

Strategic Analysis of Capabilities and Dilemma to use Windward in Central Cities of Iran

Seyed Mostafa Mokhtabad-Amrei^a, Saeideh Bagheri rad^{b}, Masoud Valinejad shoubi^c*

^a Associate professor, Department of Literature, Faculty of art, Tarbiat Modares University, Tehran, Iran.

^b Young Researchers and Elite Club, East Tehran Branch, Islamic Azad University, Tehran, Iran.

^c Young Researchers and Elite Club, Central Tehran Branch, Islamic Azad University, Tehran, Iran.

Abstract

In new issues of durable architecture, it is tried to decrease negative effects of new architecture on environment. What is perfectly obvious is making the elements homogenous to their climatic function which was the art of our antecedents. Implementing the windward construction technique, our antecedents have well used the raw and uncontrolled flows of wind. They handled the wind and made it mild, remove the dust and created mild air-conditioning which represents the past environmental stability of Iranian architecture. Using the windward had been conventional in Iran since many years ago. Without any dependence on any kind of energy and without exploiting establishment appliances, it provides the coldness of residential places. This is the same issue on creating stability in environments where humans live in. In this research, the capabilities and limitations to use windward in salt desert's cities of Iran during today's age in were assessed to achieve some criteria quantitatively and qualitatively to enhance the windward and to provide the necessary ground for more efficient use of it. This research is of descriptive- analytical kind. Statistical population of this research includes university professors and architecture authorities in Iran. 30 persons of them were questioned directly. After survey data collection through the questionnaire, the relationships between research variables were tested by implementing swot technique. The obtained results suggest a windward in order to solve the weaknesses of previous air traps parallel to today's need. It indicates that giving the efficiency again to the windward's by creating some changes in it proportional to today's need of users and in order to enhance its efficiency, provides the conditions to achieve some parts of a sustainable architecture.

Key words: windward, swot technique, ventilation, durable architecture.

1- Introduction

Today, by development and expansion of science and technology, human society witnesses the creation and increasingly growth of available gap in close relationship between climate and architecture. While exploiting guidelines simply based on technology and without paying attention to the climate and environmental conditions of the region, the relationship between the climate and architecture was broken [1]. On the other hand, the crisis of lack of irremovable resources, destruction of natural ecosystems and increasing the pollutants, the risk of gap in ozone layer and etcetera, made human to think of stepping forward the sustainable architecture and development; a design which connects the human to the nature and architecture [2].

Sustainable development based on human consciousness is stable towards both itself and natural resources of earth planet. It desires a stable lifestyle for all humans and disagrees with excessive consumption and waste of resources as well as being careless about future generations and cutting the relationship with the past. On the other hand, sustainable development can technically be defined as a development direction in which welfare optimization for today generation doesn't result in decreasing the future welfare [3]. In discussion about durable development and subsequently; durable architecture, this has been changed into an evident matter that each building should have interaction with its surrounding environment and ground (each building should be compatible with its surrounding environment and ground).

* Corresponding author. Tell: +9891 91177980. saeideh.raad@gmail.com

The controversial and interesting part of this issue is the quality of interaction establishment and the kind of the considered policies [4].

Regarding the limitation of energy resources, it is several years when exploiting natural potentials in order to supply the requirements such as heat, cold and air-conditioning to create human welfare condition in residential places is addressed by architects. The most important sustainable principles are based on this same rule [5]. In fact, the criteria for appropriate designing for salt desert-located houses is to promote passive and natural systems; but low consumption and less dependency on high-consumption systems make the houses and villages more durable. There are some designing principles which can be followed for more enhancements of durable desert-located houses [6]. One of these designing principles is Iranian native architecture which was able to inject the stability blood into dried vessels of that area proportional to the needs and with different innovative elements and special elements of that environment in different climates. One of these elements which generate environmental stability in Iranian native architecture is windward [7]. Windward, as it is obvious from its name, is regarded as some part of body of buildings in hot and dry and/or hot and humid districts of Iran [8]. In fact, in addition to make the buildings beautiful, windward's have a very valuable role in the quality of ventilation of internal space of buildings and cooling the crypts and cisterns. They are towers which conduct natural air flow through some ducts which have usually been contrived towards pleasant winds of each land [9] into different buildings regarding their special building [10]. On the other hand, when no wind blows, the windward's have application for natural ventilation of residential buildings [11]. In a more comprehensive view, the wind ward can be know as a feedback from the region's natives against a factor named as wind to convert abnormal environmental factors into normal ones.

