Catchers and their types

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Received: June 10 2013
Accepted: July 10 2013

ABSTRACT

The constituent elements of Islamic architecture can also be divided attributed to the presence in different geographical and climatic zones of Iran despite the diversity of how to create and different shapes which have different functions because of belonging to different spaces. Part of the main elements of Islamic architecture, particularly religious buildings are specific to mosques like minarets (Mazan) and dome, but other groups have a direct relationships with daily and living accommodation that water storages, refrigerators and wind catchers are more important among them, in addition to the hot and dry climate of central and southern parts of Iran which provide prone area to attend one of these elements that is a wind catcher. The present study seeks to classify Iranian wind catchers by using library studies and finally to consider different wind catchers in Iran according to their forming factors.
KEYWORDS: identifying, wind catcher, types, Iranian architecture

1. INTRODUCTION

Iranian wind catchers are important because of many factors including performance, construction practices, ornamental types and the impact on landscape, but two features can be outlined as more important ones: 1- construction practices and 2- performance. The number and diversity of wind catchers in hot and dry climate are so that they can be identified and classified according to the needs of each location and finance acquisition of makers. The use of wind catchers was has been common from inhibited islands of Persian Gulf to the cities in the central areas and almost in all the Iran longitude. Maintaining respect to this architectural culture, in addition to documentation and introducing them are the main goals of this research. Based on some assumptions, it is likely that all Iranian wind catchers follow a core structure. It also seems that Iranian wind catchers can be introduced in six categories based on performance and construction practices.

1. Terminology of Identity

The term "Hoviat" which is composed of "Ho + Yate» is an Arabic infinitive, which speaks about "ho" or "he" and the official response to the question "ما هو" means "what is it", so it can be translated as "what".

Identity in mystical sense means "God" and more mystics only know the identity as the being of God or the Divine Being. Wise mystic (Arabic Ibn and his disciples) know the identity including all levels of the manifestation of God from the universe of affairs to the universe of creation. Identity in a philosophical approach uses as the meaning of "existence". The third meaning of identity is "nature or dignity" which is laid on general understanding of it in addition to some philosophical approaches. So, what leads to the identification of the object forms its identity.

Regarding phenomenon, if the two main elements of the "existence" and "essence" are accepted, it can be said that the identity of a phenomenon totally makes the existence and nature of it apparent. Since (existence) of ordering of kinds, innateness and common human nature are considered as non-transformed, so what explains the different and uncommon points of identities are intentional and actual human nature (Noghre Kar, 2008, p. 54).

2. Recognizing sources of Islamic Identity in Architecture

In order to recognize Islamic identity in architecture and urban planning, it is necessary to consider and analyze the sources which made and must be the maker of this identity. What is meant by the "Islamic identity"? This identity is defined in the answer to two questions:

1-What principles and features can be considered by Islamic practical wisdom and teachings for both the individual living space and society?

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2 - What have been experienced and achieved by architecture and city construction in this field? The answer to the first question must be followed in these sources in order of its importance:

- Quran and Hadith of Innocents (AS) about the life space and orders and advises that are said about this matter.
- Works which have been made or accepted by the Infallibles (AS).
- The impressions and interpretations which scientists and artists had of these doctrines in the Islamic society.

Second question must be followed in these sources in order of its importance:
- Significant works and Construction which are considered as the achievements of Islamic civilization.
- The surviving writings of Muslim scholars in the field of basic and applied science and technology related to urban planning and architecture.
- Writings which somehow give awareness about buildings, architecture, and … such as travel, poetry and ... (Noghre Kar, 2008, p. 486).

3. Wind catcher and its background

Wind catcher, as its name implies, is a part of the fabric of buildings in warm and dry or warm and humid climates of Iran which has a significant impact on moderating temperature and delivering room temperature to a temperature of human comfort by direction of the wind and enjoying pure energy of nature. Wind catchers are glaring as vertical channels in the face of the old cities of these areas and are considered as the culmination of the city sky line after minarets. Wind catchers are channel which are placed over the summer staying of each house [that have been back to the sun and have been used in summer] and by having opening on its vertices which are in front of the favorable wind, direct the wind to this part of home (Mahmoodi, 2009, p. 17).

