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The Recreation Technique Model from the Perspective of Environmental Quality Elements

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***Abstract*—**The quality improvements of the environmental elements could increase the recreational opportunities in a certain area (destination). The technique of the need for recreation focuses on choosing certain destinations for recreational purposes. The basic exchange taken into consideration is the one between the satisfaction gained after staying in that area and the value expressed in money and time allocated. The number of tourists in the respective area, the duration of staying and the money spent including transportation provide information on how individuals rank the place or certain aspects of the area (such as the quality of the environmental elements).

For the statistical analysis of the environmental benefits offered by an area through the need of recreation technique, the following stages are suggested:

- characterization of the reference area based on the statistical variables considered;
- estimation of the environmental benefit through comparing the reference area with other similar areas (having the same environmental characteristics), from the perspective of the statistical variables considered.

The model compared in recreation technique faced with a series of difficulties which refers to the reference area and correct transformation of time in money.

***Keywords*—**Comparison in recreation technique, the quality of the environmental elements, statistical analysis model.

I. Introduction

THE statistical analysis of the attractiveness of an area from the perspective of the environmental benefits unfolds in three successive stages: observation, processing and interpretation of data (Fig. 1).

II. Identifying the Categories of Environmental Benefits

The collecting of the individual data referring to the environmental benefits is achieved through identifying the categories of benefits, by elaborating an inventory of the negative effects that can be mitigated. The statistical observation will have in view: the purpose, the admissible limits for emissions and evacuations, the physical effects of the contaminating factors, the potential modifications in the nature of effects. The collecting of the data is achieved in a unitary form of the units making up the phenomenon analyzed together with their common characteristics.

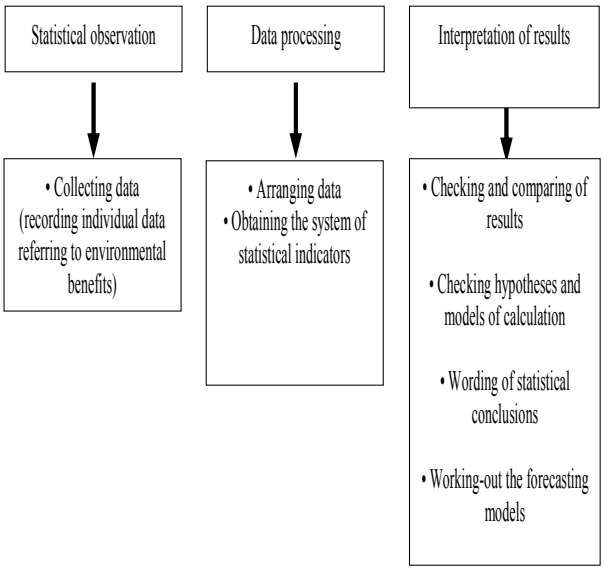

Fig. 1 Stages in the statistical analysis of the attractiveness of an area from the perspective of the environmental benefits

In order to facilitate the understanding of the proposed concepts, we shall during the study refer to aspects taken out from one of my own studies called *Environmental benefits obtained by terminating a tip and neutralizing its effects.* This study is complex for which reason we are only going to highlight the suggestive issues for this paper. The study targeted a community located in a mountain area. The existence of the tip in the very close neighborhood affects the quality of the lake water, drinkable water, air and soil having different effects on the community. The period for rolling out the statistical observation was July-November 2007. The populations covered by the study are:

- the community of the people grouped in 50 households located at a distance of seven kilometers away from the tip, at the most;
- the community of the tourists coming in and out of the respective area.

Data referring to the duration of the trip were collected. Tourists were grouped depending on the number of days spent in the area (Table I).

TABLE I
DISTRIBUTION OF TOURISTS DEPENDING ON THE DURATION OF THEIR TRIP

Duration of trip (days)	Number of tourists
1	100
2	180
3	190
4	185
5	120
6	96
7	90
8	21
9	20
10	19
11	17
12	12
13	10
14	7
15	2
16	2
17	1
18	1
Total	**1073**

III. CHARACTERIZATION OF THE REFERENCE AREA

The analysis of how tourists are distributed depending on the researched variables suggests information on the attractiveness of the area. If the data series contains a great number of individual values, then the polygon of differences (Fig. 2) approximates the distribution density graph well enough. In the case of the quantitative variables, the indicators of flatness and asymmetry could be determined.

In order to quantify the asymmetry and flatness of distribution the values of the central tendency (average, median, mode) are used, as well as the moments focusing on various sequences.