On one hand, the building industry is one of the most consuming sectors of developed and developing countries where are consuming the energy. A significant percentage of energy consumption in this sector is spent by cool, heat and air-conditioning system. The importance of using natural air-conditioning systems is reflected in fourteenth and nineteenth issues of Iran's national regulations for buildings. For example, the clause 14-4-3-1 of national regulations in Iran for buildings expresses: In each part of building spaces where is occupied by human and/or is under possession of human and it is possible to replace the required air through natural ventilation, air replacement (natural air-conditioning) should be predicted and mechanical ventilation is not necessary [8]. In this direction, the forgotten guidelines in designing durable residential environment should be identified and they should be used in designing durable buildings by updating them with regard to the available technologies. Today, the architecture of salt desert-located cities is increasingly becoming far from their natural and desired situation. This necessitates seeking for some guidelines to contrast against the available undesired procedure and to reform the undesired consequences of anatomical intervention in these cities such that it can realize durable development of the city. The study of Iranian traditional architecture characteristics can be at service of planning, designing and publicization of today's life environment [12]. The windward's which have been designed by climatic approach are known as a cold system [8]. Therefore, giving renewed efficiency to the windward's provides the conditions to achieve some parts of a sustainable architecture. But direct using of the past solutions is not possible and correct and some changes should be created in them in order to enhance the efficiency proportional to today's need. This system should be evolved such that its efficiency should be improved and it should be responsive to more numbers of story's [2]. Since the strengths and weaknesses of a building have direct effect on the world's ecology, very sensitive responsibility in this respect is assumed by the architects [12].

According to this, the selection of this research topic is an attempt to start an issue which it is hoped to be continued and be a step to save our contemporary urbanization and architecture from this anxiety and instability. Therefore; in this article, it is attempted studying on the characteristics of wind ward in terms of sustainability regarding positive and adjustable points of today's life style and exploiting the advantages of technology in designing residential environment, to provide an opportunity to take further steps in direction of sustainable development to continue the above-mentioned procedure and to accommodate and combine into present time conditions.

2- Background of windward in Iran and the world

Primary concept looking like the windward can be known as simple opening valves on the tents of primitives in Sri Lanka. There is a small opening above the tent which is able to conduct the air flow to the centre of tent (figure 1).

The performed researches on historical record of windward in the world date definitely back to before Christ. In Egyptian maps belonging to 1500 B.C which are drawn. Two triangular windward's are observed in these maps which are placed on luxurious house belonging to new king. In historical texts, it was pointed out that there was a windward with two wind receivers behind royal all of Babel (600 B.C) (figure 2). On the other hand, Me soda, famous archeologist, after two excavations of flint hill during the years 1971 and 1973, expresses in a report in 1984, "The first historical document about Iran's wind wards dates back to fourth millennium B.C. A simple example of it was found in Iran by one of Japanese archeological boards in a house in flint hill located at 8km north Shahroud and in southern slopes of Elburz mountain chain on north-east of Iran."

This important matter can be a reason for Iranian people's claim about the invention of windward in the world since there is no such a history for using the windward all over the Middle East.

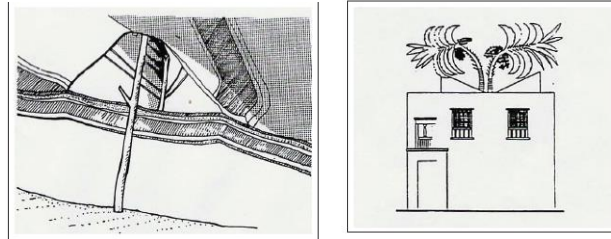


Figure 1-(left) Primary idea to implement tent (veil) and wood to trap the wind and ventilation of tents.

Figure 2-(right) The found image on the papyrus in the grave of new kingdom of Egypt related to 3222- 1580 B.C.

But in respect of using the windward by Iranian people before Arabian people, it can definitely be emphasized on this matter and two reasons for this claim are enough. First, in Arabic old poems which are presented in poem part, the words "Bad hanj", "Bad ahanj" and "Baz hanj" are used which these vocabularies are Persian. Regarding the application of Persian word for this structure, the method of its construction has reached beyond Persian Gulf waters from Iran. Second, Emirates' windward's are located at Bostak district where is Iranian-dwelling district of Emirates where Iranian people were the first residents of it. Therefore, it can be indicated that Iranian people were inspiration source of other countries in respect of designing the windward like other inventions in the architecture area [8].

3- Kinds of windward

Windward's have various structures with the same performance. Structural differences of windward's have stemmed from climatic needs and evolution of architecture. Studying the structure of wind wards, they can be divided into three groups which are as follows:

- Ardakani windward is more observed in Ardakan district in which the directions of windward's openings are towards the pleasant wind of Isfahan. It has no opening at west, east and south directions. The structure of these windward's is simple and it is cost- effective economically.
- Kerman windward's are almost small and simple in terms of architecture. Since they are bilateral, they are called as twin wind wards. The function of these wind wards is more precise compared to Ardakani wind wards since wind pressure from one side causes fast discharge of hot and polluted air from the other side. Meanwhile, the windward's of most water reservoirs are built of Kermani kind.
- Yazd windward's is larger than other windward. It is usually built quadrilateral and its height is high [10].

