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Information technology for evaluating the level of travel satisfaction with respect to infrastructure and accessibility

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Abstract. Research has been carried out on the actual task of developing information technology for assessing the level of satisfaction with travel in relation to infrastructure and accessibility. To this end, the following will be developed: an information model of criteria for evaluating the level of tourist traffic in terms of infrastructure and accessibility; fuzzy travel satisfaction rating patterns relative to expected and actual infrastructure and accessibility experiences.
Keywords: *information technology; unclear logic; regional tourism; intellectual analysis of knowledge.*

Technological development, development of markets, destinations, and infrastructure contribute to the development of tourism, which is the fastest-growing service industry. From an economic point of view, tourism is the largest business in the world. Tourism significantly contributes to the creation of jobs and the development of the regional economy. With the development of tourism, questions of its sustainability are raised. Although the dimensions of tourism are widely studied, many questions, both empirical and theoretical, remain unresolved. [1].

The digital transformation of the tourism industry requires the creation of both models and information technologies themselves and therefore initiates the development of new scientific approaches and research [1-2].

The main goal of this study is to develop an information technology for assessing the level of satisfaction with travel in relation to infrastructure and accessibility, based on the expected and real experience of participants in the tourist movement.

Let us have $R_C = \{R_{C1}; R_{C2}; \dots; R_{Cr}\}$ – a set of regions for evaluating the level of tourist traffic. Of course, regions

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can be from different countries $C = \{c_1; c_2; \dots; c_c\}$. A set of participants in the tourist movement (experts) is known – $E = \{e_1; e_2; \dots; e_n\}$, who assessed the level of internal and external infrastructure in the destination visited in the corresponding region of the country in the period ε_p.

To create information technology, you need to have a lot of input data. It is suggested that input will be obtained in an expert manner. For example, let there be criteria for evaluating the level of tourist traffic in relation to infrastructure and accessibility. For each of the criteria, the expert must give one linguistic answer $L_1 = \{EP_1; RP_1; EN_1; RN_1\}$ to questions about positive and negative aspects of infrastructure and external (internal) accessibility at the destination, relative to expected and actual experience, e.g.:

1. What positive aspects were hoped to experience in terms of infrastructure and external (internal) accessibility at the destination? Expert's answer: $EP_{1(2)}(ep) =$ { Didn't expect; Expected}.

2. What positive aspects were actually experienced in terms of infrastructure and external (internal) accessibility at the destination? Expert's answer: $RP_{1(2)}(rp) =$ { Had no experience; Had experience}.

3. What negative aspects were expected to be experienced in terms of infrastructure and external (internal) accessibility at the destination? The expert's answer: $EN_{1(2)}(en) =$ { Did not assume; Assumed}.

4. What negative aspects were actually experienced in terms of infrastructure and external (internal) accessibility at the destination? Expert's answer: $RN_{1(2)}(rn) =$ { Had no experience; Had experience}.

The expert must answer the question by choosing the option that most accurately reflects the expected positive and negative aspects of the trip, as well as the actual positive and negative aspects that arise after the visit. For this purpose, the proposed evaluation criteria are used. The set of criteria and the system for obtaining input data is an information model of criteria for evaluating the level of tourist traffic in relation to infrastructure and accessibility – K_T.

As a result, after traveling in year ε, some region R_C of country C, input expert data from expert e_j will look as follows, table 1:

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Table 1

Input from an expert e_j

Name criterion	Positive aspects		Negative aspects	
	Expected experience	Real experience	Expected experience	Real experience
G_1 – infrastructure and external accessibility				
K_{11}	$(EP_1)_{11}^j$	$(RP_1)_{11}^j$	$(EN_1)_{11}^j$	$(RN_1)_{11}^j$
K_{12}	$(EP_1)_{12}^j$	$(RP_1)_{12}^j$	$(EN_1)_{12}^j$	$(RN_1)_{12}^j$
…	…	…	…	…
G_2 – infrastructure and internal accessibility				
K_{21}	$(EP_2)_{21}^j$	$(RP_2)_{21}^j$	$(EN_2)_{21}^j$	$(RN_2)_{21}^j$
K_{22}	$(EP_2)_{22}^j$	$(RP_2)_{22}^j$	$(EN_2)_{22}^j$	$(RN_2)_{22}^j$
…	…	…	…	…

Where $(EP_g)_{gk}^j$; $(RP_g)_{gk}^j$; $(EN_g)_{gk}^j$; $(RN_g)_{gk}^j$ – *linguistic evaluations of* g – *th group of criteria,* gk – *criterion number,* j – *expert number,* $g = \overline{1,2}$; $j = \overline{1,n}$.