The empirical distribution cannot be (or can exceptionally be) distributions of a symmetrical type Gauss-Laplace whose graph of distribution density has the form of a symmetrical bell, the axis of symmetry being given by the average of the data series. In order to determine the type of asymmetry without highlighting its intensity, the central moment of order 3 is worked out[1]. The negative values suggest an asymmetry on the right side and the positive ones an asymmetrical distribution to the left. In order to measure the intensity of asymmetry the following coefficients are used: Pearson, Fisher, Yulle and Kendall.

The Pearson coefficient for asymmetry applies in the case of the slightly asymmetrical distributions. It is determined through relating the difference between average and mode to the average square deviation. The indicator provides information on both the direction of asymmetry and its intensity.

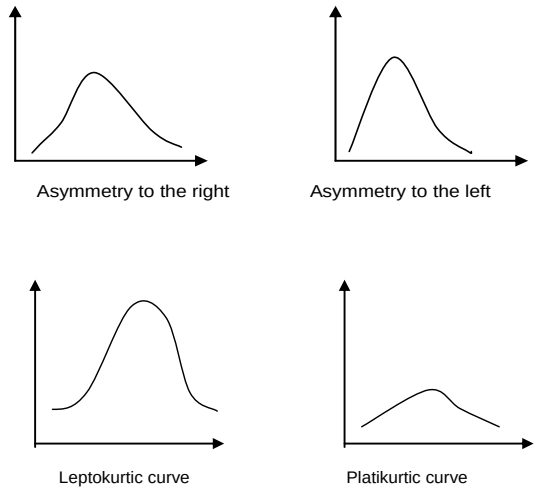

Fig. 2 Types of asymmetry and flatness

Thus, the higher the absolute value of the indicator, the more prominent the distribution asymmetry is. The coefficient suggested by Pearson may also be applied to the comparative analysis of the asymmetry of the distribution of two or more variables. The Yulle and Kendall asymmetry coefficient is an indicator defined on the basis of the quartiles through relating the difference between quartile 3 and the median to that between median and quartile 1. the closer to zero the value of the indicator, the less asymmetrical the distribution is. The Fisher asymmetry coefficient is based on the central moments of 2 and 3 order.

The distribution is flat if, for bigger variations of the characteristic, there are less prominent variations of the relative frequencies. The flatness coefficients (Pearson, Fisher) indicate the extent to which the values of the characteristic are centered around the mode. The Pearson flatness coefficient is determined through relating the moment focused by order 4 to the one by order 2. The analysis of the distribution pursues a normal distribution when the value of coefficient is 3. For smaller values, the curve of the frequencies is leptokurtic, the curve thus presenting prominent flatness. The Fisher flatness coefficient is similar to the one set forth by Pearson, the comparison being related to 0.

Reference is made to *objective 2* of the study *Environmental benefits obtained from shutting down the tip and neutralizing its effects.* The characteristics pursued refer to the tourists' duration of stay and daily expenses. The reference area is symbolized by A. The data referring to the tourists' duration of stay in the reference area are presented in Table II.

1 For the asymmetrical distributions the uneven central moments are null

TABLE II
RELATIVE MEASURES OF STRUCTURE AS REGARDS THE DURATION OF STAY

Duration of stay (days)	Number of tourists	Relative frequencies	Relative frequencies cumulated increasingly
1	100	9,3	9,3
2	180	16,8	26,1
3	190	17,7	43,8
4	185	17,2	61,0
5	120	11,2	72,2
6	96	8,9	81,2
7	90	8,4	89,6
8	21	2,0	91,5
9	20	1,9	93,4
10	19	1,8	95,2
11	17	1,6	96,7
12	12	1,1	97,9
13	10	0,9	98,8
14	7	0,7	99,4
15	2	0,2	99,6
16	2	0,2	99,8
17	1	0,1	99,9
18	1	0,1	100,0
Total	1073	100,0	

An analysis of the tourists' distribution asymmetry and flatness was made depending on their duration of stay in the area. Thus, the asymmetry coefficient has the value of 1.4 and the flatness one 2.4. The descriptive statistics are presented in Table III.

TABLE III
DESCRIPTIVE STATISTICS AS REGARDS THE DURATION OF STAY

Indicators of distribution series	Valoare
Arithmetical average	4,44
Median	4
Module	3
Square average deviation	2,8
Coefficient of asymmetry	1,4
Coefficient of flatness	2,4

The conclusion is reached that *the majority of tourists would rather stay in the area analyzed for short time periods, as there is no uniform distribution of them depending on the variable analyzed. Their option for short time periods of stay, of 3 days, may be explained by the influence the tip has on the quality of the environmental elements in the area. Shutting down the tip and neutralizing its effects would lead to an increase in the duration of stay for the majority of tourists choosing the area for recreational purposes; which would trigger an increase in the average expenses per duration of stay.*

IV. COMPARING THE REFERENCE AREA TO SIMILAR AREAS

For the analysis of the environmental benefit generated by the tip's disappearance and neutralization of its effects a comparison between the reference area and other similar recreational areas will be drawn. The stages of the analysis are:

- a multi-criteria hierarchy of the similar recreational areas will be built;
- a quantification of the environmental benefits will be worked out by comparing the reference area to the most visited area by tourists.