Regarding the direction of wind blowing, the windward's have quadrilateral, octagonal and often rectangular ground. Some times, on seaside, they are observed just as an air vent at the opposite direction of sea wind blowing [13].

4-windwards performance approach

As it is obvious in figure3, a windward is consisted of three main parts including windward head, windward column and conducting knee- joints. Day & night performance of windward when wind speed is zero: At night, because of lowering environment temperature and thermal radiation from the surface of external walls of windward to the sky, some cold energy is stored in the mass of windward building.

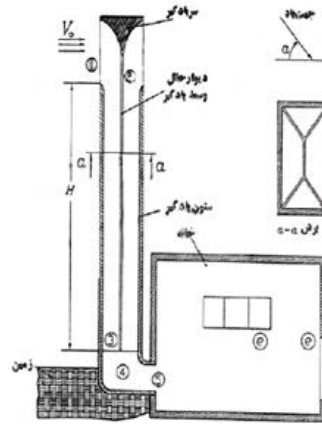


Figure 3- A profile of windward.

During initial hours of the next morning, some air is entered the building due to floating power. At evening, because of warming windward's walls, air density inside the windward column decreases compared to the density of environment air. In effect of this density difference, the air is conducted in the environment from inside the windward. Due to sun radiation during day time, the temperature of windward's walls increases and the air inside the column becomes lighter than the environment air. Therefore, the air inside the building is conducted to the environment through the windward. In fact, the windward acts like a chimney in this state.

The performance of windward when the wind blows at an appropriate speed: when the wind blows, cool air enters the building through the windward, itself at night. Early in the morning, the air becomes cool by passing through the windward column which has stored some old energy into itself during last night. During day, the air enters the building by some changes in temperature [10].

5- Materials and Methods and statistical population

In this research, we collected data and desired subjects by two library and survey methods (interview- observation – questionnaire). Statistical population of this research includes architecture professors, experts and authorities. Implementing the questionnaire tool, 30 samples were questioned directly. Regarding lack of data resources, a questionnaire was compiled by help of documental studies and referring to architecture professors and achieving information. Each of internal and external factors determined in the questionnaire was given a value and/or coefficient [from 1: very low to 5: very high]. Also, each of the factors or parameters was ranked from 1 through 4 based on their value level from the view of architecture experts. Their R_j coefficients were determined. Completing the questionnaires by samples of the desired statistical population who were 30 persons, the deficits were removed to some extent. Finally, the collected data was processed and analyzed using swot technique.

5.1. swot technique

This technique is a tool to recognize the available threats and opportunities in the external environment of a system and to identify its internal weaknesses and strengths in order to assess the situation and to compile a strategy to conduct and control the system. General goal of swot analysis is to identify that category of internal and external factors which are important to achieve the goals. Therefore, in this method, the data is divided into two following key groups:

- Internal factors (strengths and weaknesses).
- External factors (opportunities and threats).

Table1. Calculation method for matrix to evaluate strategically factors

| Parameter | Primary Coefficient | Weight Mean | Rank | Final Value or Coefficient |
|---|-----------------------------|--------------------------------------|---|---|
| Points: Strengths, Weaknesses, Opportunities, Threats | $Z_i = \sum_{j=1}^n a_{ij}$ | $M_i = \frac{Z_j}{\sum_{j=1}^n Z_j}$ | $R_j = \frac{1}{n} \sum_{i=1}^n b_{ij}$ | $A_j = \frac{Z_j}{\sum_{j=1}^n Z_j} \times R_j$ |

Now, according to these factors and at the same time; final coefficient, we determine four kinds of different strategies (aggressive, defensive, competitive, conservative) as a combination of internal and external factors for the studied topic. In this way, swot comparative matrix can be drawn. Finally, using final value of each of these four factors, we determine a matrix which expresses the kind of the determined strategies and in what direction they are determined. Regarding the strategies, practical guidelines are deduced.

Table 2. SWOT Comparative Matrix

| | | |
|-------------------|------------------------------|-----------------------------|
| | Strengths (S) | Weaknesses (W) |
| Opportunities (O) | Aggressive strategies (SO) | Competitive strategies (WO) |
| Threats (T) | Conservative strategies (ST) | Defensive strategies (WT) |

6- Analysis of findings by swot model (strength- weakness- opportunity- threat)

After survey observations and studies and the obtained ideas from architecture authorities and experts; internal factors (strengths and weaknesses) and external factors (opportunities and threats) which are effective on windward's in Iran's cities are listed as follows.

