FACTORIAL CORRESPONDENCES IN THE TOURISM SERVICES PROVIDED TO THE POPULATION IN ROMANIA

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Abstract
In the recent years, the tourism industry has shaped an increasingly important role in our country's economy, undergoing a significant modernization and diversification process of the tourist services provided to the population.
This paper aims at revealing and analyzing the service types or the tourism accommodation structures prevailing on the tourism market, in terms of data statistical analysis. Assuming that the primary purpose of any business is to maximize profits, we analyzed, across time, the tourism service providers' orientation towards those activity types that they considered opportune in order to attract a large number of clients. Our data analysis enabled us to establish a hierarchy of preferences in terms of tourism offers and to observe several similarities between tourism activity types.
The conclusions of our study showed that, in our country, the predominant services from the tourism sector are represented by the restaurant segment, in contrast with the other elements of the tourist accommodation structure, which may indicate the need for a coherent strategy applied in tourism nationwide, possibly in modernizing the infrastructure and the other services on the tourism market.

Keywords
Factor analysis of correspondences, tourism services, tourism accommodation structures

JEL Classification
I20, L83, C10, C38

Introduction

The tourism potential of a country undergoes different influences, both in terms of demographic resources, history or stage of civilization, and also in terms of policies, coherence of the strategies applied on the market or the general economic framework.
The reciprocal relationship between tourism and economic development is strongly proven across Europe, which has enshrined its global leadership position in terms of tourist traffic and which has become, in this way, a model of regional economic integration.
According to the statistics at European level, Romania still plays a modest role in the hierarchy of tourist destinations, although its demographic, natural and anthropogenic

potential could create the prerequisites for a significant tourism potential.
According to the statistical data provided at the level of our country and derived from the analysis of the tourism offer, based on the study of the websites in the field, this study has identified as relevant for the analytical processing the following manifestation forms of tourism services and accommodation structures nationwide: Hotels and other similar accommodation facilities (hostels, motels); Accommodation facilities for holiday and short-term periods; Caravan parks, campgrounds and camps; Other accommodation services (apartments, family business); Restaurants; Catering for events and other services; Bars and beverage serving activities; Activities of travel agencies and tour operators; Activities of travel agencies and tour operators.
The literature has not indicated so far a universally valid model of a successful tourism strategy. The tourism industry of each country progresses according to its natural resources, applied strategies, culture and traditions, which undergo many local influences. (Woods, 1996)

1. Methodology
The "factor analysis of correspondences" (FAC) is a descriptive method of data multivariate analysis, to be applied in particular for data presented in the form of contingency tables.
Data on two variables respectively "year" and "tourism services provided to population, per activities" are projected by points concentrated in a factorial axes system. So, the line point cloud and the column point cloud, respectively, will be projected on unrelated orthogonal axes (Spircu, 2005). To find these axes, we calculated the eigenvalues of the inertia matrix and the coordinates of the eigenvectors associated to each eigenvalue (Pintilescu, 2007).
To assign a sense of distance between the line-points and the column-points, the relative frequencies are used, thereby to give "profiles" of the lines and respectively of the columns, through the usual transformations of descriptive statistics (Kachigan,1982).

2. Data and results
In order to perform the factor analysis of correspondences method, in terms of the indicator "Tourism services provided to population by activities", by service category and years, we included two nonnumeric variables in our analysis, i.e. "service category" and "years". Subsequent to data processing by the "factor analysis of correspondences", we obtained the statistical indicators calculated for the line-points and the column-points and the graphical representation of these points in the system of factorial axes.
Graph no1shows the distribution of the value of the tourism services provided to population by activity type, the statistical series data being processed, provided by the National Institute of Statistics of Romania (NIS), for 2008-2015 timeframe.
In order to obtain a conclusive result, I used the data on the average euro exchange rate set by the National Bank of Romania (NBR).
The data processing, the examination of the indicators' significance and the graphical representations were performed by means of the SPSS statistical software (Field, 2009).
The analysis of the global sector for tourist services highlights the lack of training of the organizational framework and the lack of an adequate strategy for absorbing and developing in an increased pace the tourist flows.