In fact, the main function of wind catchers is directing the air into the building, relatively making the air cool and establishing the natural flow of air at work and the place people live in different cities and parts. Wind catchers were also used in establishing air flow in public water storages and keeping water cool in these water storages. Iran is among the countries which have used wind catchers in different shapes and sizes based of the type of architecture and its climate, especially in the southern and border of the desert cities (Bahadori Nezhad and Dehghani, 2008, p. 3).

The more beautiful and useable type of them are in the surrounding of dry and burning plains, especially in the city of Kashan, Yazd, Tabas, Bam, Jahrom, and the coast of Arvand Rud and the Persian Gulf (Memarian, 2011, p. 538).

Wind catcher is one of the architectural elements which is constructed in domestic architecture of the warm and dry as well as warm and humid areas of Iran with a climatic approach and can be seen as a vertical channel in the face of some cities. Wind catchers architecture and their function, which were effective in the natural cooling of buildings in these areas, have been the genius of the architects who had a role in their design and construction. Wind catcher have been used in neighboring countries of Iran, especially Arabic countries in the Persian Gulf like Emirates that is fifty years old and also in North Africa such as Egypt (Mahmoodi and Mofidi, 2008, p. 26).

Wind catchers have been used in Iran from many days ago it seems that it is not a new phenomenon based on its ancient and diverse names such as Vatghar, Badhanj, Batkhan, Khyshud and Khyshkhan. Wind catcher has different types and has been constructed in different shapes based on wind and weather (climate) and wind direction across Iran (Memarian, 2011, p. 538).

Adoor band and Kowar are used for cooling residential areas in rural and temporary housing in normative. In Adoorband method, some thorn (adoor) are put on the bottom and external part of Kowar and a narrow river is dogged in its surrounding and it is tried to keep thorns wet and damp by pouring water on them and a window is placed where Adoor is put. So, the warm wind would bring cool air to the people who stay there after hitting with moist plants (Tajedini, 2003, p. 287).

4. Wind catchers' performance and their roles

Generally, wind catchers play three primary roles:

1- Converting the hot and raw air into cool and gentle air and creating cool.

2 - Converting dust and dirt air into clear, clean and bright air.

3-The role of making beautiful like traditional architecture of the region is generally an introverted architecture method and it did not consider landscape much and nothing was seen from outside except high clay walls and domed, clay or brick roofs. The existence of high and long wind catchers with pergolas filled with windows of colored glass and viewing give special beauty and glory to buildings, and basically, creating wind catchers on traditional, desert buildings have a perfect harmony with the architecture of the place (Tajedini, 2003, p. 287).

5. The background of wind catcher in Iran

Wind catcher is one of the masterpieces of Iranian architecture and the history and background of its use are unclear due to its position on the highest part of the building, or in other words, the first part which is exposed to destroying (Mahmoodi and Mofidi, 2008, p. 25).

Finding a detailed background of wind catchers is very hard because these structures were the highest part of the buildings and the first signs of damage can be seen on the roof, especially in wind catchers of every building (Mahmoodi, 2009, p. 21).

There is no accurate and comprehensive history and background of wind catchers. But what is certain is that their invention can be attributed to Iranians base on the familiarity of ancient Iranians with air flow characteristics and application of wind catchers. Rosenthal, in his study of the emergence and expansion of wind catchers believes that this structure has been invented in Iran and it was limited to the region of Mesopotamia in the Abbasid era. But, with addition to political and economic importance of Egypt during the Fatimid rule, it became common in that region (Bahadori Nezhad and Dehghani, 2008, p. 193).

Making wind catchers was common in the greatest Iran at least from the earliest periods of AH and it has been a common work to use this important element in architecture of the Iranian near and far lands, even to North Africa.

