

# STATISTICAL TESTS APPLIED IN TOURISM

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**Abstract:** *Being given the conditions of an ever increasing competition between the offerers of touristic products at internal and international level, an important factor is represented by the formation of stable customers who should also ensure the promotion of the touristic product among the possible clients on different markets. This supposes the achievement of some high quality touristic services which should generate favourable and long-lasting impressions. The paper is meant to build an analysis model of the data resulted from sounding research based by applying statistical tests.*

**Key words:** *statistical test, data analysis, tourists' opinion.*

## 1. Introduction

Taking into account the present increase in the competition between the suppliers of touristic products at national and international level, it is very important to have stable customers who should ensure the promotion of the local touristic product among the possible tourists on different markets.

The main requirement in order to achieve this goal is represented by the ensurance of qualitatively superior conditions to accomplish the touristic services offered, the creation of elements meant to generate favourable and lasting impressions among the visitors.

Linked to the afore-mentioned facts, in order to know the tourists' motivation, their degree of satisfaction, their constructive proposals and suggestions, it is necessary to have a permanent contact with the visitors, a real and sincere dialogue, which can be achieved by launching a discussion forum.

In order to model the touristic offer according to the tourists' needs and motivation, a set of operations should be done, which should ensure the scientific prospect of the market by:

- a) establishing and applying those methods and techniques of market prospect which, by its nature, should provide estimations and predictions concerning the possible tourist customers;
- b) formulating variants of solutions which should be available for the decision-making persons in the tourism field and which should allow them to make the right decision regarding the activities of the tourism organizers and the service providers.

The most frequent method and which should offer relevant information regarding the peculiarities of the touristic demand at a certain date is the poll-based investigation.

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To study the touristic demand in Poiana Brasov, an experimental sample was needed of about 110 Romanian and foreign tourists.

*The tourists' repartition according to the residence country at the sample level*

Table 1

Residence country	Number of tourists	%
Romania	68	61,80
Greece	4	3,63
Israel	17	15,45
Turkey	9	8,18
Germany	10	9,00
Belgium	2	1,94
Total	110	100,00

The research is meant to describe the characteristics of the touristic demand in the Brasov area and to determine the size of the differences from the point of view of the needs, attitudes and opinions between the Romanian and the foreign tourists.

Taking into account the peculiarities of these demands, the appropriate type of research is the descriptive one.

## 2. Testing Statistical Hypotheses

1)  $H_0$ : The main reasons for choosing the Brasov area were independent of the tourists' residence country;

$$\chi^2_{calc} = \sum_{ij} \frac{(n_{ij} - nt_{ij})^2}{nt_{ij}} \quad (1)$$

where:  $n_{ij}$  - the frequency observed in the cell  $ij$ ;

$nt_{ij}$  - the frequency expected in the cell  $ij$ .

The significance level chosen is  $\alpha = 0,05$ , The number of the freedom degrees  $df = 40$ ,  $\chi^2_{calculated} = 109,1$   $\chi^2_{0,05;40} = 55,76$ ,

$\chi^2_{calculated} > \chi^2_{0,05;40} \Rightarrow$  we accept the  $H_1$  hypothesis, according to which there are significant differences from the statistical point of view between the Romanian and the foreign tourists regarding the reasons for choosing the Brasov area to spend their holidays.

2)  $H_0$ : The frequency of visiting Brasov is independent of the tourists' age;

$H_1$ : The main reasons for choosing the Brasov area were dependent on the tourists' residence country;

The  $\chi^2$  test was used which supposes the testing of the statistical significance for the distribution of the frequencies, starting from the hypothesis of the independence of the variables. The null hypothesis implies the comparison of the observed frequencies with those expected.

$H_1$ : The frequency of visiting Brasov is dependent on the tourists' age;

$\chi^2_{calculated} = 6,1$ . The significance level chosen is  $\alpha = 0,05$ . The number of freedom degrees:  $df = 15$ ,  $\chi^2_{0,05;15} = 25$ ,  $\chi^2_{calculated} < \chi^2_{0,05;15} \Rightarrow$  we accept the null  $H_0$  hypothesis which shows that the frequency of visiting Brasov by foreign tourist is independent of their age.