Table no 1: Table line profile (output-up Row Profiles)
Row Profiles

Year	Tourism services provided to population, per activities									
	Hotels and other similar accommodation facilities	Accommodation facilities for holiday and short-term periods	Caravan parks, campgrounds and camps	Other accommodation services	Restaurants	Catering for events and other services	Bars and beverage serving activities	Activities of travel agencies and tour operators	Other reservation services and tourism assistance	Active Margin
2008	.213	.027	.003	.015	.323	.062	.142	.212	.003	1.000
2009	.202	.014	.002	.034	.364	.048	.141	.189	.005	1.000
2010	.205	.012	.004	.039	.353	.058	.130	.196	.004	1.000
2011	.215	.015	.003	.040	.350	.053	.116	.208	.000	1.000
2012	.178	.014	.001	.058	.350	.046	.123	.218	.013	1.000
2013	.183	.012	.001	.019	.406	.046	.117	.208	.007	1.000
2014	.173	.013	.001	.020	.426	.042	.114	.203	.008	1.000
2015	.188	.014	.001	.018	.420	.046	.106	.200	.007	1.000
Mass	.194	.015	.002	.029	.377	.050	.123	.205	.006	

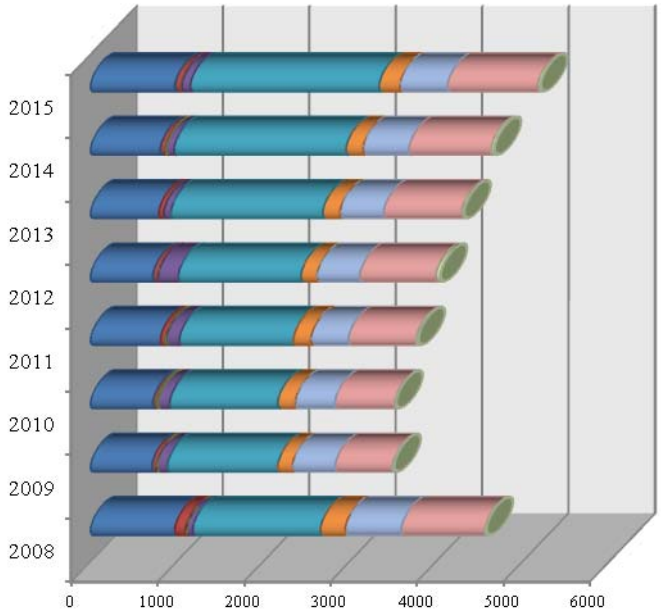
Source: SPSS processing, based on data from the National Institute of Statistics

Table no 2: Table Column Profiles (output-up Column Profiles)
Column Profiles

Year	Tourism services provided to population, per activities									
	Hotels and other similar accommodation facilities	Accommodation facilities for holiday and short-term periods	Caravan parks, campgrounds and camps	Other accommodation services	Restaurants	Catering for events and other services	Bars and beverage serving activities	Activities of travel agencies and tour operators	Other reservation services and tourism assistance	Mass
2008	.150	.243	.179	.069	.117	.169	.158	.141	.068	.136
2009	.109	.098	.118	.123	.101	.101	.120	.096	.090	.104
2010	.111	.084	.188	.140	.099	.122	.111	.101	.066	.105
2011	.124	.107	.183	.154	.104	.118	.106	.114	.000	.112
2012	.111	.110	.082	.238	.112	.110	.120	.128	.262	.120
2013	.121	.100	.093	.083	.139	.119	.122	.131	.153	.128
2014	.124	.117	.063	.096	.157	.117	.129	.138	.188	.139
2015	.150	.141	.093	.097	.172	.144	.133	.151	.173	.155
Active Margin	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	

Source: SPSS processing, based on data from the National Institute of Statistics

Figure no. 1: The correlation table for the value of the tourism services provided to population per years, by activity type (million Euros**)**



