

ORIGINAL SCIENTIFIC PAPER

## **DEX – i methodology application: a case study of tourist farm evaluation**

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### **Abstract**

Farm - based tourism is not a new phenomenon; indeed, tourism on farms has long been recognized throughout Europe as an identifiable form of rural tourism. Paper represents developed multi-attribute hierarchical DEX-i model (DEX-i is a computer program for multi-attribute decision making) for tourist farm evaluation. Based on a survey of potential guests, it explores their attitudes to a variety of criteria related by choosing a farm to visit or stay on. The model was applied in practice on 4 tourist farms. The data from the questionnaires was used as input data in the multi-attribute model. The results of the model are shown as the assessments for individual tourist farm. From four chosen farms two achieved the best possible evaluation (i.e. very good). One of them achieved middle (i.e. average) and one tourist farm the worse (i.e. bad) evaluation.

Key words: tourism farm, evaluation, multi-criteria modeling, DEX-i methodology

### **Introduction**

Rural tourism enterprises have been developed in rural areas as an alternative to agriculture. Farm tourism has been primarily developed for its economic benefits and represents a symbiotic relationship for areas where neither farming or tourism could be independently justified (Inskeep, 1991); Elson, Steenberg and Wilkinson (1995) add that in rural tourism two priorities are important: to generate additional income and provide economic benefits to the local economy. However, for the successful performance of the tourism farms the information about the market behavior, specialized offer, education process, searching for comparative advantages and emerging opportunities will be essential (Pažek et al., 2005). The service quality of rural tourism suppliers is a decisive factor considered by customers/consumers when choosing a farm to visit/stay on (Potočnik, 2006). Therefore there is a clear need for evaluation of service quality and the question is which methods are appropriate for the tourism farm evaluation. The literature suggests different methods for evaluation of tourism industry service quality (Fleischer et al. (1993), Reiche et al. (2000)). Kahn (2003) develops an aimed to investigate the service quality expectations of the ecotourists by developing an adapted version of the SERVQUAL scale. Štambuk (2002), Potočnik (2006), Rozman et al. (2009) proposed a methodology based on multi-criteria analysis. The DEX methodology for qualitative multi-criteria decision making (Bohanec et al. (1995), Bohanec et al. (2000)) has already been successfully used for estimation of tourist service quality in case of hotels (Štambuk, 2002) and vacation farms (Potočnik (2006) and Rozman et al. (2009)). The DEX-i methodology is designed for qualitative multi-criteria decision modelling and decision support (Bohanec and Rajkovič, 1999). Most multi-criteria methods provide numeric evaluations of alternatives that are themselves described with numbers. Operations in these models are arithmetic, usually weighted sums. Alternatively, decision problems can be described qualitatively, using non-numeric variables and 'if-then' rules (Bohanec et al., 2008). This is especially useful for problems that are not well formalized - tourist farms evaluation are a typical example of such problems. The qualitative methodology called DEX (Bohanec and

Rajkovič, 1990) has been applied to many real-world decision problems (Bohanec and Rajkovič, 1999; Kontić et al., 2006).

## Materials and methods

A multi-attribute DEX model is characterized by the following (Bohanec, 2003):

- the model consists of hierarchically structured variables called attributes
- all these attributes are qualitative rather than numerical: they can take only a finite (and usually a small) number of discrete symbolic values
- aggregation of values in the model is defined by rules.

For each attribute, DEX requires a definition of a set of corresponding qualitative values. These are usually descriptive as seen in table 1. The aggregation of values is carried out according to aggregation rules, which are usually given in tabular form (Table 2). The attributes at the lowest level are basic descriptors of alternatives – tourist farm; they represent model inputs and must be provided by the user.

**Table 1. Descriptive qualitative values for each attribute in the hierarchy**

Attribute	Scale
<b>TOURIST FARM EVALUATION</b>	bad; average; <i>very good</i>
<b>LOCATION</b>	unsuitable; <i>suitable</i>
Position	unsuitable ; average; <i>very suitable</i>
Accessibility	inaccessible; <i>accessible</i>
<b>TOURIST FARM TYPE</b>	unsuitable; <i>suitable</i>
Farm to stay on	unsuitable; <i>suitable</i>
Tripp farm	unsuitable; <i>suitable</i>
<b>SUPPLY</b>	worse; good; <i>excellent</i>
Food	bad; average; <i>excellent</i>
Drinks	<i>excellent</i> ; average; bad
Other supplementary activities	uninteresting; <i>intereseting</i>
Sport activities	unsatisfying; middle satisfying; <i>very satisfying</i>
Quality of living space	bad; middle; <i>excellent</i>
Logo	without; inappropriate; <i>appropriate</i>
<b>ENVIRONMENT SETTLEMENT</b>	unsettled; middle settled; <i>settled</i>
Flowers and greenness	worse; average; <i>good</i>
Preservation of cultural landscape	not present; <i>present</i>
Tourist farm categorization	<i>4 apple</i> ; <i>3 apple</i> ; 2 apple; 1 apple; without
<b>KINDNESS</b>	unsatisfied; <i>satisfied</i>
Reception on the farm	bad; good; <i>perfect</i>
Arrangements, shows	unpresent ; <i>present</i>
Information accessibility to the guests	unaccessible; <i>accessible</i>
<b>ATTITUDE: PERSONAL TO GUESTS</b>	worse; good; <i>excellent</i>
Family settlement	unsettled; <i>settled</i>
Cleanliness and hygiene on the farm	bad; average; <i>perfect</i>