After receiving a set of input data, they are processed using information technology models to derive the initial estimate. For this study, it is proposed to use fuzzy models of intellectual analysis of knowledge [3]: M_{FLC} – a fuzzy logic inference model of travel satisfaction levels relative to expected and actual experiences from infrastructure and accessibility; M_{AR} – a hybrid fuzzy model for estimating the level of tourist traffic in the region; M_{PR} – model for forecasting the level of tourist traffic in the selected region.

Information technology can be formally presented in the form of a theoretical-multiple model of the task of assessing the level of tourist traffic in relation to infrastructure and accessibility in the regions, as follows:

$$\{C, R_C, \mathrm{E}, \varepsilon_p, K_T, M_{FLC}, M_{AR}, M_{PR} | Y(f)\}. \quad (1)$$

As a result, the initial assessment of information technology is obtained $Y(f) = \{\theta; \gamma\}$, which consists of θ – a quantitative assessment (predicted assessment) of the level of tourist traffic and a linguistic assessment γ of the interpretation of this level. Using this digital toolkit, it is possible to increase the degree of reasonableness of management decision-making regarding regional tourism support

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scenarios.

The structural scheme of the information technology for assessing the level of satisfaction with travel in relation to infrastructure and accessibility is given in the following form, fig. 1.

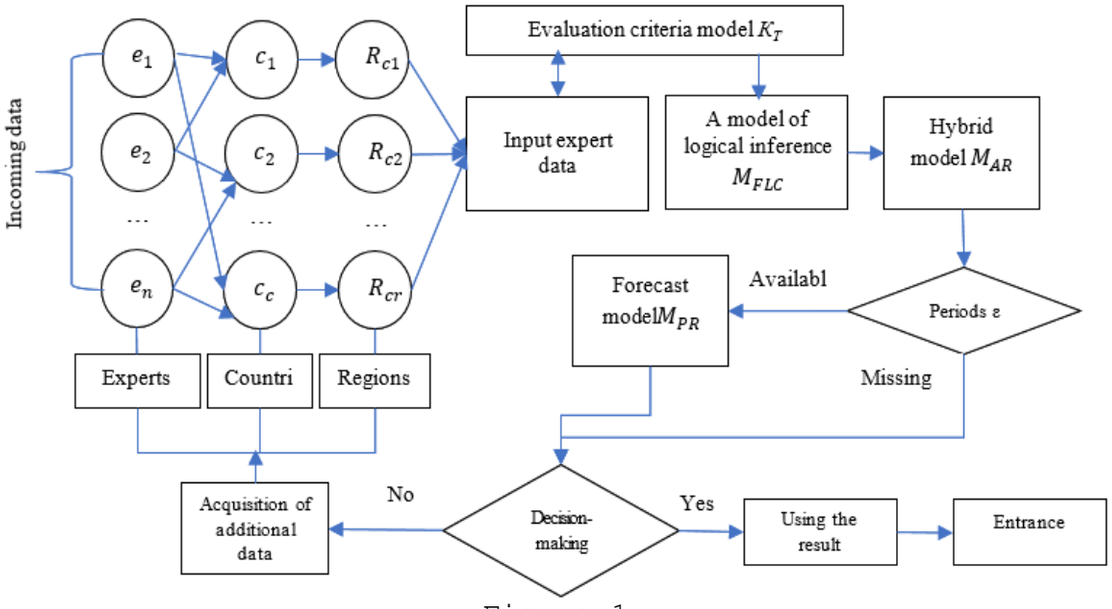

Figure 1

Structural diagram of information technology for evaluating the level of tourist traffic

Fig. 1. shows the structural scheme of information technology for assessing the level of tourist traffic in relation to infrastructure and accessibility in the regions. The assessment is followed by a decision by the decision-making person (DM) regarding the feasibility of improving accessibility, and internal and external infrastructure in places of tourist traffic, with the aim of increasing regional tourism. If the decision does not satisfy the DM, it is possible to revise the assessment or involve additional indicators and data for the assessment.

At the output of information technology, we have an initial quantitative estimate, a predicted estimate, and a linguistic value of the level of the tourist traffic of the studied region or country in a given period. The initial assessments contain the feasibility of improving accessibility, and internal and external infrastructure in places of tourist traffic, and based on them, the degree of

validity of decision-making regarding regional tourism support scenarios increases. Based on the quantitative assessment of the level of tourist traffic, it is possible to analyze the situation in tourism, by region, to make decisions on improving the quality of infrastructure, satisfaction of participants, and the development of regions.

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