	2008	2009	2010	2011	2012	2013	2014	2015
Hotels and other similar accommodation facilities	976,81	710,33	723,72	810,5	721,7	791,79	809,23	978,65
Accommodation facilities for holiday and short-term periods	125,7	50,62	43,21	55,59	56,64	51,64	60,64	73,14
Caravan parks, campgrounds and camps	11,97	7,93	12,57	12,27	5,52	6,25	4,21	6,23
Other accommodation services	68,24	121,07	138,29	151,42	233,98	81,81	94,16	95,61
Restaurants	1478,26	1276,99	1248,39	1320,37	1417,08	1756,03	1988,32	2185,67
Catering for events and other services	283,87	169,16	203,69	198,09	184,25	199,14	196,44	241,78
Bars and beverage serving activities	650,34	495,2	459,3	437,24	496,39	505,14	531,81	550,53
Activities of travel agencies and tour operators	970,97	663,23	693,18	782,93	880,48	899,75	950,64	1042,59
Other reservation services and tourism assistance	13,5	17,82	13,09	24,16	51,99	30,35	37,3	34,35

Source: Processing based on data from the National Institute of Statistics

After 2008, the total value of services has decreased by 23% in 2009, followed by a return only in 2014 the amount reached like in 2008.

The increase by 11 percent the year 2015 than in 2014 proves that this sector increasingly needs a new tourism policy model that influences their competitive position in the current competitive conditions.

In order to apply the factor analysis of correspondences, it is necessary to test the hypothesis of the independence between the variables studied, i.e. service category and

years. This hypothesis is tested based on the calculated statistics χ^2 and it requires formulation of the following statistical hypotheses:

- the null hypothesis, H_0: the hypothesis of the variables' independence (there is no connection between activity types and years);
- the alternative hypothesis, H_1: the hypothesis of the variables' dependence (there are connections between activity types and years) (Dimitrios, Stephen, 2016).

The very high calculated value of the test statistics presented in Table no 3, Column Chi Square, and χ^2 and sig = 0.000<0.05 indicates that the hypothesis H_0 is rejected. Thus, with a probability of 95%, we can ensure that, in terms of the tourism services provided to the population, there is a connection between the variables considered, namely between the activity type and year.

The connections between these variables will be described by the results achieved by the factor analysis of correspondences for the line-profiles and the column-profiles, respectively.

Table no 3: The calculated value of χ^2 statistics, the eigenvalues and the inertia explained by each factorial axis (Summary output)

Summary

Dimension	Singular Value	Inertia	Chi Square	Sig.	Proportion of Inertia		Confidence Singular Value	
					Accounted for	Cumulative	Standard Deviation	Correlation 2
1	.092	.008			.466	.466	.005	.112
2	.084	.007			.388	.853	.006	
3	.042	.002			.099	.952		
4	.024	.001			.033	.985		
5	.012	.000			.008	.993		
6	.010	.000			.005	.999		
7	.005	.000			.001	1.000		
Total		.018	606.131	.000[a]	1.000	1.000		
a. 56 degrees of freedom								

Source: SPSS processing, based on data from the National Institute of Statistics

In the factorial analysis, the main objective is to find the axis that highlights the greatest differences between statistical units, by the variables recorded. The first factorial axis is the one with the maximum value obtained for the inertia (spreading) of the point cloud explained by this axis. Basically, on this axis, there are grouped the units with the highest spreading. Each factorial axis is ranked in the descending order of the dispersions of the individuals' projections on these axes.

The eigenvalues represent the variance explained by each factorial axis, and the eigenvectors associated to these values define the factorial axes.

The greatest eigenvalue (column inertia) shows the variance of the first factorial axis, and the sum of the eigenvalues measure total inertia of the point cloud.

The inertia (variance) explained by each factorial axis is shown in the column *Proportion of Inertia*. The first factorial axis explains 46.6% of the total variance and the second factorial

axis explains 38.8%. We chose the number of the factorial axes in the FAC in accordance with Benzécri's criterion, i.e. we chose those factorial axes that explain at least 70% of the total variance. (Benzecri, 1992)
In this situation, we needed two factorial axes (85.3%).