According to the preliminary defined hierarchy a set of questions was issued to potential customers – guests. Questions of survey were modified for model criteria. All criteria were associated into groups of criteria to define final evaluation. The guest questionnaires were set according to Taylor et al. (1992) and Rozman et al. (2009) recommendations regarding the main parameters (attributes) influencing the guests decision whether to take a vacation on a specific site. The total of 4 vacations farms for stay on were included into research and guest questioners were issued to total 30 guests. Farm 1 is defined as farm with 3 apples (apples are mark for measuring the quality of farm service. The details about quality mark see in UL RS, No. 62/2008, 80/2008, 115/2008 and 72/2009), farm 4 is categorized with 4 apples, farm 2 and 3 have not any quality mark yet. The questionnaire results were used as input data for DEX-i multi criteria model as well as for modification of model hierarchy. After each attribute has been assigned with its scales (qualitative value), the utility functions are defined. The utility functions evaluate each individual attribute with respect to their immediate descendants in the hierarchy (Figure 1). This procedure is conducted for each level in the hierarchy (partial utility function for aggregate attributes and overall utility function for the whole model except for the lowest level in the hierarchy.

Tables							
LOCATION	TOURIST FARM TYPE	SUPPLY	ENVIRONMENT	SETTLEMENT	KINDNESS	ATTITUDE: PERSONAL TO GUESTS	TOURIST FARM EVALUATION
24%	27%	13%	12%		13%	10%	
1	unsuitable	unsuitable	worse	*	*	*	bad
2	unsuitable	unsuitable	<=good	unsettled	*	*	bad
3	unsuitable	unsuitable	<=good	*	unsatisfied	*	bad
4	unsuitable	unsuitable	*	unsettled	unsatisfied	*	bad
5	unsuitable	unsuitable	worse	<=middle settled	*	worse	bad
6	unsuitable	*	worse	unsettled	*	<=good	bad
7	unsuitable	*	<=good	<=middle settled	unsatisfied	worse	bad
8	unsuitable	*	<=good	unsettled	unsatisfied	<=good	bad
9	unsuitable	*	*	unsettled	*	worse	bad
10	unsuitable	*	worse	unsettled	unsatisfied	*	bad
11	*	unsuitable	<=good	unsettled	*	<=good	bad
12	*	unsuitable	<=good	unsettled	*	<=good	bad
13	*	unsuitable	*	unsettled	unsatisfied	worse	bad
14	*	unsuitable	*	*	unsatisfied	worse	bad
15	unsuitable	*	>=good	>=middle settled	satisfied	>=good	average
16	*	unsuitable	>=good	>=middle settled	satisfied	>=good	average
17	*	*	good	middle settled	satisfied	>=good	average
18	*	*	good	>=middle settled	satisfied	good	average
19	unsuitable	*	>=good	settled	satisfied	*	average
20	*	unsuitable	>=good	settled	satisfied	*	average
21	*	*	good	settled	satisfied	<=good	average
22	unsuitable	*	excellent	*	satisfied	excellent	average
23	*	unsuitable	excellent	*	satisfied	excellent	average
24	*	*	excellent	unsettled	satisfied	excellent	average
25	unsuitable	*	excellent	>=middle settled	*	>=good	average
26	*	unsuitable	excellent	>=middle settled	*	>=good	average
27	unsuitable	suitable	*	>=middle settled	*	excellent	average
28	*	suitable	<=good	middle settled	*	excellent	average
29	*	suitable	<=good	>=middle settled	unsatisfied	excellent	average
30	unsuitable	suitable	>=good	*	*	excellent	average
31	*	suitable	good	<=middle settled	*	excellent	average
32	*	suitable	good	*	unsatisfied	excellent	average
33	*	suitable	>=good	unsettled	*	excellent	average
34	unsuitable	suitable	>=good	*	satisfied	>=good	average
35	*	suitable	good	<=middle settled	satisfied	>=good	average
36	*	suitable	good	*	satisfied	good	average
37	*	suitable	>=good	unsettled	satisfied	>=good	average
38	unsuitable	suitable	>=good	>=middle settled	*	>=good	average
39	*	suitable	good	middle settled	*	>=good	average
40	*	suitable	good	>=middle settled	unsatisfied	>=good	average

Figure 2. Example of decision rules for tourist farm evaluation

However, in the figure 1 the decision rules are presented in a so-called complex form; headings display approximate attributes weights. The symbols “<=”, “>=” denote value intervals for the belonging attribute. The asterisk “\*” denotes any value.