Table 3. The approach of strategic factors in using the windward in central cities of Iran by SWOT technique

| Strengths | Weaknesses |
|---|--|
| Impossibility of controlling the amount of input air and the amount of humidity and coldness resulted from it. | Window as the available solution to tolerate hard climatic conditions of hot and dry region (use of clean and durable energy and creation of an association between the human and nature). |
| Entering the birds, harmful insect and animals through the windward. | Creating coldness and increasing relative humidity in dry region. |
| Lowering the efficiency of windward when the wind speed decreases. | Using indigenous building materials to construct the windward and decreasing the construction costs. |
| Penetration of dust through windward channel into the residential space. | Decreasing the costs in terms of the consumption of fossil energies. |
| Ascending the hot air outside the house through the windward duct at cold nights of the year. | The possibility for designing the windward with any direction of building towards the dominant wind of city and each kind of plan is differently possible. |
| Being located at the highest part of the building and pre-mature destruction resulted from it. | |
| The existence of variety in the kind and performance of windward and unawareness of appropriate use of each kind of windward based on its position. | |
| Producing warm wind by traditional windward in the afternoon up to midnight and the residents need coldness. | |

Table 4. the approach of strategic factors in using the windward in central cities of Iran by SWOT technique

| Opportunities | Threats |
|--|---|
| Inclination and need of world's people in clean energy | Inclination in using new technologies such as cooler, split. |
| The absence of specialists and weakness in respect of performance under current condition. | Helping increase in tourism and attraction (absorption) of tourists. |
| Keeping distance from the form of past plans (change in the form of plans) and inclining towards apartments homogenous with the environment and special climatic designing to decrease energy consumption. | Trying to decrease negative effects of modern architecture and accommodation of architecture with the nature and surrounding environment by implementing environment by implementing matter and building materials. |
| Lack of necessary training to convey the knowledge of windward construction in academic centers. | Suitability of environmental conditions of central cities of Iran for using the windward. |
| Lack of inclination of architecture specialists and engineers to implement the windward. | |
| Increasing air pollution in the cities because of consumption of fossil fuels. | |
| Reducing enough information in respect of the benefits and advantages to implement the windward to decrease the energy consumption. | |
| Urbanization and increase in the number of story and population. | |

As it was mentioned in tables 3 and 4, 8 strengths against 8 weaknesses as well as 4 external opportunities against 8 external threats were identified. In this way, 9 strengths and opportunities as the advantages and 16 weaknesses and

threats as dilemmas and limitations are recognized and used for use of windward in central cities of Iran. However, in a simple summation and analysis, it can be expressed that use of windward is developed by a slight planning.

6-1- Analysis of table of evaluation matrix for strategic factors:

The results of tables 5, 6, 7 and 8 were obtained by evaluation of the questionnaire which was regulated based on strategic factors related to the capabilities and dilemmas of using the windward in central cities of Iran and it was completed by statistical samples. Finally, four aggressive, defensive, competitive and conservative strategic were studied and by their comparisons, some guidelines were presented to eliminate and/or decrease the weaknesses and threats and increasingly exploitation of opportunities and strengths to exploit these points for planning to use the windward in central cities of Iran.

Table 5. Evaluation matrix of strategic factors-strengths

| Parameters (Factors) | Primary coefficient | Weight mean | rank | Final coefficient |
|--|---------------------|-------------|------|-------------------|
| The windward as the available solution to tolerate hard climatic conditions of hot and dry regions (using clean and sustainable energy and creation of relationship between human and the nature). | 110 | 0.207 | 3.5 | 0.724 |
| Producing coldness and increasing relative humidity in dry region. | 111 | 0.209 | 4 | 0.836 |
| Using indigenous building materials to construct the windward and to decrease construction costs. | 109 | 0.205 | 4 | 0.82 |
| Decreasing the costs in terms of consumption of fossil energies. | 113 | 0.212 | 3 | 0.636 |
| The possibility of designing the windward with any direction of building towards the dominant wind of city and any kind of plan is differently possible. | 89 | 0.167 | 3.5 | 0.584 |
| Total | 532 | 1 | | 3.6 |

Table 6. Evaluation matrix of strategic factors-weaknesses

| Parameters (Factors) | Primary coefficient | Weight mean | rank | Final coefficient |
|---|---------------------|-------------|------|-------------------|
| Unavailability to control the input air and levels of humidity and coldness resulted from it. | 92 | 0.123 | 4 | 0.492 |
| Entering the birds, harmful insects, and animals through the windward. | 98 | 0.131 | 3.25 | 0.425 |
| Lowering the efficiency of windward when the wind speed decreases. | 100 | 0.134 | 3.25 | 0.435 |
| Penetration of dust through windward channel into the residential space. | 97 | 0.129 | 3 | 0.387 |
| Ascending the hot air outside the house through the windward duct at cold nights of the year. | 89 | 0.119 | 4 | 0.476 |
| Being located at the highest part of the building and pre-mature destruction resulted from it. | 84 | 0.112 | 3.25 | 0.392 |
| The existence of variety in the kind and performance of windward and unawareness of appropriate use of each kind of windward based on its position. | 98 | 0.131 | 4 | 0.524 |
| Producing hot wind by traditional windward in the afternoon up to midnight, the residents need coldness. | 91 | 0.121 | 3 | 0.363 |
| Total | 749 | 1 | | 3.494 |