6. Types of Wind catchers

Wind catcher is an architectural element which has climate application and it has been considered from technical and engineering point of view, so, in classifying them, it is important to consider this fact that they are analyzing from which point. Due to the different perspectives in this field, it can be noted that critics and scholars have offered a variety of categories which will be considered.

Gholam Hossein Memarian divided wind catchers into two general categories according to their functional aspect:

"1- Purely functional wind catchers, 2- Functional-symbolic wind catchers. The first type can be seen more in general houses in Yazd and further around in Ardekan, Meibod, and etc. Wind catchers are made in one side and have their special shape in two mentioned cities. The second type can be seen in some houses of Yazd and cities around it which show the personality (importance) of the owner of the house in addition to its special performance. In these cases, the dimensions of wind catchers are also more than a three-door room" (Mahmoodi, 2009, p. 25).

Ali Asghar Shariat Zade classified them based on the local names of the ancient architects naming:

Wind catcher has three types:

1- Ardekani wind catcher

2- Kermani wind catcher

3- Yazdi wind catcher

1- Adekani wind catcher

This kind of wind catcher can be seen more in Ardekan and is in the direction of the Isfahani wind. It has no opening of West, East and South. The building of this kind of wind catcher is somewhat simpler and more economically affordable than other kinds of wind catchers, so, it can be possible to make one wind catcher for each room.

2- Kermani wind catcher

Kermani wind catcher is simple and almost humble and is for middle class to lower class families. Each builder can construct this kind of wind catchers and its main material is mostly mud. They are also called twin because this kind of wind catchers is two-sided. This kind of wind catchers are made in the direction of known wind. What this kind of wind catchers does is somewhat more accurate and ideal than Ardekani wind catchers because the air pressure to one side makes a quick evacuation of hot and infected air. Also, more wind catchers of water storages are made like Kermani wind catchers in order to reach fresh and favorable air to water from one side and bring out hot air from the other side.

3- Yazdi wind catcher

Yadi wind catcher in older than other kinds of wind catchers and is usually made in four sides. Therefore, this wind catcher is called "four-sided" or "four-directions" in some places. Certainly, its structure is more complex and more difficult than other kinds of wind catchers in architecture, so, it can be considered as the outstanding kind of architectural phenomenon. Its height is usually high. In addition, the height of wind catcher from the roof of the house and the source kinds from each side of wind catcher has a direct relationship with climatic situation of the

area. This kind of wind catcher is usually built for the rich and sometimes in the houses of middle class, rural and urban people (Shariat Zade, 1995, p. 225).

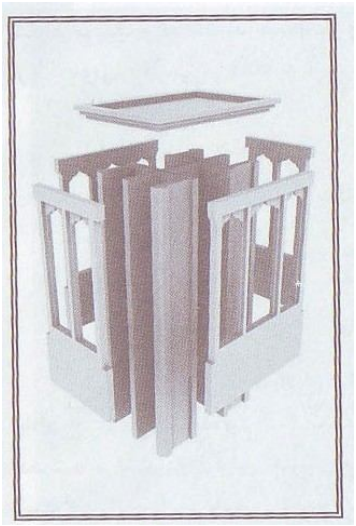

Figure 1. Yazdi wind catcher (Mahmoodi, 2009, p. 26).

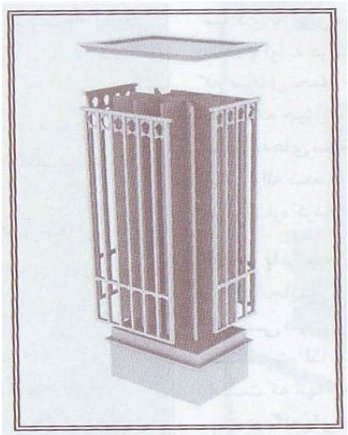

Figure 2. Yazdi wind catcher (Mahmoodi, 2009, p. 26)

