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## Investigation of the Relationship Between the Climatic Role of Iwan and Rate of Energy Consumption in Traditional Houses of Tabriz

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### Abstract

This research studies the reaction of traditional houses to solar energy according to the function of Iwan as well as the climate in Tabriz city. It aims to investigate the climatic role of Iwan in the rate of energy consumption of these houses. Statistical population of this study contains four traditional buildings registered in Cultural Heritage Organization of the East Azarbaijan province. Solar conveyor system, content analysis, and survey methods with tools including the images, tables and maps have been used for investigating the cases in order to achieve this objective. Obtained results indicates that Iwan was applied only as the symbolic element in the architecture of traditional structures in Tabriz city and its climatic function was rarely considered in designing these structures.

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## 1. Introduction

The issue of energy and the ways of taking the advantage of natural and renewable are of the most important ones which attract attentions at most nowadays. Houses are of the cases which consume the energy in urban scale. Considering the elements and appropriate architectural design of houses can decrease the significant use of non-renewable sources of energy and increase the use of renewable ones instead. Iwan is of the cases and elements that if constructed in homogeneity with climatic principles and conditions of each region, can be widely used in the case of being designed and built in consistency. However, it is worth noting that the concept of Iwan is not solely referring to what is seen in the traditional houses, but the present study aims to investigate the Iwans in Tabrizian houses and their climatic conditions. Therefore, a brief definition and history of this architectural element is mentioned before investigating the climatic principles of Iwan.

## 2. Methodology of Research

The method used in this study are Descriptive and Analytic. To achieve theoretical research, including information about climatic conditions, used the library and description methods and for to adjust the data obtained from the charts of solar conveyor.

## 3. Definitions of Iwan

In Persian, iwan means 'portico, open gallery, porch or palace' and the word liwan in Arabic covers the Persian concept [1]. In a book entitled "The Feel of Unity", the concept of Iwan or porch has been specified as follows: The concept of Iwan or porch has profound implications throughout the Islamic history. Iwan represents the certain features and space limitation and it is in fact the "procedure" or transitional space between the world of time and earth. Based on the metaphysical point of view, Iwan can be considered as the whole designation which sets a stream between the garden or yard of the soul and the room as a physical stage [2].

Iwan, as defined in the Encyclopedis of Dehkhoda, is the platform and vault, high seat with ceiling. A house and room with open front and entrance. Iwan, also has been described as the projections with walls at both sides, or as the half-open columned spaces which are next to the rooms in different forms [3], but in general, it can be defined as the half-open space which is enclosed at three sides and open at one side. Iwan, in fact, is considered as a space ahead and emphasizes on the entrance. Iwans are usually built as a connecting space in order to exist or enter a space. Definitions given above have put the emphasis on the totality of Iwan. However, according to other definitions, Iwan can be described as the space which brings out a variety of experiences for life compared to closed and open spaces via providing the shade and direct perspective towards tree and greenery.

Iwan is the oldest model of the indoor spaces in Iranian houses the construction of which was considered as a necessity until the early twentieth century. Iwan is a closed and independent space with high vault which is considered for all activities of life. One of its sides is open overlooking the yard and the other two sides are half-closed and the fourth side is closed. The closed side has usually directed to the rooms of royal seat (Shahneshin); and the space of Shahneshin is integrated with Iwan by opening the doors and windows of this room and it makes the numerous activities possible. Two other sides are connected to other spaces through passing spaces and false arches [4].

## 4. Iwan History

Even though its origins are obscure, some researchers thought that the iwan, probably, developed in Mesopotamia [5]. However, Reuther (1967,430) advanced the notion that iwans did not emerge from the habits of the sedentary people of Babylonia or Assyria, but rather from the tradition of a people accustomed to moving in open air, viewing the blue sky and living in tents or reed huts as shelters against sun and wind. Colledge (1967,120) found it to be at home in Persia, for it is the standard feature of late Iranian architecture. On the other hand, iwan-like rooms of the late Hittite palaces (beginning of the first millennium B.C.) at Zinjirli and the barrel vaulted matted straw covered rush huts (sarifa) of the dwellers of the Babylonian marshes are considered to be the prototypes of the

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