Table 7. Evaluation matrix of strategic factors-opportunities

| Parameters (Factors) | Primary coefficient | Weight mean | rank | Final coefficient |
|--|---------------------|-------------|------|-------------------|
| Inclination and need of world people in clean energy. | 129 | 0.277 | 4 | 1.108 |
| Helping the increase in tourism and absorption of tourists. | 112 | 0.241 | 4 | 0.964 |
| Trying to decrease negative effects of modern architecture and accommodation of architecture with the nature and surrounding environment by implementing matters and building materials homogenous with the environment and special climatic designing to decrease energy consumption. | 107 | 0.230 | 3.75 | 0.862 |
| Suitability of environmental conditions of central cities of Iran to use the windward. | 117 | 0.252 | 4 | 1.008 |
| Total | 465 | 1 | | 3.942 |

Table 8. Evaluation matrix of strategic factors-Threats

| Parameters (Factors) | Primary | Weight | rank | Final |
|----------------------|---------|--------|------|-------|
|----------------------|---------|--------|------|-------|

| | coefficient | mean | | coefficient |
|---|-------------|-------|------|-------------|
| Inclination in using new technologies such as cooler, split. | 115 | 0.128 | 3.5 | 0.448 |
| The absence of specialist and weakness in performance under current condition. | 112 | 0.124 | 3.75 | 0.465 |
| Keeping distance from the form of past plans (change in the form of plans) and inclination in living in apartments. | 115 | 0.128 | 4 | 0.512 |
| Lack of necessary training to transfer the knowledge for windward construction in academic centers. | 113 | 0.125 | 3.25 | 0.406 |
| Lack of inclination of architecture engineers and specialists to implement the windward. | 97 | 0.107 | 3.25 | 0.347 |
| Increasing air pollution in the cities because of consumption of fossil fuels. | 116 | 0.129 | 3.75 | 0.483 |
| Lowering enough information in respect of the benefits and advantages to implement the windward to decrease energy consumption. | 117 | 0.130 | 3.75 | 0.487 |
| Urbanization and increasing the number of floors and population. | 116 | 0.129 | 4 | 0.516 |
| Total | 901 | 1 | | 3.664 |

Studying the matrix to evaluate the strengths and weaknesses and according to the value level or final coefficient of each parameter, it is concluded that generally, strengths with final value of 3.6 are superior than weaknesses with final value of 3.4 , 4.

It is deduced that windward’s enjoy high capacity for re-implementation. Also, superiority of opportunities with final value of 3.942 over the threats with final value of 3.664 represents the sensitive role of management in planning and performance of appropriate designs to use the windward’s.

6-2- Analysis of the diagram of evaluation matrix of strategic factors:

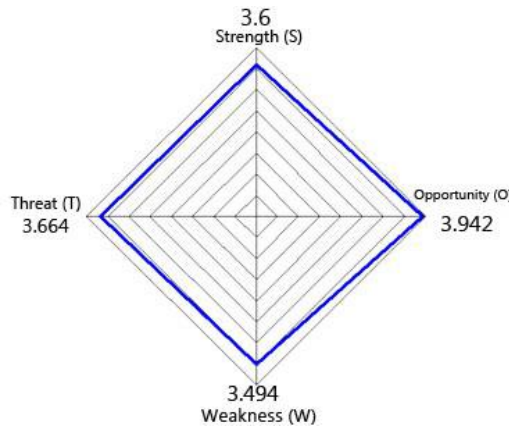


Figure 4. Evaluation matrix of strategic factors Swot (strength- weakness- opportunity- threat)

Analyzing the diagram of evaluation matrix of strategic factors (figure4), the following guidelines are suggested to improve the available conditions of using windward’s in central cities of Iran.

Table 9. Developmental guidelines for using the windward in central of Iran.

| Aggressive Guidelines (SO) | Competitive Guidelines (WO) |
|---|---|
| 1. Organization and restoration of the available historical windward to attract tourists and to create motivation in native people of the region to implement the windward again. | 1. Desired use of windward modified for responsiveness against the need of word people in clean and durable energy. |
| 2. Installation of some openings at the end of windward structure both to regulate the entrance air level and to close the openings during cold seasons of the year. | 2. Supporting the construction and use of windward due to low cost and creating no pollution in order for non-dependence on fossil fuel and coordination with the nature. |
| 3. Organization and restoration of the available historical windward to attract tourists and to create motivation in people to implement the windward again. | 3. Edition and publication of book and scientific conferences to increase the awareness of construction actors and public about the identity and advantage of windward. |
| Conservative Strategies (ST) | Defensive Strategies (WT) |
| 1. Contriving an appropriate filter to prevent the entrance of dusts and insects. | 1. Using the windward to decrease the use of mechanical establishments. |
| 2. Resolving the problem of decreasing the wind speed resulted | Encouragement and attraction of investors for investment on the |