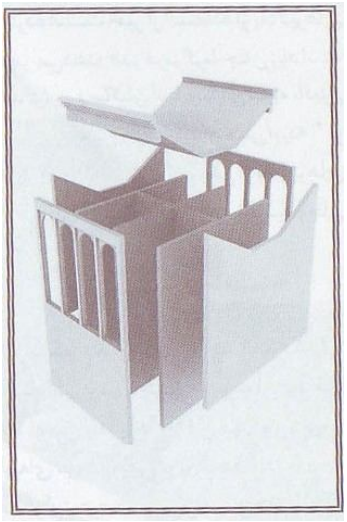

Figure 3. Kermani wind catcher (Mahmodi, 2009, p. 26)

Shariat Zade's classification has not been done according to the principles and the different kind he mentioned are limited to those cases which have been seen in three cities. What is important is to mention this point that the structure difference of these three kinds of buildings is due to climatic reasons as well as climatic differences and not due to different skills of architects of these cities or differences in their construction qualities and as what is said in the climatic part of wind catchers in Iran.

The best wind catcher classification is done by Ms. Roaf. She classified wind catchers based on the sides which receive wind by wind catcher. Ms. Roaf classification is as follows:

"1- One-sided wind catchers, 2- Two-sided wind catchers, 3- Wind catchers with diameter blades, 4- Four-sided wind catchers, 5- Six-sided or eight-sided wind catchers".

Three-sided wind catchers had not been mentioned in her classification because they are related to Yazd. Wind catchers with diameter blades which mean four-sided wind catchers with a square plan can be put in subcategories of four-sided wind catchers, so, the following classification can be provided according to mentioned points.

1- One-sided wind catchers

These wind catchers are faced to the North or North-West in Yazd except those that have been built over the water storages. They are often called "Kermani", especially if they have steep roof and one or two openings. These wind catchers are sometimes called with the latitude side which is faced to them, for instance, Northern. "22 Wind catchers of 713 wind catchers of Yazd which are considered by Roaf are of this kind. These types of wind catchers have often been seen over water storages or small homes".

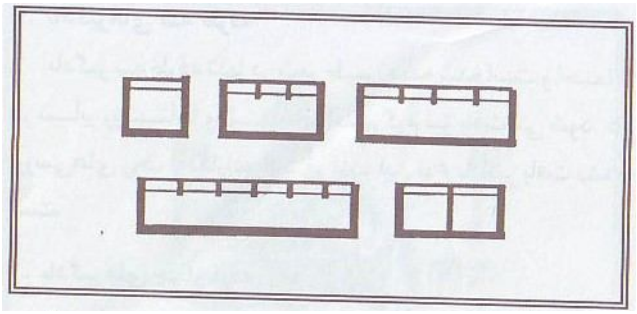

Figure 4. One plan sample of one-sided wind catchers in Iran (Mahyari, 1996, p. 58)

2- Two-sided wind catchers

This kind of wind catcher has a simple tip in which wind catcher channel is a vertical brick blade held with wooden beams is divided that is divided into two parts. "These wind catchers are often called with the side topic which are faced to them, for example, the North - South. 127 cases which were investigated by Roaf have been of this type, all of which were owned by the typical houses".

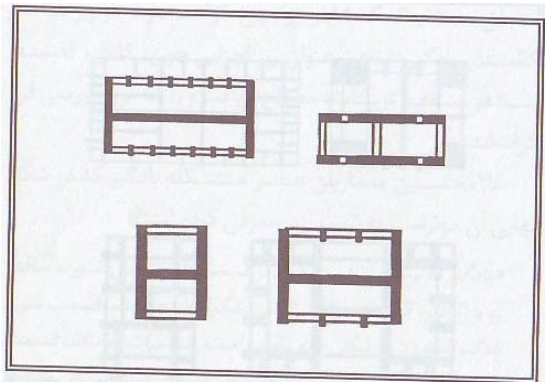

Figure 5. One sample plan of two-sided wind catchers in Iran (Mahyari, 1996, p. 59)

3- Three-sided wind catchers

Three-sided wind catchers have been only seen only in Tabas and it can be probably found in warm climatic cities. This kind of wind catcher have not been found in Roaf's and the author's considerations of Yazd.