Table no 4: The FAC results in terms of the variable "years"
Overview Row Points[a]

Year	Mass	Score in Dimension		Inertia	Contribution				
					Of Point to Inertia of Dimension		Of Dimension to Inertia of Point		
		1	2		1	2	1	2	Total
2008	.136	-.133	.592	.005	.026	.570	.048	.857	.904
2009	.104	-.159	.021	.001	.029	.001	.389	.006	.395
2010	.105	-.274	.017	.001	.086	.000	.681	.002	.683
2011	.112	-.290	.073	.002	.103	.007	.498	.029	.526
2012	.120	-.401	-.515	.005	.211	.382	.363	.546	.909
2013	.128	.290	-.038	.001	.118	.002	.927	.015	.942
2014	.139	.375	-.145	.002	.214	.035	.863	.117	.979
2015	.155	.355	-.036	.002	.213	.002	.933	.009	.942
Active Total	1.000			.018	1.000	1.000			

a. Symmetrical normalization

Source: SPSS processing, based on data from the National Institute of Statistics

By analyzing the values of the contributions of points on factorial axes, as shown in Table no 4 (column Contribution of Point to Inertia of Dimension), we highlighted the years among which there are differences in terms of service value per years, namely between 2012 and 2015, between 2008 and 2014, and between 2008 and 2015. These points will be located in different quadrants (see Figure no 1). Similarities in terms of service value per years are registered between the following years: 2014 and 2015, 2008.
The contribution of a point to the inertia explained for a factorial axis (Column *Contribution of Point to Inertia of Dimension*) shows the contribution of the category (year) to the dispersion of the factorial axis. The points with high contributions on a factorial axis (those with a contribution greater than 1/m=1/8=0,125) are those points that contribute to the formation of the respective axis (column *Contribution of Point to Inertia of Dimension,* Table no 4). These are called points that explain the formation of the respective axis, being the ones that exercise the greatest influence in shaping the profile (structure) of the activity type per years. (Everitt, Dunn, 2001)
By analyzing the values of the point coordinates on the factorial axes, we highlighted the activity types among which there are the greatest differences or similarities.
Table no 5 reveals that the greatest differences are the registered between the following activity types: "Other accommodation services" and "Restaurants"; "Accommodation facilities for holidays and short-term periods" and "Restaurants"; "Other reservation

services and tourism assistance" and "Accommodation facilities for holidays and short-term periods". Moreover, "Other reservation services and tourism assistance" distances itself clearly from all the other analyzed categories, being located at the chart's extremity (see Figure no 1).
Also, by analyzing the results obtained and presented in Table no5, we can appreciate that "Accommodation facilities for holidays and short-term periods" and "Other accommodation services" contribute to the second factorial axis (the second group in terms of scattering), by 13.9% and 37%, respectively (column Contribution of Point to Inertia of Dimension 2). By analyzing the coordinates of these points (columns Score in Dimension 1 and 2), we revealed that there are differences per years in terms of activity types between these categories.

Table no 5: The FAC results in terms of the variable "activity type"
Overview Column Points[a]

Tourism services provided to population, per activities	Mass	Score in Dimension		Inertia	Contribution				
		1	2		Of Point to Inertia of Dimension		Of Dimension to Inertia of Point		
					1	2	1	2	Total
Hotels and other similar accommodation facilities	.194	-.143	.200	.001	.043	.093	.307	.546	.854
Accommodation facilities for holiday and short-term periods	.015	-.249	.870	.002	.010	.139	.056	.627	.684
Caravan parks, campgrounds and camps	.002	-1.055	.792	.000	.024	.015	.478	.246	.724
Other accommodation services	.029	-1.232	-1.028	.007	.485	.370	.607	.386	.992
Restaurants	.377	.291	-.138	.004	.347	.086	.804	.165	.969
Catering for events and other services	.050	-.226	.354	.001	.028	.075	.277	.620	.897
Bars and beverage serving activities	.123	-.201	.181	.001	.054	.048	.355	.265	.620
Activities of travel agencies and tour operators	.205	-.028	-.011	.000	.002	.000	.044	.007	.051
Other reservation services and tourism assistance	.006	.325	-1.569	.002	.007	.174	.027	.582	.609
Total assets	1.000			.018	1.000	1.000			

a. Symmetrical normalization

Source: SPSS processing, based on data from the National Institute of Statistics

Conclusion

The FAC method allows us to state (with a probability of 95%) that, in terms of the value of the tourism services provided to population, there are connections between the variables considered, namely between activity types and years.

