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STUDYING GEOMORPHOLOGICAL IN LOCATING AND DISTRIBUTION OF RURAL SETTLEMENTS BY HIERARCHICAL ANALYSIS SYSTEM

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ABSTRACT

From the old times, climate has been studied in the construction industry and has always been as one of the influential parameters. The role of climate and its subordinate elements are the key elements in positioning and establishment of macro-residential spaces and rural settlements, as forming social, economic life, are no exception. The method based on objective is applied, and based on the nature; it is descriptive and analytical where the analysis is carried out by analytic hierarchy process (AHP) system to lead to a correct answer to prove the research hypothesis. The aim of this study is to evaluate climatic factors on the location and distribution of rural settlements by AHP system where it is tried to study and analyze Bojnoord rural settlements with respect to several parameters. From the results, one can deduce issues such as be reasonable

establishment of rural settlements due to climatic factors, that with respect to process of this study, they can be generalized to other uses to study establishment in micro and macro levels, which in turn, it is a kind of sustainable development ultimately leading to the preparation of the land.

Keywords: Rural settlements, land preparation, sustainable development, locating, AHP

INTRODUCTION

One of the factors affecting the geographical area of the village is the climate. A wise look at this can have a significant impact on land use and location. Climate has always been an important factor affecting all environmental life phenomena, which can be considered as an integral part of the environment. Existence of natural resources such as suitable soil, flat land, favorable climate and flowing water provides ground that human societies especially villagers are attracted towards it and continue to live with the operation of these facilities [10]. Another factor discussed in this research is location, which can be paraphrased as: locating is an activity in which we analyze the capabilities of an area regarding existence of suitable and adequate land, its communication with other users and facilities to choose a suitable location for specific use [12]. Rural communities because of the rule of traditional patterns in the exploitation of the environment and the low level of technology in dealing with the natural environment are constantly in search of places, so that they can conquer nature with their activity and use its potential in order to survive [4].

Statement of the problem

Nowadays, the importance and necessity of attention to climatic conditions in the design and construction of all buildings, particularly buildings that are directly used by humans and living organisms, is proved. Inevitably, human is affected by environmental conditions, and it is the most important environmental factor that separates the districts from each other, and directly affects human activities including subsistence type, temperament, health, type of settlement and the forms of buildings of each area. With regard to the above discussions and considering the importance of rural residential location and their distribution climate can be considered an important issue, which is one of the most important and influential factors in the formation of the village and is the distribution. Here, as climate has much importance, must be analyzed. Given the questions raised, in the next section, we deal with it to confirm or

refute the hypothesis so that with a good understanding of it, logical strategies are presented. Therefore, in this study, it is tried to study the factors affecting rural spaces settlements.

Research questions

Of the questions in the minds of the authors of this study are:

1. To what extent, are climate factors involved in the establishment and distribution of rural settlements?

2. Can climate factors alone contribute to the establishment of a village?

Hypotheses

With regard to the subject of the study regarding climatic factors on the location and distribution of rural settlements of Bojnoord, the following assumptions are presented, after the process of evaluating the data, they are analyzed and evaluated, this finally leads to rejection or confirmation.

First hypothesis: it seems the deployment and distribution of rural settlements in Bojnoord is not according to affective climate parameters.

The second hypothesis: climatic factors alone can be influential in establishing and locating biological spaces in the micro and macro levels.

The objectives and the need for research

Climate is one of the main issues in the localization and distribution of rural settlements that lies in geography and architecture fields so the objectives and the need for research can be considered as:

1. Identification of climatic parameters
2. Factors of distribution of settlements
3. Factors Affecting location

RESEARCH METHODOLOGY

The method based on objective is applied, and based on the nature, it is descriptive and analytical. Of the findings of the study, issues such as rural deployment of Bojnoord settlements according to climatic parameters can be mentioned and the results can be used at cross-regional and regional levels.

Data collection method

Given the importance of the subject, it was tried to use various data collection methods in carrying out this study. tried a variety of methods to capture the author of this study should be used, of the methods used library studies (both domestic and foreign, linked sites and field studies) can be noted.

Data collection tool

Gotten from field studies, objective perception is done according to the type of subject being studied, questionnaire design, and interviewing cards, in the meantime, with respect to research and better understand the affective factors of the

climate, the geographic information system (GIS) is used.