3)  $H_0$ :  $\pi_1 = \pi_2$ : there are no differences between the Romanian and the foreign tourists regarding reservation making;

$H_1: \pi_1 \neq \pi_2$ : there are differences between the Romanian and the foreign tourists regarding reservation making;

In order to check the  $H_0$  hypothesis, the **Z** test was used to check the equality of two averages:

$$z = \frac{p_1 - p_2}{\sqrt{\frac{p_1 \cdot (1 - p_1)}{n_1} + \frac{p_2 \cdot (1 - p_2)}{n_2}}} \quad (2)$$

The proportion of the Romanian tourists who make reservation is:  $p_1 = 39,7\%$ .

The proportion of foreign tourists who make reservation is:  $p_2 = 85,7\%$ .

$$n_1 = 68; \quad n_2 = 42; \quad z_{\text{calculated}} = 15,63$$

For the significance level  $\alpha = 0,05$   $z_{\text{calculated}} > 1,96 \Rightarrow$  we reject the null  $H_0$  hypothesis and we accept the alternative  $H_1$  hypothesis according to which there is a significant difference between the Romanian and the foreign tourists regarding reservation making.

**4)**  $H_0$ : there are no differences between the percentages belonging to the two categories of tourists regarding the accommodation in a certain hotel;

$H_1$ : there are differences between the percentages belonging to the two categories of tourists regarding the accommodation in a certain hotel;

The proportion of the Romanian tourists who prefer the accommodation in a certain hotel is  $p_1 = 58,8\%$ .

The proportion of foreign tourists who prefer the accommodation in a certain hotel is:  $p_2 = 90,4\%$ .

$$n_1 = 68; \quad n_2 = 42; \quad z_{\text{calculated}} = -4,211$$

For the significance level  $\alpha = 0,05$ ,  $z_{\text{theoretical}} = \pm 1,96$ .

$$D_{\text{calc}} = 1,36 \sqrt{\frac{n_1 + n_2}{n_1 n_2}} \quad (3)$$

For a chosen significance level  $\alpha = 0,05$   $D_{\text{calculated}} = 0,29$ .

$H_0: p_1 = p_2$  with the alternative

$H_1: p_1 \neq p_2$

The z test has the following expression:

Because  $z_{\text{calculated}} < z_{\text{theoretical}}$ , we reject the null hypothesis and we accept the alternative one which shows that there is a significant difference between the Romanian and the foreign tourists regarding the accommodation in a certain hotel.

**5)** In order to see if statistically there are significant differences between the Romanian and the foreign tourists' views on the services in the food stores, we used the **Kolmogorov-Smirnov test**.

For the two samples of tourists, we calculated the cumulated relative frequencies ( $F_1(k)$  și  $F_2(k)$ , where  $k$  represents a given modality).

The following hypotheses are valid for both categories of analysed services.

$H_0$ : the maximum difference between the cumulated relative frequencies for the Romanian tourists ( $F_1$ ) and the foreign tourists ( $F_2$ ) is zero;

$H_1$ : the maximum difference between the cumulated relative frequencies for the Romanian tourists ( $F_1$ ) and the foreign tourists ( $F_2$ ) is different from zero;

For a chosen significance level  $\alpha = 0,05$ , the theoretical value of  $D$  in the case of two independent samples ( $n_1=39$ ,  $n_2=50$ ) is calculated using the following relation:

From the computations, there resulted a maximum difference between the cumulated relative frequencies of the two groups of tourists equal to 0,058.  $D_{abs}=0,058$ .

$D_{abs} < D_{calculated}$  ( 0,058 < 0,29 ) => we are obliged to accept  $H_0$  : there are no significant differences between the opinions of the two groups of tourists.

6)  $H_0 : \pi_1=\pi_2$ : there are no differences between the percentage of Romanian tourists and the percentage of foreign tourists regarding winter-sports practising in Brasov;

$H_1 : \pi_1\neq\pi_2$ : there are differences between the percentage of Romanian tourists and the percentage of foreign tourists regarding winter-sports practising in Brasov.