| | |
|---|---|
| from the disturbance by changes and conversions in the windward entrance by installation of curved edge up to 40%. | construction of projects in which the windward has been used to decrease the costs. |
| 3. Creating appropriate changes and modifications in the windward and preparing a complete series of maps including different kinds of modified windward. | 3. Using the windward in state places to create the motivation to implement it in private building. |
| 4. Increasing the windward height to decrease the humidity when wind speed reduces. | 4. Holding technique-training courses for windward construction for their renewal. |
| 5. Reinforcement of the windward structure to prevent its destruction. | 5. Using the windward as the supplement of air-conditioning and coldness system of the building. |

7- Using the windward is present

Environment protection Agency (EPA) reports in 2006, UN enough ventilation can increase the level of inside pollutants by lack of enough transfer of fresh air from the outside and lack of dilution of disseminating the pollutants of inside air towards outside the building [14].The suitable ventilation and regulation of air quality inside a space is a necessary need to ensure a safe and comfortable life for human [15]. Since 60 through (to) 90 percent of people’s time is spent inside the building; therefore, if there are inappropriate ventilation and weak and bad quality of air inside the building, it is resulted in respiratory diseases, allergies, asthma, building syndrome [18]. It has a direct effect on mental performance and working efficiency of the residents [15].

Nowadays, while there are complexity and uncertainty, air- conditioning systems should provide the desired thermal conditions in the building. In most today’s air- conditioning systems, on/off controllers and/or PID controller in more advanced kinds are used. Regarding different environmental conditions, they are not able to supply the desired environmental conditions in addition to not being optimal [16]. Therefore, regarding the importance of powers used in the building which is estimated about 40% of total consumed energy in the world which a great part of it is devoted to the ventilation and air- conditioning of the building, the issue of using natural air- conditioning is proposed by newly posing different strategies for energy optimization as well as using the available potentials in the building’s space [17]. If natural ventilation is used; in addition to decrease the costs resulted from the consumed energies, initial costs to produce unnecessary mechanical equipments can also be prevented.

According to what is said; today, natural air-conditioning systems such as windward’s are used in different performance such as residential official, service spaces, etc. to enhance the quality of internal air. On the other hand, advancing the science and technology and creating new innovations and inventions, it is tried to remove the deficits and weaknesses of traditional windward’s proportional to the used place. In the following, regarding the weaknesses expressed in the previous sections, we suggest a windward which creates a good air- conditioning in the given space in addition to producing the electricity power.

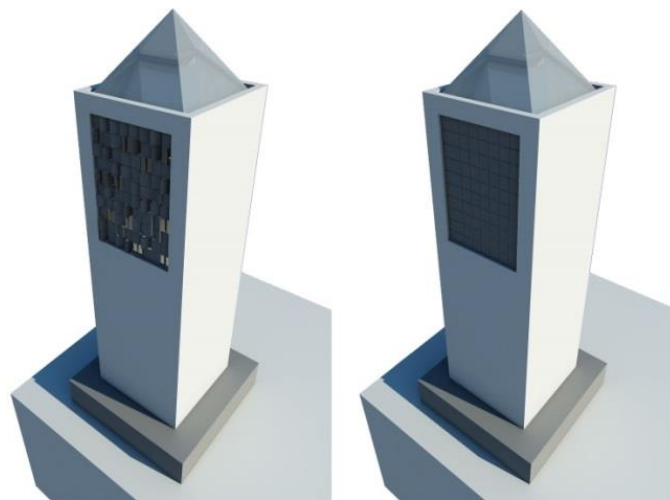


Figure 4: A view of the proposed wind

Some of deficits proposed in using traditional windward’s include: entering the birds and harmful insects and lack of controlling the entrance air into the building (table 3). The guideline presented to solve this problem is to use small mobile panels on the input and output places of wind (Figure 5, No.3). These panels are placed along each other in

several rows; each panel began to move with the slightest wind. Each of these panels rotates around an armature winder- magnet axis. At the same time, it will produce electricity power. The produced electricity is saved and will be consumed in the desired space. The magnets are controllable by the user by control switch. If necessary, all the panels remain fixed and are latched together. In this way, the amount of the entrance air inside the windward is controlled. Whenever there is no need in ventilation, the ventilation can be stopped by closing this opening. On the other hand, the possibility of entering the birds is removed because of certain placement of openings and valves. The movement of panels and their latching procedure are represented in figure 4.