Data analysis tools

Considering the importance of research and consideration of criteria and multiple options in data analysis the data, AHP method was used.

Research background

1. Sajjad Zadeh et al (2014) in examining the structures of vernacular architecture to consider in severe mountainous and polar climates finally concluded that climate issues can inspire innovative architecture in form and function that can be good enough spaces worthy of life for human life [7].

2. Saberian and colleagues (2014) in a study titled "Evaluating the role of climatic factors and the nature of cold areas" on the way to sustainable architecture concluded that: from old times, buildings have been built while influenced by their climate. [9]

3. Golzar Majid et al (2014) in an article entitled "Analysis and location of residential townships in Bojnoord according to geographical criteria (focusing on passive defense), and renewable energy, by AHP" concluded that renewable energy such as wind energy, solar energy, vegetation and topography can play an important role in locating and using it and with a wisely look, use it logically. [14]

4. In the field of climate and architecture, or in another word, climate application in construction and architecture, and urban and rural land use due to the particular condition of Iran and its varied climates, many studies for different regions of Iran, all of which indicate the importance of the issue, at the global level, the importance of the potential climate is clearly discussed.

For this purpose, for the first time in 1965, a commission to investigate the urgent necessity of building climate in Geneva was set up composed of meteorologists, environmental and health professionals, architects, engineers and urban planners to be aware of the urban effects of air and final decision to choose the best result on urban climatology. These reviews, along with two other fitting issues were studied in Brussels Symposium 1968- a Symposium on urban climatology and climate of the building [6].

Definitions and theoretical foundations

Land preparation

Logistics in Moin Dictionary means: mixing-decoration-ornament- and preparation [16]. In the Larousse dictionary, logistics has been defined as: the best geographical distribution of economic activity due to natural and human resources [15]. Logistics equivalent in English is the word (PREPATATION) and means planning of land use (ibid.).

Sustainable Development

Sustainable development is the process that consists of two basic parts:

1. Protection: the limited nature of human action in terms of sustainable development capacity of the region and its natural resources 2. Development: urban, rural, industrial and socio-economic development and planning in order to meet the needs of people and to provide healthy, long, and fruitful social living. Sustainable development is a complex process of environmental, social and economic issues, but to develop an applied and flexible application that bring us to its objectives. [3]

Stability

The ability to do something durable or something durable (Oxford Dictionary, 2000), the concept was raised from the time issuance of the common future in the World Commission on Environment and Development since 1987 [3].

Theories of locating and positioning of a settlement include the establishment place on ground and positioning, choosing the most suitable place for the new establishments according to the conditions and characteristics of the land [12]. Locating theories were first manifested in the economics literature in planning. The oldest location model to Pier de Dermer (1600).

Analytic hierarchy process (AHP)

One of the decision making supporting tool is multi-criteria method of decision-making. These methods are used for a variety of purposes including analysis of decision making problems, production of solution options and evaluating options based on the decision-makers [2].

Effects and uses of land preparation improvement on the improvement of environment

• Minimal and optimal use of non-renewable resources using update technology

• Optimal use of renewable natural resources and recycling them [15]

• Capacity of the environment to absorb the level of pollutants and waste

• Responding to human needs (various applications) in all areas of housing, agriculture, industry and mining and supplying facilities related to environment towards human welfare and all vital systems [1]

Climatic factors

Factors that affect the climate of a region or place are referred to as climatic factors. Factors affecting the Earth's climate, such as the intensity of solar radiation at ground level, tilt of the Earth's axis, the airflow and geographic location (in terms of vicissitudes, height from the sea level) determine the type

and quality of water and air in each area from earth [11]. On a smaller scale, climate determinant factors are "temperature, humidity, solar radiation, air movement (wind) in each region. Among other factors affecting the quality of atmospheric or local weather geographical location in terms of topography, land cover type and physical location regarding the building's construction type. (ibid)

Solar radiation

Earth receives all its natural energy from the sun directly and indirectly, this is done by different means. Radiation energy is a spectrum of different wavelength known as the solar spectrum. In this wide range, the highest waves (radio waves) are about 1021 and short wave is (gamma). Nevertheless, the maximum energy and a lot of radiant energy is in the narrow range of visible range. In the process of global warming factors such as terrestrial radiation, chaotic transport, latent heat, and the greenhouse effect play an important role.