The proportion of Romanian tourists practising winter sports is:  $p_1= 35,29\%$ , the proportion of foreign tourists practising winter sports is:  $p_2 = 59,5\%$ .

$n_1 = 68$ ;  $n_2 = 42$   $z_{calculated} = 2,5$ .  
 $z_{calculated} > 1,96$  for the significance level  $\alpha = 0,05$  => there are differences between the percentage of Romanian tourists and the percentage of foreign tourists regarding winter-sports practising in Brasov.

7)  $H_0$ : there are no differences between the percentage of the Romanian tourists and that of the foreign tourists regarding their willingness to allot additional sums of money for spending their holidays in qualitatively superior conditions;

$H_1$ : there are differences between the percentage of the Romanian tourists and that of the foreign tourists regarding their willingness to allot additional sums of money for spending their holidays in qualitatively superior conditions.

The proportion of Romanian tourists willing to allot additional sums for

spending their holidays in qualitatively superior conditions is:  $p_1= 47,7\%$ .

The proportion of foreign tourists willing to allot additional sums for spending their holidays in qualitatively superior conditions is:  $p_2= 42,6\%$ .

$n_1 = 68$ ;  $n_2 = 42$   $z_{calculated} = 9,24$ ,  
 $z_{calculated} > 1,96$  for the significance level  $\alpha = 0,05$  => there are differences between the percentages belonging to the Romanian tourists and those belonging to the foreign tourists regarding their willingness to allot additional sums for spending their holidays in qualitatively superior conditions.

### 3. Conclusions

From the analysis of the results obtained from the poll among the tourists in the Brasov area, the following conclusions can be drawn:

- the tourists generally choose Brasov as a touristic destination because of the possibility to practise winter-sports, for pleasure, but also for rest; this decision is influenced especially by the tourists' previous experiences in this area, as well as by the friends' accounts and the publicity made by the tourist agencies;
- comparing the tourists' motivational profiles, one can notice the great importance given to fun, to adventure (except for the Israeli tourists who, being most of them elderly people, prefer to have relaxing holidays, without too many unexpected things);
- irrespective of the resource country, the tourists, whether Romanian or foreign, prefer to go on group trips;
- while foreign tourists prefer mostly organized tourism, making their reservations in Brasov in due time and using especially tourist agencies,

Romanian tourists mostly prefer to go on their own and to stay for about 4 days (the average), as a follow up of the decrease in the general standard of living;

- foreign tourists use the plane as a means of transport for the trip;

According to the remarks mentioned and to the tourists' suggestions, the following proposals should be underlined:

- to advertise in the country (by watching touristic films, by guides, maps, direct information conceived by guides) and abroad especially through tourist agencies, partner firms, TV and Internet;
- to conceive some complete touristic products which should address tourists differently, depending on the motivational elements characterizing them;
- taking into account the great fluctuation of foreign tourists in this area (with different tastes and preferences), it is imperative to have a highly qualified personnel both in hotels and restaurants, especially in the kitchen, in order to satisfy even the most pretensions tastes (special menus for the tourists from Israel, Germany, Turkey, without neglecting the vegetarians);
- for the positions involving direct contact with tourists - food sector, accommodation, trips, services etc., knowledge of at least one international language should be stipulated;
- to post the weather broadcast in hotels;
- to take care of the tracks correspondingly and to respect the ski-course programme (4 hours/day) with the active participation of the supervisors;
- to diversify ski- offers;

- to improve the aesthetic aspect of the means of transport on wire and to avoid the minimum speed in the crowded days, in order to shorten the waiting time as much as possible;
- to organize special shows for foreign tourists (jazz concerts, symphony concerts etc.), apart from the folklore ones;
- to organize trips by the autocar in the surroundings, especially during the days when the tracks are crowded and when the transport on wire is in revision;
- to put greater emphasis on the trips in the country;
- to make the programme of the evenings more diverse;
- more touristic information, panels, indicators for and path leaflets, touristic maps, guides etc. are needed. In addition, it is imperative to have maps lighted during the night in visible places.

The poll has an experimental one, one which could represent a starting point in the study of the tourists' opinion in the Brasov area in the future. The tourists' opinion should also be analyzed during summer, so that the research should gradually get a permanent character.

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