4- Four-sided wind catchers

More than half of Iran's wind catchers are of this kind. They are called Yazdi wind catcher in terms of local architects. All wind catchers in south of Iran are of this kind. Four-sided wind catchers with blades are divided into the main channel. This kind of wind catcher can direct the wind which is flowing in each side associated with one of the channels. Four-sided wind catchers are designed and constructed with both square and rectangular plans. However, all wind catchers in South have been seen with square plans.

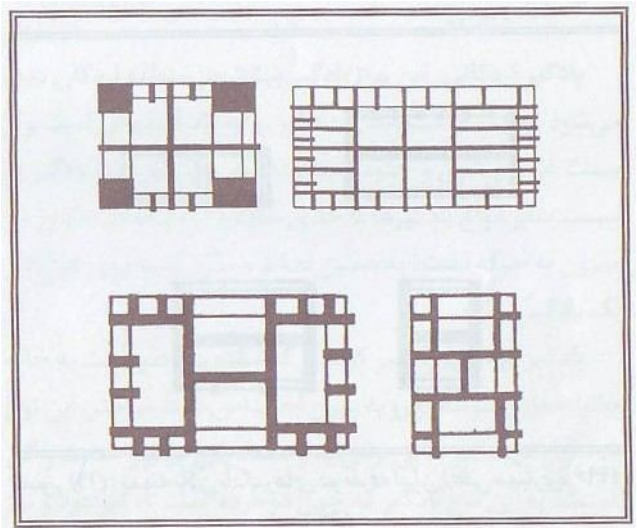

Figure 6. One plan sample of four0-sided wind catchers in Iran (Mahyari, 1996, p. 60)

5- Multi-sided wind catchers (hexagonal, octagonal or in circular shape)

This kind of wind catchers have been less seen in residential areas and are more constructed over water storages. They have the capability of receiving winds which are flowing in different sides due to existence of openings in every side of these wind catchers. The highest wind catcher of Yazd which is Dolat Abad Garden wind catcher is of eight-sided kind of wind catchers. Famous wind catchers of Yazd have eight-sided wind catchers like the wind catcher which is in Tal area.

Six-sided or eight-sided wind catchers with diameter blades are divided into smaller channels. Six-sided wind catcher has at least six separated channels and eight-sided wind catcher has at least eight channels. Only 20 wind catchers of wind catchers which have been considered by Roaf are of six-sided of eight-sided kinds.

Wind catchers with circle plans are of rare examples on Iran. The author has been seen only four wind catchers of this kind. The most prominent is a two-story wind catcher of Sarhang Abad garden of Ardestan in which both stories have been built with circular plans. Two give and take wind catchers of Kashan had also circle plans.

Wind catchers with circular plans are not likely to be built in Yazd; however, in the book "Iran architecture", Zomorshidi have a picture of a wind catcher which is constructed in recent 50 years and has four wind catchers in its surrounding and circular plans of these wind catchers evoke minaret and probably it have been built circularly because it looks like minaret. The major and minor blades of these wind catchers are along with the circle diameters.

6- Dome Shafts

The sample of this shaft which is known to all is dome shaft of Boroujerdi house in Kashan in which the creativity of the architecture in its forming has also made it the symbol of Kashan. What is explained in defining wind catcher in the presented book is about the existence of a channel which is placed in the surrounding of summer staying space, so, this kind of wind catchers are those pergolas which can be seen in the top of pool room which is attached to the wind catcher. Also, the shaft of Boroujerdi house is the developed form of pergola or circular holes of roofs in Iranian architecture which is placed near the wind catcher in order to complete the performance of wind catcher (Mahmoodi, 2009, p. 26).