The temperature

Temperature is measuring temperature or heat that can be measured in the soil and air, and all organisms are directly affected by this temperature. studies on the energy balance show that the radiation temperature changes according to radiation energy change.

Humidity

The air humidity is the amount of water vapor in the air. Water vapor by evaporation from the oceans and seas or moist surfaces such as plant enters air and is transported to other locations by air currents and wind. The warmer air, the more water vapor it holds. The amount of moisture in the air can be measured and expressed in different ways such as absolute humidity, specific humidity, vapor pressure, and relative humidity.

Wind

Pressure systems in the atmosphere encompass large areas, high pressure system are called anti-cyclones and low pressure ones are called cyclones. Wind is the air flow that moves from low pressure centers and moves in the direction of pressure slope. The higher the pressure gradient between the two points, the greater the air flow. The pressure difference between two points is called pressure gradient or barometric slope.

Rainfall

Rain occurs when both moist air and ascending factors are both present. In other words, humid air should go up to a certain height so that due to adiabatic cooling reach saturation point and then create a cloud. Absence of any of these factors will prevent the occurrence of rain. In creation of rain mechanisms such as volubility precipitation,

convection, convection sports, thermal convection, and uneven are effective. [17]

Thermal conductivity

The physical properties of objects that reflect the heat conductivity by molecular motions [13].

Studying the climate of the region under study

Geographical features

Geographical location of Bojnoord

Bojnoord expands between 37 degrees and 27 minutes and 27 seconds to 37 degrees 29 minutes and 31 seconds of north latitude and 57 degrees 17 minutes and 4 seconds to 57 degrees and 21 minutes 36 seconds of east longitude and its height from free sea level is 1070 m [5].

Climate

Bojnoord area is generally affected by cold air masses from the north and warm Mediterranean-Caspian from the West. Because of collision of two air masses, especially in winter, snow in the highlands and to some extent plus rain in lowland plains, happen. Despite the cold and dry features of cold air masses, Caspian air mass is warm and humid. For this reason, air humidity and moderation increases from the West.

Wind

North Khorasan is strongly affected by cold currents that brings about severe cold weather. For this reason, most cities of the region have a cold and dry climate that under the influence of moist western part the drought is reduced and moderated. In addition to the above-mentioned two currents, the other current influencing the regional climate some time of year is the wind that blows from the south called Qibla Wind. Because of passing through the inner and desert areas of the country, this wind has a high temperature affected by which and humid West currents (Caspian) the severity of cold Siberian air flows is reduced to some extent and moderates the weather. Surtuk Wind is the fourth air flow in the region. This wind blows from the north and brings extreme cold in winter and in summer reduces the intensity of the heat. This air flow moves like the Siberian cold flow and its difference with the Siberian cold is in the name and extension. Seasonal and annual studies of the wind flow show that generally westerly winds are dominant. As rose from the table and prepared according to 5 year statistics (1978-83), it is concluded that the dominance is with westerly winds that the speed is 4.5 knots and frequency is more than 11% that has 5.5 knots of speed [5].

Process of AHP

1. Building the hierarchy:

It has 3 levels: 1: Objective 2: Criteria 3: Options

Objective: To choose the best option

Criteria: The main traits of the options

Options: items studied.

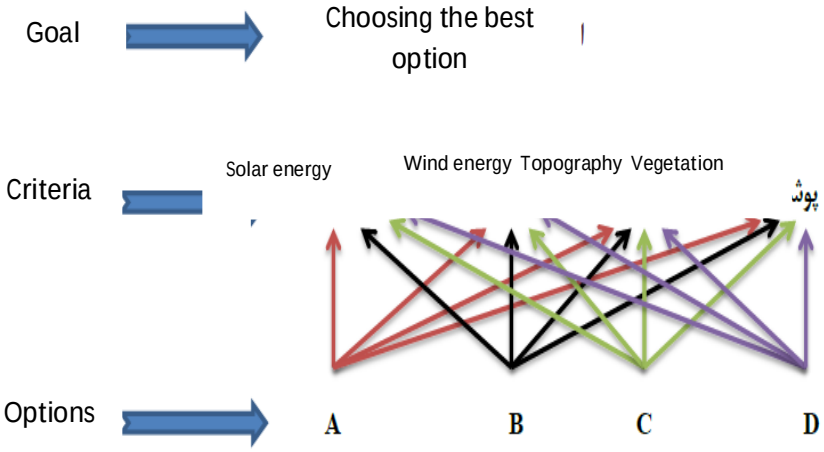
2. Weight calculation

3. System compatibility

We study the best location among the four predetermined options.