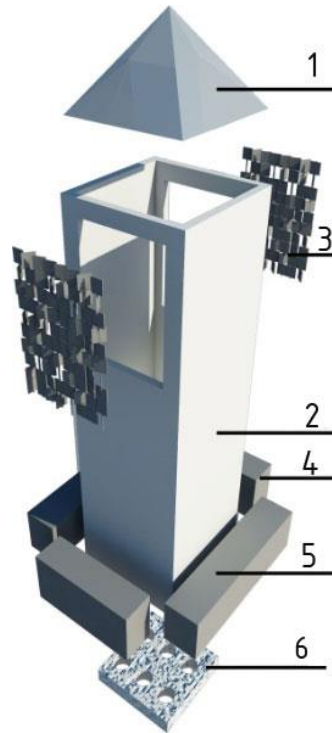


Figure 5: Various components of the proposed wind

In this windward, a pyramid- shaped mass is used as parasol (Figure 5, No.1). The goal of placing this canopy is not to supply the light for the space but the goal is to use thermal energy of the sun to create artificial ventilation and to use that heat during the necessary times. Sunlight is entered the windward channel by this pyramid (Figure 5, No.2) and heats the air inside this channel. In the first step, this hot air can be used during cold seasons of the year by blowing towards internal space. In the second step, this hot air can be used as a stimulus for ventilation of internal space whenever there is no wind such that when the air inside the channel is heated, it moves up and creates suction in the bottom during moving up which conducts the air of internal space towards the windward channel. One air of deficits expressed about traditional windward is to produce hot wind by traditional windward's in the afternoon up to midnight when the residents need coldness (Table 3). To solve this problem in the proposed windward, a series of porous materials with high capacity of special heat is used where the air enters internal space which become moderately wet by water drops at appropriate time (Figure 5, No.6) The desired water is supplied by a reservoir at bottom part of the windward channel and is sprayed on the porous materials by thin pipes (Figure 5, No.5).The air flow misses its high temperature during passing through this section of windward and becomes cool significantly. Following this, the cool air can be entered the space. In addition to reach the welfare temperature, a desired and natural cool air flow can be created and the dust is separated from the wind. During cold seasons of the year when the windward is not used because of conduct of cold air, electrical heaters are used in the proposed windward's to enhance the air temperature during entering internal space (Figure 5, No.4). The above- mentioned heater conveys the heat by heating the porous mass.

The opening of this windward is place in two sides. Whenever the goal is to enter the wind inside the space, this is performed by closing the opening located in back of the wind. Whenever the goal is to exit the wind from internal space, this will be performed by closing the opening in the opposite of the wind. Sun heat and wind's behavioral diagram is represented in the following figure.

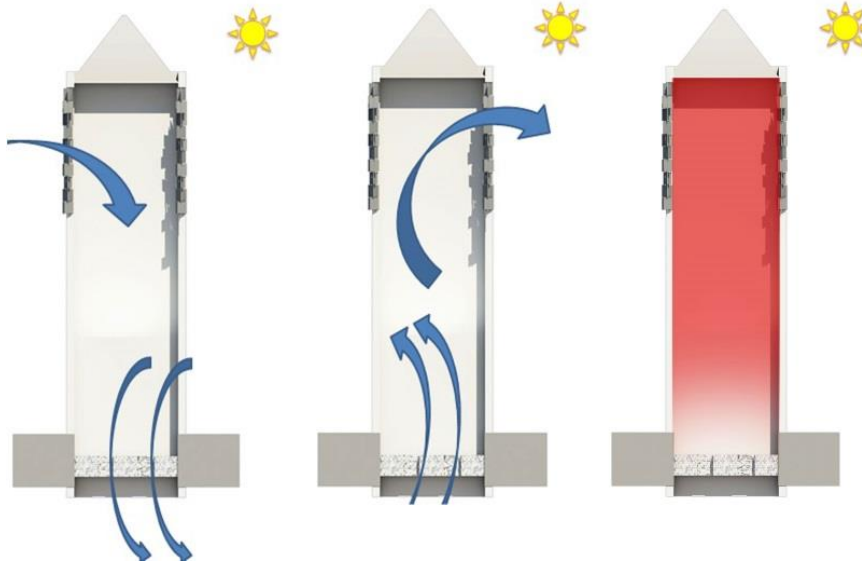


Figure 5: Wind direction at different positions

Conclusion:

During the history, native people of each region could achieve some efficient patterns compatible with their life place using test & error. These patterns are compiled to enhance life quality and to supply welfare conditions for native people of each region. Although these patterns have reduced a great part of ecological problems; regarding the existence of technology and development of sciences, there are procedural problems in some of these patterns. Regarding durability issues; today, creating some programs to produce the architecture compatible to the climate has been changed into a necessary and undeniable matter. Since air-conditioning systems have devoted a great part of the consumed energy of the building to themselves; therefore, the development of traditional and sustainable approaches to create natural ventilation in the building has been changed into a required matter. One of the most prominent cases of these methods is to use the windward. Like other traditional methods, traditional windward's had some deficits and dived vantages. For using them in today buildings, some guidelines should be arranged to fulfill these deficits.

