Badgir (Wind-Catcher)

Environmental and natural phenomena play a very significant role in laying the region's interrelated cultural, economic and social infrastructures.

The buildings in the Iranian desert regions are constructed according to the specific climatic conditions and differ with those built in other climates. Due to lack of access to modern heating and cooling equipment in ancient times the architects were obliged to rely on natural energies to render the inside condition of the buildings pleasant.

In the past, without modern facilities, it was only the intelligent architecture of the buildings that enabled people to tolerate the hot summer. The ventilation structures called Badgirs were the most important means by which the interior was cooled. The wind-catcher operates according to the condition of the wind and sun radiation in the region. In ancient times and in traditional buildings in arid and dry regions the air trap functioned like the present modern air conditioning system.

Wind-catcher is like a chimney whose end is in the underground and the top is set over a specific height on the roof and were built at the entrance of the house over underground water reservoirs or ponds built inside the house.

The dry and warm wind will pass over a pond with a fountain gets cool and wet through evaporation. The Badgir's material again plays another role. Due to high fluctuation of temperature differences between day and night in this climate and night time coldness, Badgir which is made with mud-brick, gets cool by radiation and convection.

The system works, when there is no wind, but when wind is blowing this system does not have problems. Because during the day, if there is wind, then cool air flows faster and at night, with wind, it may absorb the heat of the walls, because the night wind is cool enough.

The wind-catcher has been used in Iran since early times, it is one to the special masterpieces of Iran's architecture and it is also the signs of predecessors' intelligence in agreement with the climate, you can consider it the most specific examples of clean energy. The most number of wind-catchers are in Iran; these wind-catchers are made in two areas: the hot and humid area in south (such as Lenghe Port) and the hot and dry area of central plateau (such as Yazd) wind-

catcher is a device with real/noble form and constant structure in Iran architecture, it leads the suitable wind through the inner part of the building and it is the most effective function in making comfort. There are actually two kinds of main functions about wind-catchers:

1 .The function according to the principle of traction of opening facing the wind and the suction of openings back against the wind.

"The way a wind-catcher works is mainly based on taking the fresh air into the building and sending the hot and polluted air out or" the suction functions" perhaps it is not so necessary to explain that when the wind hits against the walls of internal blades of the wind-catcher it necessarily falls down, but it is necessary to refer to this point that the other holes of the indcatcher turning back to the wind direction, gives the hot and polluted air into the wind and so works like a ventilation and a sucked machine (Pyrnia, 1981.(

The function of this kind of a wind-catcher is actually performed according to this fact that when the wind hits an obstacle, and since the density of the air is thick on the side of the wind direction, so in this direction there is a positive pressure, but a negative pressure on the other side. Therefore, when the ventilation is open on the sided of the wind there will be a positive pressure to a negative pressure. In the wind-chatchers, according to this principal, the opening facing the wind takes the e air into the porch and the air in the porch with its negative pressure on the opening back of the wind is drawn out (Fig. 1). Sometimes according to the superficial evaporation the wind-catcher supplies the necessary moisture by conveying the wind over the weather and the cold-storage.

2 .The function according to temperature difference. But it seems that there is a little attention of technicians about the function of a wind-catcher regarding the temperature difference. In fact when there is not a windy blast sensibly, the wind-catcher acts according to this action.

During the day, since the sun hits on the southern face of the wind catcher, the air heats in the southern face of the wind catcher, and goes up. This air taken above through the inner air of the porch is compensated and in fact it makes a kind of proportional vacuum inside the porch, and takes the cool air of the inner court into itself, so the existing air in the northern opening is pulled down too (Fig. 2.(

During the night it becomes cold outside, and the cold air moves down. This air is saved by the heat and becomes warm on parapets and then goes up. This circle continues till the temperature of the walls and outside temperature become equal. But before it usually arrives at this situation the night ends and once again the wind-catcher acts its function as mentioned above. In general, in most time, wind-catcher does as we explained it, in order to the traction, suction, and the effect of temperature difference.