(Location of 4 villages located in Bojnoord)

The first step: Building hierarchy



Preference	Numeric value
Completely preferred	9
Preference with strong importance	7
Preference or better	5
A little more preferred	3
The same preference	1
Preference between seasons	2-4-6-8

Second step: the numeric value to each option according to the preference table

* Note: All measures in the tables are the same about themselves. This means that the ratio of A to A is one.

* Note: In numbering tables, this ratio must be met. [B to A$\frac{1}{N}$ = A toNB].

The criteria include: 1.wind energy, 2. solar wind, 3. Vegetation, 4. topography

Options include: A: Badranlu Village, B: Hamzanlu Village, C: Alah Verdi Khan Village, D: Baba Aman Village

Table 1: First criterion: wind energy

	Option A	Option B	Option C	Option D
Option A	**1**	**3**	**2**	**3**
Option B	**0.3333**	**1**	**4**	**3**
Option C	**0.5**	**0.25**	**1**	**3**
Option D	**0.3333**	**0.3333**	**0.3333**	**1**
Sum	**2.1666**	**4.58333**	**7.3333**	**10**

	Option A	Option B	Option C	Option D	Average of each line
Option A	**0.4614**	**0.6564**	**0.2727**	**0.3**	**0.4221**
Option B	**0.1538**	**0.2181**	**0.5454**	**0.3**	**0.3043**
Option C	**0.2307**	**0.0545**	**0.1363**	**0.3**	**0.1803**
Option D	**0.1538**	**0.0727**	**0.0454**	**0.1**	**0.0929**
Total of each column	**0.9997**	**0.9998**	**0.9998**	**1**	**0.9996**

Table 2: The second measure: Solar energy

	Option A	Option B	Option C	Option D
Option A	**1**	**5**	**6**	**7**
Option B	**0.2**	**1**	**2**	**3**
Option C	**0.1666**	**0. 5**	**1**	**4**
Option D	**0.1428**	**0.5**	**0.25**	**1**
Sum	**1.5094**	**7**	**9.25**	**15**

	Option A	Option B	Option C	Option D	Average of each line
Option A	**0.6625**	**0.7142**	**0.6486**	**0.4666**	**0.6229**
Option B	**0.1325**	**0.1428**	**0.2162**	**0.2**	**0.1728**
Option C	**0.1103**	**0.0714**	**0.1081**	**0.2666**	**0.1391**
Option D	**0.0946**	**0.0714**	**0.0270**	**0.0666**	**0.0649**
Total of each column	**0.9999**	**0.9998**	**0.9999**	**0.9998**	**0.9997**

Table 3: The third criterion: Vegetation

	Option A	Option B	Option C	Option D
Option A	**1**	**2**	**2**	**2**
Option B	**0.5**	**1**	**4**	**5**
Option C	**0.5**	**0. 25**	**1**	**3**
Option D	**0.5**	**0.2**	**0.3333**	**1**
Sum	**2.5**	**3.45**	**7.3333**	**11**

	Option A	Option B	Option C	Option D	Average of each line
Option A	**0.4**	**0.5797**	**0.6486**	**0.1818**	**0.3585**
Option B	**0.2**	**0.2898**	**0.2162**	**0.4545**	**0.3724**
Option C	**0.2**	**0.0724**	**0.1081**	**0.2727**	**0.1704**
Option D	**0.2**	**0.0579**	**0.454**	**0.0909**	**0.0985**
Total of each column	**1**	**0.9998**	**0.9998**	**0.9999**	**0.9999**

Table 4: Fourth criterion: Topography

	Option A	Option B	Option C	Option D
Option A	**1**	**2**	**2**	**2**
Option B	**0.5**	**1**	**1**	**3**
Option C	**0.5**	**0. 2**	**0.2**	**2**
Option D	**0.5**	**0.333**	**0.3333**	**1**
Sum	**2.5**	**3.5333**	**3.5333**	**8**