The multi-criteria hierarchy of the similar recreational areas presupposes the following steps:

- selecting the indicators to be applied in the elaboration of the multi-criteria hierarchy;
- selecting the form to express the comparison result and elaborating temporary hierarchies based on each indicator selected, eventually;
- determining the method of aggregation in a single indicator of the simple, one-criterion comparisons.

Comparing the reference area to the other similar areas is made by the modal duration of stay, number of tourists in a year, daily average expenses by the tourist.

A rank to each area is successively assigned depending on each indicator covered by the analysis: area with a maximum qualitative performance gets rank 1, the following units being numbered with ever higher ranks, the highest one being assigned to the area recording the minimum qualitative level for each variable.

A score is obtained by adding up the ranks corresponding to each area. The area getting the lowest score is the most performing from all the points of view included in the multi-criteria analysis (Table IV).

TABLE IV
MULTI CRITERIA HIERARCHY OF SIMILAR AREAS

Area	Modal duration of stay		Number of tourists in a year		Dily average expenses		Score	Rank
	days	rank	personns	rangk	lei	rangk		
A	**3**	**8**	**1073**	**9**	**175**	**8**	**25**	**9**
B	12	2	1011	10	184	7	19	5
C	10	4	1245	8	171	9	21	7
D	2	9	1498	4	165	10	23	8
E	1	10	1310	7	207	3	20	6
F	4	7	1387	6	191	6	19	5
G	**12**	**3**	**1732**	**1**	**210**	**2**	**6**	**1**
H	5	6	1547	3	215	1	10	3
I	14	1	1609	2	201	4	7	2
J	8	5	1432	5	196	5	15	4

The assigning of ranks has the advantage of a fast and easy application supplying generally the correct information on the area hierarchy. Besides, the results could be included in the

analyses based on the non-parametrical methods of measuring the intensity of the relationship between variables.

Insufficiencies are related to the double leveling of the variable size of the differences between units by replacing them with an arithmetical progression having the ratio 1 unit. The first leveling comes with the assigning of ranks to each of the characteristics included in the analysis, and the second one comes with the replacing of the score by the row of final ranks. In this way a good part of the information quality is lost.

Another insufficiency is that two or more areas frequently happen to score the same (areas B and F). Their split cannot be done unless the analyst jumps in to introduce an additional criterion.

Tourists favor area G the most. For the environmental benefit to be estimated a comparison between the reference area (A) and area G is drawn up (Table V)

TABLE V
GAPS BETWEEN THE REFERENCE AREA AND THE MOST ATTRACTIVE ONE

Indicator	Area A	Area G	Gap
Modal duration of stay (days)	3	12	9
Number of tourists	1073	1732	659
Daily average expenses (lei)	175	210	35

The estimation of the environmental benefit generated by the tip's disappearance and neutralization of its effects, through the indicators' point of view, aims at the following perspectives:

- in area A the same number of tourists would come and would spend equal daily average amounts, but the majority would rather extend their stay for another nine days;
- in area A the same number of tourists would come and spend a daily average with 35 lei more, but the majority would rather have a 3 days' stay;
- in area A the same number of tourists would come and spend a daily average amount with 35 lei more and the majority would rather extend their stay for another 9 days;
- in area A, 659 more tourists would come and spend a daily average in equal amounts and the majority would rather stay for 3 days;
- in area A, 659 more tourists would come and spend a daily average in equal amounts and the majority would rather extend their stay for another 9 days;
- in area A, 659 more tourists would come and spend a daily average amount with 35 lei more and the majority would rather extend their stay for another 9 days.

The need of recreation technique – based statistical analysis faces a series of difficulties:

- choice of area;
- correct conversion of time into money
- multiple-destinations trips for several purposes.

V. CHOICE OF AREA

Moreover than not a compromise is reached in choosing the recreation area, drawing up a balance between necessities availability, costs and time.

VI. CORRECT CONVERSATION OF TIME INTO MONEY

Duration of stay is not determined only be the quality of the environmental elements in the reference area but also by a series of other factors varying in dependence with the tourists' income and working hours.

VII. MULTIPLE DESTINATION TRIPS FOR SEVERAL PURPOSES

The technique of the need for recreation presupposes that it represents the only purpose of a trip. The multiple-destinations trips or those having several aims trouble the attempts of analyzing the environmental benefits.

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