Table 1. *The classification of wind catcher types based on different views of experts (the author)*

Exclusive Features	Wind Catcher Types	Division Base	Experts
One-side wind catchers in typical houses of Yazd and around it.	Purely Functional Wind Catchers	Applicable aspects of Wind Catcher	Gholam Hossein Memarian
They represent the characteristic of the homeowner in addition to its specific function. The dimensions of wind catcher are more than a 3*4 room.	Functional-symbolic wind catchers		
These wind catchers are relatively simple and affordable. They are mostly in Ardakan. The face of the wind catcher is to the Esfahani wind. There is one wind catcher in each room.	Ardakani	Local Names	Ali Asghar Shariat Zade
Simple and relatively modest wind catchers - Two-sided wind catchers(twins)- In the direction of known winds- Water storages wind catcher	Kermani		
Bigger wind catchers- Special for the rich- Four-sided (four directions)- high height	Yazdi		
Over water storages or small houses- They are called Kermani- Sometimes, they are called based on geographical side to which they are placed.	Multi-sided wind catchers	The number of sides which receive the wind	Roaf
Typical houses- They are called as the sides to which they are placed.	Two-sided wind catchers		
They have only been seen in Tabas.	Three-sided wind catchers		
Half of Iran wind catchers are four-sided. They are called Yazdi- They are wind catchers with square or rectangular plans.	Four-sided wind catchers		
They are over water storages- They are capable of receiving wind from different sides. They are pergolas that are attached to the wind catcher on top of the pool room.	Multi-sided wind catchers Domical shafts		

7- Typology of the Iranian wind catchers

Wind catchers can be classified and considered based on several factors:

1- The shape of the column section

The column or body of the wind catchers are called square, rectangular, hexagonal, or octagonal shapes (in some cases, circular section also has been observed.) Eight and four sides are more suitable for areas where have light and variable winds and there are the possibility of directing and using wind in different directions for the wind catcher. Also, rectangular columns are applicable in areas where the flowing side of the wind is from only one side in the warm season, usually from the southwest to the northeast. Rectangular columns in these areas would increase the wind catchers opening surface with wind.

2- The number and Types of wind catcher openings

Wind catchers are divided into two groups of one opening and four openings in terms of openings.

One-opening wind catchers are faced to mountains and often to the north-east and their roof are made like dome roofs in order to withstand a tornado.

Wind catchers are one-opening and in the shape of hoses in the coast of the Persian Gulf. The openings are faced to sea and flow humid wind which is raised from sea into the building. In Bandar Abbas, some have tried to dig water wells below these wind catchers in order to bring up the cold air of the dig and make more tolerable its interior space. Several wind catchers (double wind catchers) can be seen on houses and water storages of some homes like Yazd and Kashan. The number of wind catchers depends on largeness of water storages and sometimes are seven. The openings of double wind catchers face to different directions. Therefore, wind flows to inside of water storages from each side which is flown and is directed to outside from that or other wind catchers and the air flow is set. Thus, one or two columns do what the wind catcher does (blowing air) and one or other columns do what fans do. Architects call these kinds of wind catchers "give and take". Four-opening wind catchers are seen mostly in central cities and desert borders and they also increase the beauty and flaunt of general space of city in addition to their main application which is cooling the inside of the building. There are some four-opening and eight-fracture wind catchers in Minab and Qeshm that their interior divisions do the work of wind catcher (blowing) and fans at the same time and flow the air from inside of the building of water storages. One to eight wind catchers with four to eight openings are used on some large buildings, especially large water storages despite the high power of double wind catchers.

3- The number of wind catcher class

Two-class wind catcher is also one of the wind catcher types which is constructed in Iran. This kind of wind catcher is large and is built in areas where the direction of wind changed. Two classes of this wind catcher are built on the other and somewhat that the floor of the lower wind catcher is larger and the floor of the upper wind catcher is smaller.

4- The building of interior column

Columns were divided into diagonals with brick blades in order to direct fresh air to inside or the warm air to outside. In this case, with the arrival of wind from one opening, warm air is drawn out to the top of the wind catcher from other openings of wind catcher which are behind to wind direction (Bahadori Nezhad and Mofidi, 2008, p. 85).

Totally, wind catcher is seen with circular, hexagonal, octagonal, square and rectangular plans. Wind catcher with triangular form is not known in any area of the Middle East. Wind catcher with a circular plan is a rare kind in Iran (Mahmoodi and Mofidi, 2008, p. 85).