	Option A	Option B	Option C	Option D	Average of each line
Option A	**0.4**	**0.5660**	**0.2352**	**0.25**	**0.3628**
Option B	**0.2**	**0.2830**	**0.5882**	**0.375**	**0.3615**
Option C	**0.2**	**0.0566**	**0.1176**	**0.25**	**0.1560**
Option D	**0.2**	**0.0943**	**0.588**	**0.125**	**0.1195**
Total of each column	**1**	**0.9998**	**0.9998**	**1**	**0.9999**

Table 5: Comparison of the criteria with options

	Wind energy	Solar energy	Vegetation	Topography
Option A	**0.4221**	**0.6229**	**0.3585**	**0.3628**
Option B	**0.3043**	**0.1728**	**0.3724**	**0.3615**
Option C	**0.1803**	**0.1391**	**0.1704**	**0.1560**
Option D	**0.0929**	**0.0649**	**0.0985**	**0.1195**

Table 6: Comparison of the criteria

	Wind energy	Wind energy	Vegetation	Topography
Wind energy	**1**	**4**	**5**	**3**
Wind energy	**0.25**	**1**	**7**	**5**
Vegetation	**0.2**	**0.1428**	**1**	**2**
Topography	**0.3333**	**0.2**	**0.5**	**1**
	1.7833	**5.3428**	**13.5**	**11**

	Wind energy	Wind energy	Vegetation	Topography	Average of each line
Wind energy	**0.5607**	**0.7486**	**0.3703**	**0.2727**	**0.4880**
Wind energy	**0.1401**	**0.1871**	**0.5158**	**0.4545**	**0.3251**
Vegetation	**0.1121**	**0.0267**	**0.0740**	**0.1818**	**0.0986**
Topography	**0.1869**	**0.0374**	**0.0370**	**0.0909**	**0.0880**
Total of each column	**0.9999**	**0.9999**	**0.9999**	**0.9999**	**0.9999**

The calculation of the final weight

Weight of criteria reflects their importance in determining the target. The weight of each option against the criteria is related to the share of option in the criterion. Thus, it can be easily said that the final weight of each option can be obtained from the sum of multiplying weight of each criterion at the option weight.

In other words:

The average of each column of stage 5* each row separately in stage 4.

Finally, after completing the above steps, the item that has a larger number than the other options is selected as the best option.

0.0880*0.3628+0.0986*0.3585+0.3251*0.6229+0.4880*0.4221= 0.4757optionA

0.0880*0.3615+0.0986*0.3724+0.3251*0.1728+0.4880*0.3043= 0.2732optionB

0.0880*0.1560+0.0986*0.1704+0.3251*0.1391+0.4880*0.1803= 0.1637optionC

0.0880*0.1195+0.0986*0.0985+0.3251*0.0649+0.4880*0.0929= 0.0866 optionD

Testing the hypotheses

First hypothesis: it seems the deployment and distribution of rural settlements in Bojnoord is not according to affective climate parameters.

According to the process of the present study, this hypothesis is confirmed that the result of analysis represents it to be true.

The second hypothesis: climatic factors alone can be influential in establishing and locating biological spaces in the micro and macro levels.

This hypothesis is rejected. In locating the villages of the region, attention is not given to various climatic and geographical parameters as to achieve sustainable development goals, and climate alone cannot play a role in locating settlements.

CONCLUSION

According to the process of the present research and using AHP preparation tool and considering determining criteria "solar energy, wind, vegetation and topography" in the options studied "A: Badranlu Village, B: Hamzanlu Village, C: Alah Verdi Khan Village, D: Baba Aman Village" of Bojnoord, we found that option A- Badranlu Village- considering proper use of geo-morphological factors is located in a better location compared to other options. Thus, this God given gift can wisely be used the best way possible. It is hoped that this research could be a step towards sustainable development and, ultimately, land use preparation.

With regards to scholars and scientific experts and valuable partners. It is hoped that this research could be a step towards sustainable development and land use preparation and carry out its mission the best manner possible. Be victorious, proud, and solid stepped.

"Majid Golzar"

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