In the next step the attribute values for each alternative are put into the DEX-i evaluation table (the values are obtained from questionnaires) and the evaluation analysis is ultimately conducted.

### Results and discussion

The aim of this paper is to evaluate 4 vacations farms for stay on with application of methodology DEX-i. On the base of the defined utility functions with respect to the defined decision hierarchy the tourist farms were evaluated. The developed model enables ranking of farms from the best to the worse one. The results show evaluation for 4 analyzed farms, as seen in figure 2, where the final DEX-i evaluation for individual tourist farm is presented. Model results shows that the tourist farm 1 and 4 became the higher evaluation (very good), followed by farm 2 (average) and at least farm 3 (bad evaluation and the worse ranking). The reason for bad evaluation of farm 3 are the *worse* evaluation by integrate Supply attribute and *unsuitable* evaluation of aggregate decision rules by attributes Location and Tourist farm type (both aggregate attributes are evaluated as *unsuitable*). One explanation for evaluation results by farm 3 is beside the worse position and accessibility the fact that farm 3 is in conversion status from tourism farm for visiting into the tourism farm for staying on.

Option	FARM 1	FARM 2	FARM 3	FARM 4
<b>TOURIST FARM EVALUATION</b>	<b>very good</b>	<b>average</b>	<b>bad</b>	<b>very good</b>
<b>LOCATION</b>	<b>suitable</b>	<b>suitable</b>	<b>unsuitable</b>	<b>suitable</b>
... <b>Position</b>	very suitable	very suitable	very suitable	<b>average</b>
... <b>Accessibility</b>	accessible	accessible	inaccessible	accessible
<b>TOURIST FARM TYPE</b>	<b>suitable</b>	<b>suitable</b>	<b>unsuitable</b>	<b>suitable</b>
... <b>Farm to stay on</b>	suitable	suitable	unsuitable	suitable
... <b>Tripp farm</b>	suitable	suitable	unsuitable	suitable
<b>SUPPLY</b>	<b>excellent</b>	<b>good</b>	<b>worse</b>	<b>worse</b>
... <b>Food</b>	excellent	<b>average</b>	excellent	excellent
... <b>Drinks</b>	<b>average</b>	<b>average</b>	excellent	<b>average</b>
... <b>Other supplementary activities</b>	interseting	interseting	uninteresting	interseting
... <b>Sport activities</b>	middle satisfying	very satisfying	unsatisfying	very satisfying
... <b>Quality of living space</b>	excellent	excellent	excellent	middle
... <b>Logo</b>	without	without	without	without
<b>ENVIRONMENT SETTLEMENT</b>	<b>settled</b>	<b>middle settled</b>	<b>middle settled</b>	<b>settled</b>
... <b>Flovers and greenness</b>	good	<b>average</b>	<b>average</b>	good
... <b>Preservation of cultural landscape</b>	present	present	not present	present
... <b>Tourist farm categorization</b>	4 apple	3 apple	3 apple	2 apple
<b>KINDNESS</b>	<b>satisfied</b>	<b>satisfied</b>	<b>satisfied</b>	<b>satisfied</b>
... <b>Reception on the farm</b>	perfect	good	good	perfect
... <b>Arrangements, shows</b>	present	unpresent	unpresent	present
... <b>Information accessibility to the guests</b>	accessible	accessible	accessible	accessible
<b>ATTITUDE: PERSONAL TO GUESTS</b>	<b>excellent</b>	<b>excellent</b>	<b>excellent</b>	<b>excellent</b>
... <b>Family settlement</b>	settled	settled	settled	settled
... <b>Cleanliness and hygiene on the farm</b>	perfect	<b>average</b>	perfect	perfect

**Figure 2. Results of DEX-i evaluation for tourist farm (presented values are for basic and aggregate attributes)**

The developed multi-criteria model can be used in order to identify possible weaknesses of the analyzed tourist farms. The model enables the “what-if” analysis, where a set of scenarios are possible.

## Conclusions

The presented DEX-i multi-criteria models enable evaluation and ranking of tourist farms. This decision model is comprehensible to a wide range of users in the evaluation process. The model is based on the use of decision rules defined by experts responsible for model development. The DEX-i multi criteria method enabled similar yet more precise ranking of tourist farms in comparison with i.e arbitrary costumers - guest evaluation.

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