The diagram below summarizes synthetically, in a very suggestive manner, the previous conclusions that allowed us:

- to determine the importance paid to each activity type, every year, separately;
- to hierarchize the types of the tourism activities provided to population, every year, identifying a number of similarities and differences between different categories;
- to note the similarities or differences between activity types, at the level of each year.

The conclusions of our study showed that, in our country, the predominant services from the tourism sector are represented by the restaurant segment, in contrast with the other elements of the tourist accommodation structure, which may indicate the need for a coherent strategy applied in tourism nationwide, possibly in modernizing the infrastructure and the other services on the tourism market.

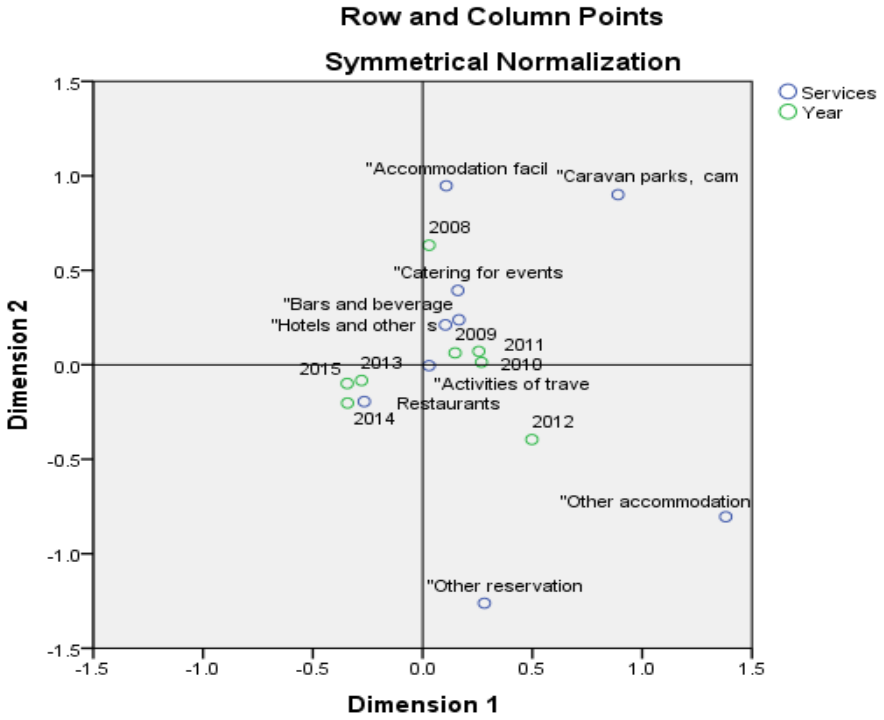


Figure no. 2: The graphical representation of the variables' position in the system of factorial axes using option Column Principal Normalization

References

Benzecri, J.P., 1992. *Correspondence Analysis Handbook.* New-York: Marcel Dekker.

Dimitrios, A.,Stephen, G.H., 2016. *Applied Econometrics 3rd Edition.* New York: Palgrave Macmillan.

Everitt, B., Dunn, G., 2001. *Applied Multivariate Data Analysis.* London: Arnold.

Field, A., 2009. *Discovering Statistics Using SPSS.* London: Sage Publications Ltd.

Institutul Naţional de Statistică. [online] Available at: <http://statistici.insse.ro/> [Accessed February 1st, 2017].

Kachigan, S., 1982.*Multivariate statistical analysis.* New York: Radius Press.

Pintilescu, C., 2007. *Analiză statistică multivariată* (*Multivariate analysis)*. Iaşi: Editura Universităţii Alexandru Ioan Cuza.

Spircu, L., 2005. *Analiza datelor-Aplicaţii economice (Economic Data Analysis Applications)*. Bucureşti: ASE.

Woods, R. H., 1996. *Quality, leadership and management in the hospitality industry*. East Lansing, Michigan: Educational Institute of the American Hotel and Motel Association.