The present research examined the deficits expressed about the windward. Introducing a proposed example, it tries to show how each of these problems can be solved. This method can be efficient and applicable for other patterns. Finally, it can be said that regarding native people of hot & dry and hot & humid cities used the windward to fulfill their need and for ventilation of their houses from far past as well as significant advancements which are shaped in respect of quality improvement of this Iranian element all over the world; changing their policies to enhance the structure and performance of windward and re-implementation of this architecture element to response increasingly demands during future years for the necessity of considering the use of clean and durable energies in relation to compile and administer the rules and regulations to modify the windward's, the authorities should regard the necessary measures in the related plans. In order to improve the quality of windward and to achieve the maximum efficiency, it is necessary to pay attention to architecture considerations proportional to the performance. At present, by strategic planning's on the available opportunities and strengths in the region and reducing the weaknesses and threats, this architecture element can be revived for ventilation in the region by aggressive strategy. It causes to use clean and durable energy, to create the relationship between human and the nature, to decrease the costs and consumption of fossil energies, The strategies in table 9 and the guidelines presented to solve the problems of windward's in today samples can be regarded as an appropriate solution to develop the windward application in hot & dry and hot & humid regions, such that removing the studied deficits and faults, the designers and architects can achieve an appropriate, efficient design proportional to today's architecture.

References

- [1]. Elahi Shervin. Wind symbol of sustainable architecture in hot and dry climates, *First National Conference on Development*. 2011, 1 .
- [2]. Abna H., Aghayee chatrouzadeh. Enjoying some old models of sustainable architecture by modifying and combining them with a chimney, solar vents. *Conference facilities, roads, architecture*. 2011,1.
- [3].Zahedi SH., Najafi GH. The Concept of Sustainable Development. *Professor of Humanities Quarterly*, Volume 10. 2006, 50.
- [4]. Zandiyeh M., Parvadinejad S. Concepts of sustainable development in residential architecture, *Journal of architecture and environment of rural housing*. 2010, 2-21.
- [5]. Ramezani Gourayee., kazemnejad. The relationship between sustainable development and environmental architecture and design climate in mountainous areas, Case Study: Town village, the journal of preparation of a geographic area, Number 14. 2010, 21-38.
- [6]. Banayn M. Place of residence to the wilderness of the desert community of homes Sustainability, University of Arizona. Publication, education, geography, Period of twenty-third. 2008, 34-40.
- [7]. Soltani Y., Torabi D. Wind indigenous architectural symbol of stability. *The Second International Conference on Sustainable Architecture*. 2011, 1.
- [8]. Mahmoudi M. Iranian identity deflector and architectural history of the issue, *the Journal of Identity*, Vol II, No. 2. 2008, 25-33.
- [10]. Mazidi M. Numerical analysis of wind towers as passive cooling systems in hot and dry areas, J[9]. Parinaz Keshtkaran, , Harmonization between climate and architecture in vernacular heritage: a case study in Yazd, Iran, *International Conferene on Green Buildings and Sustainable Cities*, Procardia Engineering 21, 2011, 428-438.
- ournal of Energy*, Vol 11, Issue 28, 2008, 39-46
- [11]. Johnson V. Climate and architecture (with emphasis on the traditional architecture of the Middle East). Translate Neo-Majid Habibi smiling, *Geographical Research Quarterly*, No. 46, 1997, 154-159.
- [12]. Mellatparast M. Sustainable Architecture in the desert towns. *Journal of Armanshahr*. No. 3, 2009, 121-128
- [13]. Pirneya M. Islamic Architecture. *Soroush Publications*. 2008, 332.
- [14]. Mohammadi M. Hvajryan windows, new ideas for resolving the conflict between ventilation and thermal insulation in buildings shells, *International Conference of Tabriz*. 2013.
- [15]. N.A Ahmad, K.Wong panyathaworn,. Optimizing louver location to improve indoor thermal comfort based on natural ventilation, *Evolving Energy-IEF International Energy Congress*. 2012.
- [16]. Moavenian M & Naimi Amini P. Control adaptation of an air conditioning system using a two stage fuzzy controller, *International Annual Conference on Mechanical Engineering*, Tehran University. 2009, 29-31.
- [17]. C.C. Siewa, A.I. Che-Anib, N.M. Tawilb, N.A.G. Abdullah, M. Mohd-Tahirb ,2011, Classification of Natural Ventilation Strategies in Optimizing Energy Consumption in Malaysian Office Buildings, The2nd International Building Control Conference. 2011.
- [18]. J.R.Gosselin et.al, 2008, A dual Airflow window for indoor air quality improvement and energy conservation in buildings, HVAC&R Research 14.