Wind catcher is sometimes four-sided or eight-sided and mostly in rectangular shape based on the direction of wind blowing. They are only seen like fans in the contrast side of wind direction of sea over the buildings in lands which are in the sea border.

Four-sided and eight-sided wind catchers are special for lands where in desirable air is flown from some directions and air is sometimes flown from north to south and sometimes from east to west especially in warm times. Rectangular wind catchers are made in lands where in the direction of wind is from one side and mostly from north-east to south-west in summer. Therefore, the large view of wind catcher is made exactly in front of it. Wind catchers are made only in front of one side which is north-east and other sides are closed in villages near or inside the desert in order to avoid tornadoes damages and heavy storms. These kinds of wind catchers are mostly like the openings which are faced to the mountains breeze and their roofs are made like dome roof in order to bring in the air and avoid damages against tornadoes.

Wind catchers are made like proboscis on roofs and back to the sea in Khoozestan and the Persian Gulf borders in order to draw out the warm air with the help of breeze which is flown on the sea full of fluctuations and go inside the house from wind catcher openings. The same method was also common in outside of Iran and in South borders of Rome like this that a network-like wall was made near houses that the sea wind direct to itself and in its way the inside of the house air and put fresh air instead of it. Double wind catcher was made in two sides of predominant places in some cities like Tehran and Kashan. The first rod does the work of catcher air and the second rod does the work of pulling air in these kinds of wind catchers (Memarian, 2011, p. 538).

Table 2. *Typology of Iranian wind catchers (the author)*

Exclusive features	Using areas	Types of wind catcher	Division Base
The possibility of directing and using wind in different sides for wind catcher.	Mild and various winds	Four-sided and eight-sided columns	The shape of column section
It increases the opening surface of wind catcher with wind- The large view of wind catcher is made exactly in front of wind blowing.	The direction of the wind is from one side and from North-east to South-west	Rectangular column	
Its roof is made like dome roof in order to withstand against heat.	Faced to the mountains and North-east	One-opening	The number and kinds of wind catcher openings
They increase the beauty and flaunt of the general space of the city in addition to their main application.	Central cities and desert borders	Four-opening	
Two classes of wind catcher are made somewhat that the lower floor of wind catcher in larger that the upper floor.	The direction of wind varies.	Two classes	The number of classes of wind catcher
Brick, diagonal blades for pulling fresh air to inside or pushing warm air to outside of the column.	The sea borders lands	-	The building of column inside

REFERENCES

1. Bahadori Nezhad, M. & Dehghani, A. R. (2008). "Wind catcher, the masterpiece of Iranian engineering". Yazda, Tehran.
2. Mahmoodi, M. (2009). "Wind catcher, the symbol of Iranian architecture". Yazda, Tehran.
3. Mahmoodi, M. & Mofidi, M. (2008). "Iranina identity of wind catcher and finding its background in Iranian architecture". Hoviat-e-Shahr, (2), Tehran.
4. Mahmoodi, M. & Mofidi, M. (2008). "Considering how wind catcher architectural plan affects the decrease in environmental temperature", Environmental Science and Technology, 1, Tehran.
5. Mahyari, A. (1996). "The Wind Catcher", Ph.D thises ; Sydney University ; Australia.
6. Memarian, Gh. (2011). "Iranian architecture". Soroush-e-Danesh, Tehran.
7. Noghre Kar, A. (2008). "An introduction to Islamic identity in architecture". Payam-e-Sima, Tehran.
8. Roaf, s. (1988). "The Wind Catcher of Yazd", Ph.D thesis ; Department of Architecture ; oxford polytechnic.
9. Shariat Zade, A. (1995). "Wind catcher role in southern area of Dasht-e-Kavir of Yazd". Proceedings of the Second International Congress of Iranian Architectural History and City Construction, 2, Kerman.
10. Tajedidni, H. (2003). "wind catcher and its role in Iranian desert and traditional architecture". Proceedings of the Second International Congress of Iranian Architectural History and City Construction, 5, Kerman.