



CALCULATION OF THE TERRITORY RECREATION ATTRACTIVENESS USING FUZZY LOGIC

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Abstract: *in this paper the calculation method of the territory tourist attractiveness aggregated potential is offered on the base of fuzzy logic taking into account the factor of seasonality. The potentials of tourist attractiveness are found for the basic tourist recreation systems of the Chernivtsi region.*

Keywords: *seasonal attractiveness of the territory, fuzzy logic, program-algorithmic model.*

Tourist industry of any region would develop considerably more effective, if it is possible to determine areas potentially attractive for tourists and holiday-makers, to determine the level of their attractiveness and specialization on the proper types of rest. It will allow finding out objects attractive for investments, and also will help to form more effective economic development strategy for tourist business in regions.

A research purpose is to develop fuzzy algorithm for calculation of the potential of territory's tourist attractiveness.

Research actuality is in determination of the level of territory's attractiveness for tourists and holiday-makers during a year with the purpose to form a strategy of activity for enterprises in tourist and recreation industries.

The practical value of this article consists in the giving concrete recommendations to the investors about expedience of creation the tourist recreation systems (TRS) and determination of the optimum strategy of their activity.

Among the problems which arise up during organization of tourist-recreation complex there is seasonality of its activity. For example, the mountain-skiing complexes get a lot of custom in winter, but are unfilled the rest of the year. It is related to the proper climatic terms. That is why, sometimes foundation of such business is unprofitable, even when territory has conditions complimentary enough for this purpose. Some territories have good climatic, natural, financial and

other conditions for organization of a few types of rest and recreation, as within the limits of one season so for a year. In winter a tourist center can work as a mountain-skiing resort, and, for example, in summer to organize entertainments on water, if alongside there is the proper basin. Service diversification of tourist enterprise not only multiplies his incomes but also does less dependency upon the critical factors of temporal character, such as incongruous weather conditions during the long period of time. If, as a result of that, profits are received less in one of seasons, there is possibility to compensate it with active work of the rest of a year. The more sources of income has the enterprise, the more resistant it is to influencing of critical factors and circumstances of force-majeure.

The given research was directed on determination of the territory's seasonal aggregated index of attractiveness for tourists and holiday-makers conducting the variety of their preferences in having a rest. In addition, it should be taken into account the size of consumer audience, in other words, the amount of people, interested in this type of rest.

The recreation attractiveness of territory is determined by the types of rest and recreation, which can be organized and carried out on this territory. Rest and recreation, in the turn, depend on climatic, geographical, historic and cultural conditions and human activity.

Thus, the territory's aggregated index of attractiveness for tourists and holiday-makers consists of a few separate indexes of attractiveness,

which are based on the certain types of rest. For territories of the Chernivtsi region the actual types of rest and recreation can be united in four groups:

p_1 – winter rest;

p_2 – rest in summer time at basin;

p_3 – rest in spring and autumn in the countryside;

p_4 – excursions and review of historic and cultural sights.

The seasonal recreation potential of territory is determined as:

$$P(t) = f(p_1(t), \dots, p_4(t)). \quad (1)$$

The linear convolution product is used for the calculation of the aggregated recreation attractiveness index. It allows getting the integral index in those cases, when the input variables are independent and equivalent values:

$$P(t) = \sum_{i=1}^4 p_i(t) \cdot \omega_i(t), \quad (2)$$

where $\omega_i(t)$ – are the parameters of groups attractiveness indexes normalized values.

The normalized value of coefficient ω_i is estimated with a formula:

$$\omega_i(t) = \frac{\omega_i^*(t)}{\sum_{i=1}^n \omega_i^*(t)}, \quad (3)$$

where n – is the common amount of parameters in given attractiveness potential, and ω_i^* is determined as:

$$\omega_i(t)^* = C_i \cdot H_i(t), \quad (4)$$

where C_i – a percent of people that want to have the indicated type of rest, $H_i(t)$ – is seasonal possibility of having a rest.

In general, complex seasonal potential of territory's attractiveness for holiday-makers and tourists depends on 16 basic parameters, 14 of them are presented as fuzzy linguistic variables.

In this research the values of complex seasonal potentials of attractiveness were accounted for 10 tourist places in Chernivtsi region. These places are the popular centers for having a rest, located in different parts of region. All places differ in their

natural conditions, relief, sizes and a level of infrastructure development.

As a result of computing it is possible to trace the variation dynamics of territory's complex recreation attractiveness during a year (fig. 1).

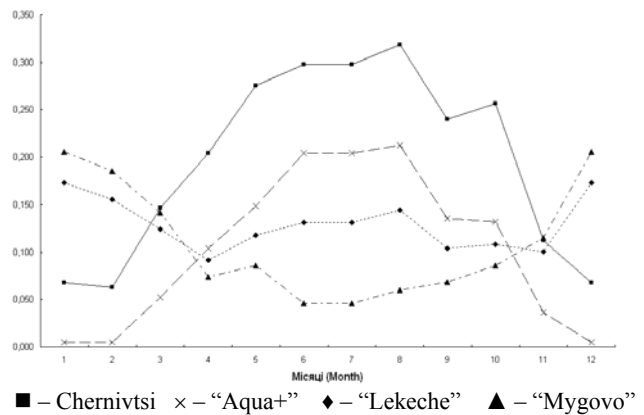


Fig. 1 – Variation of recreation attractiveness potential for some tourist-recreation centers of Chernivtsi region

Chernivtsi is a large tourist-recreation center (TRC) that provides various tourist services. This territory's level of attractiveness is high enough during the whole year. The decline of value of the aggregated index in winter is related to the fact that given territory is attractive in winter mainly due to a mountain-skiing route on the mountain of Tsetsino. While in other seasons tourists are also attracted with historic and cultural sights and possibility to ride horses (Tsetsino), to have a picnic (the Campsite), and also to take a rest near the river.

The entertaining complex "Aqua+" is placed ashore a lake. Basic specializations of this center are services of rest on water organization and also providing picnics and others like that. The picture describes that maximum level of this TRC attractiveness is summer period. In spring and in autumn the index of attractiveness decreases, and in winter period it falls down near to zero.

Mountain-skiing complex "Mygovo" opposite, has high values of the recreation attractiveness aggregated index in winter, but is uninteresting for tourists and holiday-makers the other seasons of the year.

The eco-tourism center "Lekeche" is a small TRC that provides various tourist services: rafting, fishing, hunting, gathering mushrooms, berries, horse riding and others. In addition, this territory has good conditions for organization of mountain-skiing rest. Level of recreation attractiveness of this territory is high enough during the year. Unlike previous places, on the graph "Lekeche" sharp increases and breakdowns are absent.

Using the aggregated index enables to define the attractiveness of territory for tourists and holiday-

makers more adequately, and consequently, shows to the potential investors and responsible institutions of local governing the real prospects of the recreation resources exploitation of this area.

In general, in this paper the method for calculation of complex tourist attractiveness potential of the territory is offered on the base of fuzzy logic. The developed method allows considering present natural conditions and infrastructure for organization and providing various types of rest and entertaining events.

For the first time in the calculation of territory's attractiveness potential the factor of seasonality is conducted.

The offered method will allow the tourist industry enterprises to elect more effectively direction and dimensions of capital investments in planning their strategy, arranging PR-actions.

Integrated to GIS technologies, the developed method will allow getting the map of potential tourist attractiveness of territory which can serve as a scientific base for strategy of regional development. The offered method will allow in future to plug in to the algorithm a segmentation of consumer audience – holiday-makers depending on their preferences and financial capabilities.